# A Festschrift for Kjell Johan Sæbø

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- in partial fulfilment of the requirements
for the celebration of his 50th birthday

*Edited by*

Torgrim Solstad
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# INTRODUCTION

Upon realizing that Kjell Johan Sæbø was to turn 50 in May 2006, we immediately saw an opportunity to give something back to our dear friend, colleague and mentor. Of course, we could have waited another ten or twenty years, but we wanted to demonstrate through this *Festschrift* that there is an active community of formal linguistics at the University of Oslo today, and that Kjell Johan is the leading figure of this community. Kjell Johan has done a lot to promote our shared conception of linguistics, and this *Festschrift* accords him the recognition he deserves – now, in 2006, and not in 2026.

Since Kjell Johan is only halfway through his biography and bibliography, we keep the introduction short and let the *Festschrift* speak for itself. We believe the articles collected here reflect both a sampling of the interests of Kjell Johan and the great respect he enjoys at the University of Oslo and among his fellow world-class semanticists. But above all, the *Festschrift* is an act of deep friendship.

## Necessity

The present volume contains several stories of close personal relations and shared research interests. More than 20 years ago, as a young research assistant of Arnim von Stechow in Konstanz, Kjell Johan worked on his doctoral dissertation on necessity and modality. 15 years after the completion of his thesis, Kjell Johan reopened the topic in the 2001 Festschrift for Arnim von Stechow by celebrating his former supervisor with the article *Necessary Conditions in a Natural Language*. And now, following a growing interest in "what you have to do if you want to go to Harlem", von Stechow – in collaboration with his two current research assistants Sveta Krasikova and Doris Penka – makes his reply to Kjell Johan in *Anankastic Conditionals Again*.

A somewhat shorter story of shared interests in modality is told by another good friend and outstanding semanticist, Ede Zimmermann. Inspired by a 2005-paper by Kjell Johan and a personal email exchange, Zimmermann presents his ideas on *Knowledge and Desire, from a German Perspective*.

## Optimality

Kjell Johan has an amazing ability to always explore new fields of research. Several of the contributors are inspired by Kjell Johan's most recent work from a very productive last couple of years. His neighbour at the department of German and closest colleague for 25 years, Cathrine Fabricius-Hansen, congratulates Kjell Johan (*We Congratulate - by ...*) with a comment on his forthcoming paper "The Structure of Criterion Predicates", in which he

introduces a new approach to *by*-locutions in event semantics. They wrote their first article together in 1983 and are still collaborating on various topics.

In the last decade, Kjell Johan has broadened his fields of interest to include formal pragmatics, most recently within the fast-growing framework of Optimality Theory. The founders of the new OT-based approach to formal pragmatics – Reinhard Blutner (*Embedded Implicatures and Optimality Theoretic Pragmatics*) and Henk Zeevat (*Strategies for Specifying Relations*) both contribute new material at the heart of Kjell Johan's current research interests.

**Seminal**

This brings us to Kjell Johan's role in creating an active community for formal linguistics at the University of Oslo. Together with Jan Tore Lønning (*Language Technology and the Science of Linguistics*), Kjell Johan was the organizer of the circle *Semantikkseminaret* for many years. This informal meeting place for formal semantics was founded by Jan Erik Fenstad (*Grammar, Geometry and Brain*), the former dean of the Faculty of Mathematics. Fenstad played an important role in creating an interest in these issues at our university at the time when Kjell Johan was a young student of languages and mathematics.

Last year, Kjell Johan created a new circle for formal linguistics, *Seminar i teoretisk lingvistikk*, where he is certainly the most active participant, regularly presenting new ideas at the cutting edge of current research. The profile of *Seminar i teoretisk lingvistikk* is somewhat broader than *Semantikkseminaret* and comprises both semantics and syntax. One of the more syntactically oriented participants, Janne Bondi Johannessen (*Just Any Pronoun Anywhere? Pronouns and "New" Demonstratives in Norwegian*), represents this milieu in the present volume.

Kjell Johan has also played an important role in the more empirically oriented SPRIK project (*Languages in contrast*), a project which brings together qualitative and quantitative methods, as in Wiebke Ramm's contribution (*Dispensing with Subordination in Translation - Consequences on Discourse Structure*).

**Supervision**

Besides his own research, Kjell Johan is greatly respected for his investment in doctoral education at the University of Oslo. For several years Kjell Johan was the coordinator of the PhD program in linguistics, a responsibility for which he was ideally suited, with his broad knowledge of linguistics and supportive attitude towards students.

Kjell Johan is truly an interdisciplinary scholar – being a professor of German, he has supervised four completed doctoral dissertations on various languages, and none of them was conducted at his own department! This volume contains contributions from three of his former doctoral students – Bergljot Behrens (*What the Structure of Criterion Predicates Told Me*), Ingebjørg Tonne (*Elucidating Progressives in Norwegian*) and Atle Grønn (*Norwegian Bare Singulars: A Note on Types and Sorts*).

Currently, Kjell Johan is the supervisor of Eirik Welo (*Pragmatics of the Complex DP in Ancient Greek*). Other young researchers who are inspired by Kjell Johan and benefit from his insights through discussions, occasional supervision and PhD seminars are Pål Eriksen (*The Pragmatic Nature of Grammatical Categories*) and Torgrim Solstad (*Unification and Word-Internal Pragmatics*).

**Silence**

When he's not doing linguistics or spending his time with his dear family, Kjell Johan prefers the silence of Norwegian mountains or the silent movies of Buster Keaton – no words to analyze, just Kjell Johan alone with his thoughts.

Oslo,
April 12, 2006.
Atle Grønn, Dag Haug and Torgrim Solstad (editors).

The editors wish to express their gratitude toward the *Department of Literature, Area Studies and European Languages* and its direction represented by Per Winther and Karen Gammelgaard, for financially and morally supporting this volume.

# WHAT THE STRUCTURE OF CRITERION PREDICATES TOLD ME

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**Abstract**

The notion of criteriality in predicate descriptions introduced in an article by Kearns in 2003 is taken up in a recent article by Sæbø and formalized to explain the semantic processing of English *by*-clauses. In the present paper I relate this notion to another notion of criteriality introduced in the linguistic literature a decade earlier, and apply the recent work to *ing*-participial adjuncts.

## 1 The background

One central goal of my work in linguistics about a decade ago was to get closer to an understanding of the discourse relations that are inferred to hold between ING-participial adjuncts and their matrix clauses, and to be able to explicate the procedures by which the individual discourse relations obtain. In this work event structure proved invaluable. The long established Vendlerian event classifications were used (Vendler 1967), and the causative event complex as modelled in Higginbotham (1994) and Kamp and Roßdeutscher (1994) allowed sub-events in the semantic representation. A causative discourse relation was seen to emerge if the adjunct expressed a causative event whose properties were such that the Causing sub-event was relatively void of content. This causing sub-event referent would thus look for its content in the matrix predicate, and the causative relation between matrix and adjunct would result from the causative relation in the complex adjunct event.

(1) Thomas ripped the screen door, breaking the latch.

(2) The branch fell over the beautifully laid table, breaking the glasses.

(3) Fortunately, he (Bernard the ´pisciniste´ who bites dentists) had found a dentist who fought back with anaesthetics, knocking Bernard out completely while the repair work was done.

*Knock out*, like *break*, is analyzed as a causative predicate whose causing event is underspecified. If Thomas breaks the latch we don't know what activity he enters into which causes the breaking, neither do we know what a dentist does to achieve the result of knocking you out. The information about these activities is expressed in the matrix clauses.

The reverse relation was also seen to obtain in these structures: The underspecified causative predicate appears in the matrix, and the adjunct event properties saturate it, as in (4):

(4) They defaced the two poster girls, spray-painting a down-turned mouth on one, and adding a wrinkled brow to the other.

The spray-painting and the adding of a wrinkled brow are events that fill in the underspecified conditions in the causative matrix *defacing*-event description. The result is a relation of Specification or Elaboration between the clauses.

In order to explain how a discourse relation between an *ing*-participial adjunct and its matrix clause emerges, then, predicates must be seen as structured sets of entities, and there must be an element of under-specification in the complex structure to allow merging. The structure we define will also determine the relation that obtains with the merge.

The merge itself was at the time analyzed as a presupposition satisfaction, in that the non-finite structure introduced a floating event referent in the representation and the referent would consequently look for an event referent in the discourse universe to merge with. Merging, a prerequisite for the discourse relations Result and Elaboration, would only occur if an underspecified event referent was motivated in the representation.

While the analysis is successful in so far as it helps define certain constraints on different discourse relations, a growing uneasiness was felt during this time over the lack of more finely grained event structure descriptions. The causative complex seemed to be the only predicate structure which allowed a compositional treatment of the inference leading to the emergence of a discourse relation of the kind exemplified above. Yet the relation of Elaboration is also inferred in discourses without causatives, such as in (5) and (6):

(5) He kept a low profile, driving an unobtrusive car.

(6) The (German) campers had treated his (the peasant's) elaborate defence system with contempt, rolling back boulders to make a gap in the barricade and stealing the notices that warned them of the presence of vipers.

The problem here was that there seemed to be no sound analysis of a temporary state/activity like "keep a low profile" or an activity of contemptuous treatment that would allow us to introduce an underspecified referent which we could then see filled with content by being supplied with the adjunct event properties in a merging operation. Intuitively there is something unspecified, rather abstract, even subjective in describing an activity as that of a contemptuous treatment or keeping a low profile, and the activities rendered in the *ing*-participial adjuncts do explicate, or specify, the criteria by which such descriptions are claimed to hold. So a merge must take place in the interpretation and we need a basis for structuring the matrix predicate to allow this to happen in the semantic processing of the utterance.

The Vendlerian classification of events has received a lot of attention, and has formed the basis for most of the linguistic literature on event structure. The classification has proved insightful with respect to the understanding of temporal relations and verbal aspect, but as (5) and (6) above demonstrate, the classifications do not help us structure eventualities to allow a compositional analysis of event merging in all its manifestations even within the limited syntactic configuration we are faced with here.

A major breakthrough in the direction of extending the compositional analysis to cover cases of intuitively similar event relations comes from Ryle's discussion of predicate types (1949), revived and brought further by Kate Kearns in her article on durative achievements (2003). The major difference between Ryle's discussions and Vendler's classification, according to Kearns, is the focus on the temporal dimension of the predicates, and as becomes evident from Kearns' article, the temporal dimension has in many ways been an obstacle to further refining the structure of the predicate types observed by Ryle. In our cases, there is reference to just one event, but there are two descriptions of it. The temporal relation is not the central factor in the representation of the structure, as there is no temporal relation to be identified. How can we account for such examples?

Kjell Johan Sæbø, my intellectually inspiring supervisor at the time, has recently taken Kearns' article as an opportunity to further mining out the logical structure of criterion predicates and has come up with a most convincing and thorough solution to the problem (Sæbø, to appear). His work is impressive, presenting structured solutions to vague, yet explicated conceptualizations of the semantic processing involved.

## 2 The notion of criteriality has changed

In an article from 1995, I argue that a notion of criteriality is relevant for the understanding of how the relation of Elaboration emerges as the result of a merge between two event representations (Brynildsen 1995). Criteriality was

first introduced in an unpublished paper by Lars Hellan in 1994. The notion is understood as an argument role feature applying to the agents of certain events. One example is the notion of breaking, as in for example *Thomas broke the latch.* Although it must be possible to identify Thomas as responsible for the breaking, it was observed that "there is no particular pattern of behaviour which has to be displayed by him in order to qualify for this role in the description." (Hellan 1994: 11). The subject argument is *non-criterial*. The latch, on the other hand, is criterial in this event – as there would be no breaking unless there was some entity that broke, i.e. some entity that was affected. Criterial participants in Hellan's sense can be exemplified in *John ate the apple*, in which the apple as well as John are integrally involved in every bit of the eating. The exact behaviour of John is specified, and the apple is involved in every bit of it.

This intuitive notion of non/criteriality was applied to transition verbs generally in my 1995 paper, and a distinction was made on the basis of whether or not the verbs are lexically categorized for criterial properties on their subject arguments. The factor of criteriality was seen to distinguish between two types of achievements, such as in the criterial *the capsule split* and the non-criterial *he won*. A minimal pair would be for example *open* and *unzip*, the first non-criterial, the second specifying the behaviour of the subject participant. The distinction was formally represented by postulating an underspecified event referent causatively related to the result event in non-criterial achievements and accomplishments.

In my thesis of 1998 I dropped the notion of criteriality, but kept the analysis of causatives to include an underspecified Causing event. The notion of a non-criterial agent did not seem to be independently needed to introduce the sub-events I needed for the analysis. I did not at the time realize that a notion of criteriality could be spelled out to include examples like (5) and (6).

The notion of criteriality is differently stated in Kearns, and with Kjell Johan's seminal analysis of the structure of such predicates, I can now see that criteriality *is* after all an important feature in the analysis of the relations that obtain between *ing*-participial adjuncts and their matrix clauses. Criteriality is a decisive feature for the distinction between Elaboration on the one hand, which does involve identifying two descriptions of one event, and a similar relation of Accompanying Circumstance which involves two events understood to form a unit, but not requiring full unification (see below). In the following I will present a simplified description of these predicates, based on Sæbø (forthcoming) and apply them to my cases.

Kearns defines criteriality as a property of predicates, as opposed to Hellan's definition of it as a property of the argument. A criterion predicate, according to Kearns, expresses an individual-level, characterizing property of the event, in Ryle's description stated as "a state-of-affairs which obtains over and above that

which consists in the performance of the sub-servient task activity" (Ryle 1949: 143). The key notion of criteriality is that there is some conventional criterion an action must meet in order to qualify as being an event of the criterion-matching kind (Kearns 2004: 599). Thus the property Hellan attributed to the argument role is shifted to a property of the predicate. The predicates taking non-criterial arguments in Hellan's description, would, according to Kearns, be defined as criterion predicates. Applied to example (3) above, criteriality is a property of the matrix event: a defacing event is criterial in the sense that for a proposition with such a predicate to be true, there must be an action out there that meets some conventional criteria that qualify as being of the defacing kind. The action of spray-painting a down-turned mouth on one of the poster girls would match such a criterion, and so would the action of adding a wrinkled brow on the other poster girl. The criterion-matching suggests that the criterial predicate is *parasitic* upon a *host* (Kearns 2004: 596), i.e. it qualifies as of a particular type only in virtue of the nature of its host event.

Criterion predicates in Kearns' discussion are limited to achievements. As long as the predicates are of a nature that allows us to define them as complex causatives, my analysis of *ing*-participial adjuncts in terms of a saturation of underspecified event referents does not need much refinement. However, if we look at the examples in (5) and (6), we are faced with predicates which also seem to be of the criterion matching kind, even though they are not complex causatives. Kearns' "*cure the patient*" is a causative with an implicit underspecified causing event, but "*treat the patient*" is an activity, and so is "*treat the peasant's defence system with contempt*", cf. (6), yet both are criterial in the sense that the activities described are indefinite and must match some conventional criterion for being adequately interpreted as a treatment. "*Keep a low profile*", cf. (5) would also match Ryle's description of a predicate denoting a state of affairs which obtains over-and-above the "sub-servient" performance of driving an unobtrusive car (in a manor setting).

Put in plain language, the description of criterial predicates is simple enough, and the identification of them is intuitively very satisfying for any analysis of the discourse relation Elaboration, which requires a merging of discourse referents. However, the minute we go one step further and try to model the procedure by which the two event descriptions merge into a complex description of one event, we run into problems, as Sæbø (forthcoming) convincingly argues. Events, according to him, cannot be ascribed individual level properties. Rather, it is the event *type* that can have such properties. What the German campers did to the French peasant's defence system was of a contemptuous treatment *kind*. The outcome of this observation is that criterial predicates can be used to predicate over predicates, which means, in fact, that they must be analysed as second order entities. By this analysis the first order

predication over an underspecified agentive event is included in the criterial predicate. This is spelled out in detail in Kjell Johan's article. The predicate *keep a low profile* would thus receive the following semantic representation:

(7) $$\left\langle \left\{ \begin{array}{l} \langle e, \lambda \rangle \\ \langle P, \underline{\text{indefinite}} \rangle \end{array} \right\}, \boxed{\begin{array}{l} f\ Q \\ P(e) \\ P \leq Q \\ \textit{Low Profile}(Q(\text{pro}))(\text{Agent}(e))(f) \end{array}} \right\rangle$$

There are details in this representation that are of little relevance for my presentation here. The point is to demonstrate the second order predication: *Q* predicates over the predicate *P*, which predicates over an underspecified agentive event *e.*

The semantic difference between a causative and a criterial predicate becomes particularly clear in the representation. While the causatives (not represented semantically here) have a *Cause*-operator, resulting in a counterfactual analysis, the criterial predicates on the other hand, have an *Inclusion* operator ($\leq$), by which the first order predication is included in or identical with the criterial predicate. This distinction is intuitively and logically very satisfying, as it explains how Elaboration can be inferred even though the "host" does not *cause* the proposition with the criterial predicate to be true, as exemplified in (5) and (6). This structured decomposition of criterial predicates yields a representation with an unsaturated agentive event which invites a merging operation given that an appropriate "host" is introduced in the adjunct phrase. The matrix proposition will then be true *in virtue of* its host being true.

While either predicate type in the matrix – causative or criterial – allows the predicate in the *ing*-clause to merge with an underspecified element, and thus gives rise to the Elaboration interpretation, the reverse case is different. A criterial predicate in the *ing*-adjunct can give rise to the relation of Abstraction, as in (8), while a causative predicate in this position yields the relation of Result or Consequence, as in (9):

(8) The siren sounded, indicating that the air raid was over.

(9) [The ability of DNA to replicate itself is a consequence of its unique structure. It is shaped like two intertwined helices.] During cell division these unzip, splitting the molecule along its length into two separate helices. (from D.Attenborough: *Life on Earth*)

How wonderful that there are minds in our linguistic community that can cope with such problems and help us disentangle the complexity of these phenomena!

## 3 What happened to Hellan's notion of criteriality?

Surprisingly, although criteriality in the sense of an argument role feature is spelled out in Hellan and Dimitrova-Vulchanova in a published paper from 2000, there is no reference to it in either Kearns' or Sæbø's work.

However, it seems that Sæbø's analysis implicitly answers why the Agents in the criterial examples are understood to be what Hellan called "non-criterial". In Sæbø's analysis of criterial predicates it is the implicit "host" event (explicated in the *by*-phrase, or in my examples in the *ing*-participial phrase) that is assigned an Agent, not the "parasite", cf. the Agent role on the event referent predicated over in the representation in (7) above. The formalization yields an interpretation in which the criterial event may in fact not be intended.

While the host predicate is normally concrete (cf. *drive a car* in (5) or *sound* in (8) above), relating an event that an agent is the source of and responsible for, (and when communicated, observable and testable by the interlocutor), the criterial predicate relates the speaker's perspective on that event, in the sense that the speaker uses such predicates to classify the "host" event as an event of a certain type. Kearns appeals to "conventional criteria", but they can clearly be relatively subjective. Although the agent of the "concrete" event appears as the subject of the criterial event description, it is "non-citerial" in Hellan's sense with respect to the "parasite" predication. This makes sense if the Agent role is assigned to the host event in the semantic representation.

The identification and precise description of criterion predicates, then, also contributes to the task of recognizing subjectivity in text, and their successful formalization in DRT is an important contribution to implementing not only abstraction, but also subjectivity and author's voice in this framework. What is still somewhat unclear to me is whether the formalization as stated in (7) actually entails a subjective stance on the parasite predication. This question requires further consideration that I will not enter into at this point.

## 4 A compositional analysis or a purely pragmatic inference?

The compositional analysis of the merge between the main clause predicate and the predicate in the modifying *by*-phrase is central in Sæbø's article taken up here. The availability of an under-specified referent is secured by the structure of the main predicate, the merging operation is secured by the preposition *by*. ING-participial adjuncts of the kind I exemplify here, have no preposition to guide or trigger a merging operation, yet the non-finiteness of the structure creates a syntactic dependency which at least requires that its predicate hook on to the predicate in the matrix in some way. As opposed to *by*-phrase predicates, however, *ing*-participial adjuncts may be fully acceptable in cases where a full

merging operation would fail. The result is that a discourse relation other than Cause, Elaboration or Abstraction (as mentioned in Sæbø forthcoming: 19) emerges. This is the case in for example (10) below, where two "concrete" activity predicates appear in the matrix and adjunct respectively, and the relation of "Accompanying Circumstance" emerges.

(10) "I see," she would say, nodding at some lengthy explanation of his.

The non-finite properties of the *ing*-participial adjunct invite a compositional analysis of the semantic updating procedures, but since the structure is acceptable for the implicit expression of a variety of relations, the *ing*-adjunct must have other binding conditions than the *by*-locution. Among other things, an updating procedure must be worked out for *ing*-participial adjuncts which allows for, but does not require a complete merge. The occasion of Kjell Johan's anniversary cannot be an occasion for setting out to fully exploit the nature of these conditions, but the precise analysis of the *by*-locution within a new version of DRT, which includes binding conditions on referents, certainly sharpens questions related to it. I shall not go into these questions here, but mention that one of the things that lies ahead, is to define the relevant binding condition(s) on the adjuncts discussed here, in view of their not having an explicit marker of the sort of quantifier involved. Furthermore, the compositional analysis rests on the *by*-locution. This triggers questions related to the precise definition of other connecting expressions which link criterial, indefinite predicates to predications over their "sub-servient", definite activities. English differs from for example German and Norwegian in allowing these *ing*-participial modifiers – whether preceded by a preposition or not. Parallels to the *by*-locution exist in Norwegian, and I presume the preposition *ved* + infinitives will receive the same analysis as the English *by* + V-*ing*. But when the predicate relation is reversed, as in for example (8) and (9) above, Norwegian parallels appear with connectives like *dermed*, which may introduce a sentence with a criterial predicate, as well as the complex conjunction *slik at*, which seems restricted to causatives (Behrens 1998, 2005). Further work on the precise nature of such parallels will certainly be inspired by what the structure of criterion predicates told me.

## References

Behrens, B. (1998): *Contrastive Discourse: An interlingual approach to the interpretation and translation of free ING-participial adjuncts*, PhD thesis, University of Oslo.

Behrens, B (2005): 'Cohesive ties in translation: A contrastive study of the Norwegian connective *dermed*', *Languages in Contrast* **5**(1), pp. 3-32.

Behrens, B. and C. Fabricius Hansen (2002): 'Connectives in Contrast. A discourse semantic study of Elaboration', in H. Hasselgård et al. (eds.): *Information structure in a Cross Linguistic Perspective*, pp. 45-61, Rodopi.

Brynildsen, B. Behrens (1995): 'Event structure as a factor in interpreting and translating free ING-adjuncts', in I. Moen et al. (eds.): *Proceedings from the XVth Scandinavian Conference of Linguistics,* pp. 67-79, University of Oslo.

Hellan, L. (1994): *A Model of Linguistic Signs*, ms, University of Trondheim.

Hellan, L. and M. Dimitrova-Vulchanova (2000): 'Criteriality and Grammatical Realization', in P. Coopmans, M. Everaert and J. Grimshaw (eds.): *Lexial Specification and Insertion*, John Benjamins.

Higginbotham, J. (1994): *The syntax and Semantics of Events*. Reader for Seminar in FoLLI, Copenhagen.

Kamp, H. and A. Roßdeutscher (1992): 'Remarks on Lexical Structure, DRS-Construction and Lexically Driven Inferences', Bericht Nr. 21, Arbeitspapiere des Sonderforschungsbereichs 340, Universität Stuttgart, Germany.

Kamp, H. and A. Roßdeutscher (1994): 'Lexically driven inference', in ESSLLI Reader, summer symposium on Lexical Meaning and Conceptual Structure, Copenhagen.

Kearns, K. (2003): 'Durative Achievements and Individual-Level Predicates on Events', *Linguistics and Philosophy* **26**, pp. 595-635.

Ryle, G. (1949): *The Concept of Mind* Hammondsworth: Peregrine Books.

Sæbø, K. J. (1996): 'Anaphoric Presuppositions and Zero Anaphora', *Linguistics and Philosophy* **19**, pp. 187-209.

Sæbø, K. J. (to appear): 'The Structure of Criterion Predicates', in J. Dölling and T. Heyde-Zybatow (eds.): *Event Structures in Linguistic Form and Interpretation*. Berlin: Mouton de Gruyter. Manuscript available at *http://folk.uio.no/kjelljs/Research.htm*

# EMBEDDED IMPLICATURES AND OPTIMALITY THEORETIC PRAGMATICS

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**Abstract**

In a recent paper, Chierchia (2004) distinguishes global and local approaches to conversational implicatures and claims that several puzzles concerning implicatures in complex sentences can best be explained by a local approach. This conflicts with the Neo-Gricean view which is global in nature. I will argue that both approaches can coexist in optimality theoretic pragmatics where the proper place is assigned to the two approaches: a global theory describes the principal forces that direct communication – it has a diachronic dimension and allows a rational foundation of conversational implicatures; a local theory describes the actual, synchronic dimension – it explains how online, incremental interpretation of complex sentences is possible. The connection between the two views results from assuming that the results of global optimization fossilize into a local mechanism of utterance processing.

## 1 Introduction

In a recent paper, Chierchia (2004) distinguishes between global and local approaches to conversational implicatures. According to the global (Neo-Gricean) view one first computes the (plain) meaning of the sentences; then, taking into account the relevant alternatives, one strengthens that meaning by adding in the implicature (Chierchia 2004: 42). This contrasts with the local view (also called post-Gricean) which first introduces pragmatic assumptions locally and then projects them upwards in a strictly compositional way where certain filter conditions apply. Representatives of the global view are Gazdar (1979), Krifka (1995), Soames (1982), Blutner (1998), Sauerland (2004), Sæbø (2004; 2005), and Russell (2004); the local view is taken by Chierchia (2004), van Rooy (to appear), Levinson (2000), and Relevance Theory (e.g. Sperber & Wilson, 1986; Carston, 2002).

Whereas many globalists argue against the local view and many localists against the global view, I think that proper variants of both views are justified if a different status is assigned to the two views: global theories provide the standards of rational discourse and correspond to a diachronic, evolutionary

scenario; local theories account for the shape of actual, online processing including the peculiarities of incremental interpretation. This way of distinguishing the two theories makes it possible to look for a systematic linking of the two perspectives. My suggestion is to take the idea of fossilization (or freezing/conventionalization/routinization) as a mediator between the two views. Though this suggestion is not much more than a speculative idea at the moment, I will argue that optimality theoretic (OT) pragmatics has the potential for contributing the linking theory.

The next section gives a concise introduction into OT pragmatics. It is explained how OT can account for both the diachronic and the synchronic perspective. Further, the idea of fossilization is explained with examples from Lexical Pragmatics. In Section 3 I explain how a global (Neo-Gricean) theory of conversational implicature can deal with several examples of embedded implicatures. Section 4 gives some arguments why a local account is required in order to describe the actual construction of implicatures, and it speculates about the role of fossilization. Section 5, finally, draws some general conclusions.

## 2 Optimality Theoretic Pragmatics

OT can be seen as a general framework that systematizes the use of optimization methods in linguistics.[1] One component of OT is a list of tendencies that hold for observable properties of a language. These tendencies take the form of violable constraints. Because the constraints usually express very general statements, they can be in conflict. Conflicts among constraints are resolved because the constraints differ in strength. Minimal violations of the constraints (taking their strength into account) define optimal conflict resolutions. OT specifies the relation between an input and an output. This relation is mediated by two formal mechanisms, **GEN** and **EVAL**. GEN (for Generator) creates possible output candidates on the basis of a given input. EVAL (for Evaluator) uses the particular constraint ranking of the universal set of constraints **CON** to select the best candidate for a given input from among the candidate set produced by GEN. In phonology and syntax, the input to this process of optimization is an underlying linguistic representation. The output is the (surface) form as it is expressed. Hence, what is normally used in phonology and syntax is unidirectional optimization. Obviously, the point of view of the speaker is taken. This contrasts with OT semantics where the view of the hearer is taken (Hendriks & de Hoop, 2001; de Hoop & de Swart, 2000).

Bidirectional optimization (Blutner, 1998, 2000) integrates the speaker and the hearer perspective into a simultaneous optimization procedure. In

[1] A recent overview is given in Smolensky & Legendre (2005). For OT pragmatics the reader is referred to Blutner & Zeevat (2004) and Blutner, de Hoop & Hendriks (2005).

pragmatics, this bidirectional view is motivated by a reduction of Grice's maxims of conversation to two principles: the I/R-principle, which can be seen as the force of unification minimizing the Speaker's effort, and the Q-principle, which can be seen as the force of diversification minimizing the Auditor's effort. The Q-principle corresponds to the first part of Grice's quantity maxim (*make your contribution as informative as required*), while it can be argued that the countervailing I/R-principle corresponds to the second part of the quantity maxim (*do not make your contribution more informative than is required*), the maxim of relation and possibly all the manner maxims. In a slightly different formulation, the I/R-principle seeks to select the most coherent interpretation and the Q-principle acts as a blocking mechanism which blocks all the outputs which can be grasped more economically by an alternative linguistic input. This formulation makes it quite clear that the Gricean framework can be conceived of as a bidirectional optimality framework which integrates the speaker and the hearer perspective. Whereas the I/R-principle compares different possible interpretations for the same syntactic expression, the Q-principle compares different possible syntactic expressions that the speaker could have used to communicate the same meaning.

I will give a very schematic example in order to illustrate some characteristics of the bidirectional OT. Assume that we have two forms $f_1$ and $f_2$ which are semantically equivalent. This means that **GEN** associates the same interpretations with them, say $m_1$ and $m_2$. We stipulate that the form $f_1$ is less complex (marked) than the form $f_2$ and that the interpretation $m_1$ is less complex (marked) than the interpretation $m_2$ . This is expressed by two markedness constraints F and M for forms and interpretations, respectively – F prefers $f_1$ over $f_2$ and M prefers $m_1$ over $m_2$. This is indicated by the two leftmost constraints in table (1).

Table 1: Markedness and bias constraints in a 2-forms × 2-interpretations design

| | F | M | F→M | *F→*M | F→*M | F*→M |
|---|---|---|---|---|---|---|
| $\langle f_1, m_1 \rangle$ | | | | | * | |
| $\langle f_1, m_2 \rangle$ | | * | * | | | |
| $\langle f_2, m_1 \rangle$ | * | | | * | | |
| $\langle f_2, m_2 \rangle$ | * | * | | | | * |

Besides the markedness constraints so-called linking constraints can be formulated. There are precisely four independent linking constraints in the present example. The linking constraint F→M says that simple (unmarked) forms express simple interpretations (Levinson's (2000) **I**-constraint), the constraint *F→*M says that complex forms express complex interpretations

(Levinson's **M**-constraint[2]), and the two remaining bias constraints express the opposite restrictions. In the present case linking constraints can be seen as lexical stipulations that fix a form-interpretation relation in a memory (instance) based way.

In the so-called strong version of bidirectional OT, a form-interpretation pair <*f*, *m*> is considered to be (strongly) optimal iff (I) no other pair <*f*, *m*'> can be generated that satisfies the constraints better than <*f*, *m*> and (Q) no other pair <*f*', *m*> can be generated that satisfies the constraints better than <*f*, *m*>. From the differences of markedness given by the constraints F and M the ordering relation between form-meaning pairs can be derived as shown in Figure 1. The preferences are indicated by arrows in a two-dimensional diagram. Such diagrams give an intuitive visualization for the optimal pairs of (strong) bidirectional OT: they are simply the meeting points of horizontal and vertical arrows.[3] The optimal pairs are marked with the symbol ✌ in the diagram.

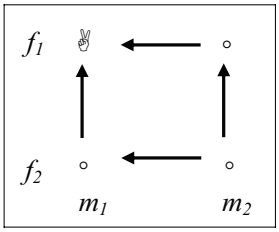



Figure 1: Diagram to illustrate strong bidirection

The scenario just mentioned describes the case of *total blocking* where some forms (e.g., *furiosity, *fallacity) do not exist because others do (fury, fallacy). However, blocking is not always total but may be partial. This means that not all the interpretations of a form must be blocked if another form exists. McCawley (1978) collects a number of examples demonstrating the phenomenon of *partial blocking*. For example, he observes that the distribution of productive causatives (in English, Japanese, German, and other languages) is restricted by the existence of a corresponding lexical causative. Whereas lexical causatives (e.g. (1a)) tend to be restricted in their distribution to the stereotypical causative situation (direct, unmediated causation through physical action), productive (periphrastic) causatives tend to pick up more marked situations of mediated,

[2] Levinson's M-principle should not be confused with the markedness constraint M introduced in Table 1.

[3] Dekker & van Rooy (2000), who introduced these diagrams, gave bidirectional OT a game theoretic interpretation where the optimal pairs can be characterized as so-called Nash Equilibria.

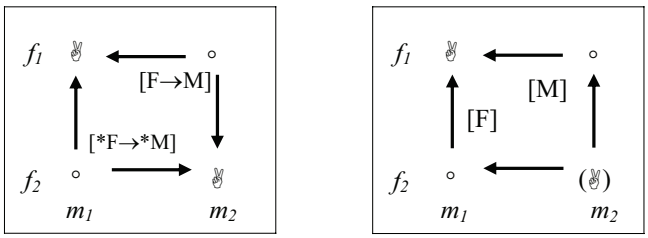
indirect causation. For example, (1b) could have been used appropriately when Black Bart caused the sheriff's gun to backfire by stuffing it with cotton.

(1) a. Black Bart killed the sheriff.
b. Black Bart caused the sheriff to die.

To make things concrete we can take $f_1$ to be the lexical causative form (1a), $f_2$ the periphrastic form (1b), $m_1$ direct (stereotypic) causation and $m_2$ indirect causation.

Typical cases of partial blocking are found in morphology, syntax and semantics. The general tendency of partial blocking seems to be that "unmarked forms tend to be used for unmarked situations and marked forms for marked situations" (Horn 1984: 26) – a tendency that Horn (1984: 22) terms *"the division of pragmatic labour"*.

There are two ways of avoiding total blocking within the bidirectional OT framework and to describe Horn's division of pragmatic labour. The first possibility makes use of linking constraints and fits the intended form-interpretation relation by stipulating the appropriate ranking of the constraints such that partial blocking comes out. Let's assume that the two bias-constraints F→M and *F→*M are higher ranked than the rest of the constraints. This can be depictured as in Figure 2a. Hence, strong bidirection can be taken as describing Horn's division of pragmatic labour when the appropriate linking constraints are dominating.




(a) (b)

Figure 2: Two ways of describing Horn's division of pragmatic labour: (a) by assuming two dominant bias constraints; (b) by assuming markedness constraints and weak bidirection

The second possibility is to weaken the notion of (strong) optimality in a way that allows us to derive Horn's division of pragmatic labour by means of the *evaluation procedure* and without stipulating particular bias constraints. Blutner (2000) develops a *weak* version of two-dimensional OT, according to which the two dimensions of optimization are mutually related: a form-interpretation pair

<f, m> is called super-optimal iff (I) no other *super-optimal* pair <*f*, *m*'> can be generated that satisfies the constraints better than <*f*, *m*> and (Q) no other *super-optimal* pair <*f* ', *m*> can be generated that satisfies the constraints better than <*f*, *m*>. This formulation looks like a circular definition, but Jäger (2002) has shown that this is a sound *recursive* definition under very general conditions (well-foundedness of the ordering relation). The important difference between the weak and strong notions of optimality is that the weak one accepts super-optimal form-meaning pairs that would not be optimal according to the strong version. It typically allows marked expressions to have an optimal interpretation, although both the expression and the situations they describe have a more efficient counterpart.

Figure 2b shows that the *weak* version of bidirection can explain the effects of partial blocking without the stipulation of extra bias constraints; especially it can explain why the marked form $f_2$ gets the marked interpretation $m_2$. This is a consequence of the *recursion* implemented in weak bidirection: the pairs $<f_1, m_2>$ and $<f_2, m_1>$ are *not* super-optimal. Hence, they cannot block the pair $<f_2, m_2>$ and it comes out as a new super-optimal pair. In this way, the weak version accounts for Horn's pattern of *the division of pragmatic labour*.

The two parts of Figure 2 describe the same set of solution pairs but the calculation of the solutions is completely different in the two cases. In the first case unidirectional optimization (either hearer or speaker perspective) is sufficient to calculate the solution pairs. It is plausible to assume that this kind of OT systems can be used to construct cognitively realistic models of online, incremental interpretation (cf. Blutner 2006). The second case – involving the recursion of weak bidirection (super-optimality) – has a completely different status. Because of its strictly non-local nature the proposed algorithms that calculate the super-optimal solutions do not even fit the simplest requirements of a psychologically realistic model of online, incremental interpretation (Beaver & Lee, 2004; Zeevat, 2000). The proper understanding of weak bidirection relates to an off-line mechanism that is based on bidirectional learning (Benz, 2003; Blutner, Borra, Lentz, Uijlings, & Zevenhuijzen, 2002; Van Rooy, 2004). In these approaches the solution concept of weak bidirection is considered as a principle describing the direction of language change: super-optimal pairs are tentatively realized in language change. This relates to the view of Horn (1984) who considers the Q and the I principle as diametrically opposed forces in language change. This conforms to the good old idea that synchronic structure is significantly informed by diachronic forces.

For the sake of illustration let's go back to our example in (1). Let's assume a population of agents who realize speaker- and hearer strategies based exclusively on the markedness constraints F and M. In this population each content is expressed in the simplest way ($f_1$) and each expression is understood

in the simplest way ($m_1$). Let's assume further that these agents communicate with each other. When agent x is in the speaker role and intends to express $m_1$, then expressive optimization yields $f_1$. Agent y is a hearer who receives $f_1$ and, according to interpretive optimization, he gets the interpretation $m_1$ – hence the hearer understands what the speaker intends: successful communication. Now assume the speaker wants to express $m_2$. With the same logic of optimization he will produce $f_1$ and the agent y interprets it as $m_1$. In this case, obviously, the communication is not successful. Now assume some kind of *adaptation* either by iterated learning or by some mutations of the ranked constraint system (including the bias constraints). According to this adaptation mechanism the expected 'utility' (how well they understand each other in the statistical mean) is improving in time. In that way a system that is evolving in time can be described including its special attractor dynamics. In each case there is a stabilizing final state that corresponds to the system of Figure 2a where the two Levinsonian (2000) constraints **I** (= [F→M]) and **M** (= [*F→*M]) outrank the rest of the constraints. It is precisely this system that reflects Horn's division of pragmatic labour. The only condition we have to assume is that the marked contents are less frequent to express in the population than the unmarked contents.[4]

Hence, the important insight is that a system that is exclusively based on markedness constraints such as in Figure 2b is evolutionary related to a system based on highly ranked bias constraints such as in Figure 2a. We will use the term *fossilization* for describing the relevant transfer.[5]

## 3 A global theory of embedded implicatures

In OT pragmatics, a global theory of conversational implicatures is realized by using weak bidirection and systems of markedness constraints for forms and interpretations. In this section I will argue that the basic findings of conversational implicatures in complex sentences can be explained by this rational approach to communication.

[4] For more discussion of the role of frequencies in an evolutionary setting see Stalnaker (2006).

[5] Mattausch (2004) has implemented the idea of fossilization using stochastic OT. In that way he could explain the evolution of reflexive marking strategies in English and he was able to show how an optional and infrequent marking strategy like that of Old English could evolve into a pattern of obligatory structural marking like that attested in modern English.

### 3.1 Reciprocals, strength and relevance

A good candidate for a markedness constraint in the interpretive domain relates to the *strongest meaning hypothesis* (SMH). In its original formulation the constraint is used as a formal tool for analyzing the remarkable variation in the meaning of reciprocal expressions like *each other* or *one another* (e.g. Dalrymple, Kanazawa, Kim, Mchombo, & Peters, 1998). Consider for instance the following example:

(2) a. The girls saw each other.
b. The girls are standing on each other.

Sentence (2a) entails that every girl saw every other girl. This contrasts with sentence (2b) which obviously does not entail that each of the girls is standing on each of the others. The interpretation that is strongly preferred in these and similar cases is best described by the SMH given below:

> SMH: A reciprocal sentence is interpreted as expressing the logically strongest candidate truth conditions which are not contradicted by known properties of the relation expressed by the reciprocal scope when restricted to the group argument.

Subsequent work has suggested to extend the application of the SMH for treating other phenomena with plurals (Winter, 2001), prepositions (Zwarts, 2003) and quantification (Blutner, Hendriks, & de Hoop, 2003).

Unfortunately, the SMH makes the wrong predictions in complex sentences such as

(3) I doubt that the girls saw each other.

What is doubted in sentence (3) is the proposition that every girl saw every other girl. Of course, this doubt conforms to the strongest interpretation of the embedded sentence. Consequently, the complex proposition that is expressed by (3) relates to the *weakest* interpretation that is possible because of the negation element in the matrix sentence. It is justified already when some girl did not see any other girl. Hence, the global application of the SMH doesn't give the right result (we had to replace it by a *weakest meaning hypothesis* in downward entailing contexts!)

Advocates of the SMH have taken these arguments as showing that the principle is based on logical properties of lexical items and directly affects truth conditions. Because of its truth-conditional, nondefeasible nature, the SMH should be applied locally first. In a second step the projection of the generated

truth conditions to the complex sentence structure appears (using the means of compositional semantics). As a consequence, we have to give up the Gricean idea of conversational implicature in the context of reciprocals (and the other examples mentioned).

In Blutner (2006) I have argued, however, that a global, Gricean solution is possible if we replace the SMH by a principle of optimal relevance. Of course, it is essential to have a proper measure of relevance. Van Rooy (to appear) listed some candidate definitions he found in the linguistic, philosophical and statistical literature. For goal-oriented theories of relevance, but also for the entropy-based version it is essential that the value of relevance can be positive and negative. The maxim of optimal relevance then means maximizing the absolute amount of relevance.

Merin (1997) identified two crucial conditions for a proper theory of relevance, i.e. a theory of relevance that conforms to a compositional, linear mode of calculating the value of relevance for complex sentences:

(4) a. Rel(A&B) = Rel(A)+Rel(B) if propositions A and B are independent
b. Rel(A) = -Rel(¬A)

Using a theory of relevance that satisfies these conditions (among them standard statistical relevance and Carnap's measure of relevance; cf. van Rooy, to appear), the Neo-Gricean approach can provide an explanation of the given examples. Of course we have to skip then the idea of *cancellability* as a general criterion for conversational implicatures.

An early example that justifies the idea that conversational implicatures are NOT necessarily cancellable is due to a classic paper by Sadock (1978):

> Grice states explicitly that generalized conversational implicatures, those that have little to do with context, are cancellable. But is it not possible that some conversational implicatures are so little dependent on context that cancellation of them will result in something approaching invariable infelicity? In a paper in preparation, I argue that sentences of the form *almost P* only conversationally entail *not P*, contrary to the claim made by Karttunen and Peters (1979). The implicature is straightforwardly calculable and highly nondetachable but, unfortunately for my thesis, just about uncancellable. The sentence *Gertrude not only almost swam the English Channel, in fact she swam it* is, I admit, pretty strange. (Sadock 1978: 293)

In Section 3.3 I will come back to the cancellability issue.

### 3.2 Explicatures

In the relevance theoretic literature (Sperber & Wilson, 1986; Carston, 2002, 2003, 2004) the term *explicature* is used for pragmatic inferences that directly affect truth-conditions.

> A key feature in the derivation of an explicature is that it may involve 'free' enrichment, that is, the incorporation of conceptual material that is wholly pragmatically inferred, on the basis of considerations of rational communicative behaviour, as these are conceived of on the relevance-theoretic account of human cognitive functioning (Carston, 2003: 819).

This is one of the standard examples:

(5) a. John had a drink ⇝ John had an alcoholic drink
b. I doubt that John had a drink ⇝ I doubt that John had an alcoholic drink

Other examples of free enrichment relate to domain restrictions in the case of quantification. In the following example the explicature depends on the context – assume the sentence is uttered in a typical party situation:

(6) a. Everyone left early (⇝ everyone at the party left early)
b. Either everyone left early or the ones who stayed on are in the garden

Also mereonomic restrictions can be seen as not fully specified by the underlying semantics and thus constituting a task for free enrichment:

(7) a. This apple is red (⇝ the outside of the apple is red)
b. I doubt that the apple is red

A straightforward observation is that all these examples are based on *I/R-implicatures* according to the Neo-Gricean classification. Hence, in order to give an explanation of the projection properties it is essential to have a proper measure of relevance as suggested above – a measure which hopefully can be extended to other complex forms than those constructed by negation and conjunction.

### 3.3 Scalar implicatures

Blutner (1998) proposed an approach to "scalar implicatures" that has some advantages over the traditional approach based on Horn-scales (see Gazdar, 1979). For example it solves a famous puzzle given by James D. McCawley. In the exercise part of his logic book McCawley (1993: 324) points out that the derivation of the exclusive interpretation by means of Horn-scales breaks down as soon as we consider disjunctions having more than two arguments. For example, from a disjunctive sentence of the form *John or Paul or Ede is sick* we can conclude that only one of the three is sick. However, the traditional approach predicts that not all the disjuncts can be true, which is too weak. The solution was to admit a whole lattice of alternative expressions constructed by the AND operator in order to block all interpretations with more than one individual sick.

As discussed in Blutner (2006), the global solution also works in cases like (8a) where the implicatures are (8b-c):

(8) a. Someone is sick
b. The speaker does not know who is sick
c. The speaker knows (exactly) one individual is sick (in a given set of individuals)

The analysis is based on three general assumptions: (i) a Neo-Gricean theory of scalar implicatures based on a global blocking mechanism; (ii) Soames' (1982) reconsideration of the epistemic status of scalar implicatures paired with a default mechanism of neg-raising (Horn, 1989); (iii) a linear theory of relevance as suggested before. Related proposals are due to recent suggestions by Sauerland (2004) and Russell (2004).

It is not difficult to see how to analyse the projection behaviour of scalar implicatures via our global theory of implicature projection. I start with one of Carston's (2002) examples:

(9) a. Mary lives somewhere in the south of France
b. Speaker does not know where in the south of France Mary resides
c. If Mary lives somewhere in the south of France, then I do not know where

Obviously, uttering (9a) implicates the proposition (9b). The derivation of this implicature is analogous to the derivation of (8b). However, the implicature does not locally arise in the antecedent of a conditional such as in (9c). If it would arise, then the whole sentence (9c) would be a tautology, but it is not. The

explanation in the present Neo-Gricean framework is obvious: the expression alternatives to (9c) have to be logically stronger than (9c) itself. Because the weak quantifier *somewhere in the south of France* occurs in the antecedent of a conditional, replacing it by concrete locations results in a weaker expression that does not count as an expression alternative. Hence, the implicature does not arise.

Chierchia (2004) discussed many other examples with scalar implicatures and concluded that only a local theory can account for the observed phenomena. However, Sauerland (2004) and Russell (2004) have shown that a global Gricean theory is appropriate to account for each of the implicatures Chierchia identified. In agreement with these authors we can conclude that a global account is possible for the treatment of scalar implicatures.

Scalar implicatures are normally considered to be cancellable. However, it has often been remarked that cancellability is difficult to distinguish from *clarification* (cf. Burton-Roberts, 2005) and also from *contextual change*. With regard to the latter point, van Kuppevelt (1996) has carefully argued that scalar implicatures are topic-dependent, i.e. they are dependent on the question being asked in a particular conversational setting. Consider the following example as discussed by van Rooy (to appear):

(10) a. Question: Who has 2 children?
b. Answer: John has 2 children
c. John doesn't have more than 2 children

In this case, the implicature (10c) does not even arise. This is different from the following situation where the question is focussing on the number of children:

(11) a. Question: How many children does John have?
b. Answer: John has 2 children
c. John doesn't have more than 2 children

In this case the implicature (c) arises; however, it cannot be cancelled. Van Kuppevelt (1996) argues that the 'phenomenon of cancellation' is in fact an effect of contextual change. In this sense scalar implicatures are *particularized* conversational implicatures. Obviously, the topic-dependency of scalar implicatures is not restricted to numerals but also holds in connection with the Q-implicature triggered by 'or' (cf. Van Rooy, to appear). The consequence of this finding is that cancellability cannot longer count as a criterion for identifying conversational implicatures.

### 3.4 Free choice interpretation

In a recent paper, Kjell Johan Sæbø (Sæbø, 2004) has developed a natural pragmatic solution to the long-standing problem of Free Choice Permission. In his theory the free choice assumption (12b) that is communicated by uttering sentences like (12a) comes out as a conversational implicature.

(12) a. You may take an apple or a pear.
b. You may take an apple and you may take a pear.

Using the framework of Bidirectional OT his solution conforms to the global approach to conversational implicature. However, examples like (13) proposed by Kamp (1973) argue against seeing this inference as a purely conversational implicature.

(13) Usually you may only take an apple. So, if you may take an apple or a pear, you should bloody well be pleased.

In cases like (13) the free choice inference projects like an explicature. The disjunctive permission is the antecedent of a conditional, and the strong interpretation of it rather serves to weaken the assertion than to strengthen it. Sæbø (2004) has interpreted this behaviour by considering the implicated assumption as constituted by an *utterance report* which is used in the embedded sentence (‘they tell you that you may take an apple or a pear’). He points out that the strong interpretation is not always available in embedded positions and gives the following examples.

(14) a. I hope you may take an apple or a pear; then, you won't feel so hungry.
b. If you may take an apple or a pear, you must take a pear.
c. If they tell you that you may take an apple or a pear, take a pear.

In example (14a), the free choice is not readily available, but in (14b) it is, at least if a paraphrase like (14c) is possible. Sæbø's treatment relates to Carston’s (2004) analysis that also refers to different uses of the embedded material (Carston 2004; especially chapter 4). Carston distinguishes between material that is used *descriptively* or *meta-representationally*. In case of the meta-representational use the implicated assumption becomes part of the proposition expressed and projects like explicatures.

Generally, it can be concluded that the strategy of treating embedded material meta-representationally can be useful, but it still leaves us with the problem of explaining the exact projection behaviour of (ordinary) implicatures,

a task that cannot be solved by simply stipulating two modes of use (as RT does). Instead, implicatures in complex sentences can be explained best by the global, rationalist approach to communication where the introduction of meta-representational elements is modelled.

## 4 Fossilization and a local theory of embedded implicatures

In the previous section I outlined a global approach to implicatures in complex sentences based on a Neo-Gricean framework of OT pragmatics. The approach rests on several assumptions that I will list here once more:

(i) Merin's (1997) local theory of relevance.
(ii) A Neo-Gricean theory of scalar implicatures based on a global blocking mechanism.
(iii) Soames' reconsideration of the epistemic status of scalar implicatures paired with a default mechanism of neg-raising.

None of these assumptions has a stipulative character; rather each of them is motivated by independent evidence that has nothing to do with the projection behaviour of implicatures. While claiming that a global theory can explain complex implicatures, it is essential to state that a global theory cannot count as an actual mechanism of language performance, since it doesn't conform to the principles of online, incremental interpretation. Rather, a global account describes the general forces that direct communication. It has a diachronic dimension. In order to get a synchronic system which describes the actual pragmatic inferences, the idea of *fossilization* has been proposed (Blutner, 2006). A theory of fossilization describes how pragmatic inferences become automatized and form part of an efficient cognitive system that makes fast online processing possible. The theory conforms to a memory/instance theory of automatization (cf. Logan, 1988).

The presumption of fossilization can be seen as a theory that realizes Dawkins' (1983) idea of *memic selection*. This idea conforms to the "universal Darwinist" claim (Dennett, 1995) that the methodology of evolutionary theory is applicable whenever any dynamical system exhibits (random) variation, selection among variants, and thus differential inheritance. Related proposals are Steels' recruitment theory of cultural evolution (e.g., Steels, 1998) and Kirby's paradigm of iterated learning (e.g., Kirby, 2000).

OT is a system of knowledge representation that invites for the development of the evolutionary perspective because the manipulation of the different rankings of a given system of constraints is a powerful but computationally simple task. It has been applied to the area of lexical pragmatics, especially in order to explain the phenomenon of broadening and strengthening in connection

with the prepositions *om* and *rond* in Dutch (Zwarts, 2005). In a related paper (Blutner, 2006) I proposed to apply the theory to phenomena outside the realm of lexical pragmatics.

Though real simulation results are missing at the moment there are some psychological implications of the new perspective of fossilization. Recent data of Noveck's experimental pragmatics group (cf. Noveck, 2005) suggests that children are sometimes more logical than adults. In one of their experiments they presented children and adults with sentences such as (15a) where a relatively weak term is used in scenarios where a stronger term is justified. From a logical point of view (15a) is obviously true. We know that elephants in general have trunks, from which it logically follows that (at least) some of them do. Things are changing if we take pragmatics into account. Understood as carrying a scalar implicature, a sentence like (15a) is not true but false. In order to make the situation even more perplex for the subjects the experimental items like (15a) were presented along with control items that are patently true or patently false, like in (15b) and (15c) respectively:

(15) a. Some elephants have trunks.
b. Some houses have bricks.
c. Some crows have radios.

Surprisingly, younger children are typically more likely than adults to find the experimental utterance acceptable. One possibility to interpret this data is to assume that children are pragmatically delayed at young ages. From the fossilization perspective, it can be claimed that scalar inferences become automatic with age and that the experimental results are simply revealing how such inference-making matures.

This way of explaining the basic empirical finding contrasts with the view of Relevance Theory that 'would suggest that children and adults use the same comprehension mechanisms but that greater cognitive resources are available for adults, which in turn encourages them to draw out more pragmatic inferences' (Noveck, 2005). Noveck's data seem to confirm Relevance Theory, especially the data that show a link between scalar-inference production and task complexity. However, the present view of fossilization does not necessarily conflict with these findings since memory-based automatization does not mean that the task complexity cannot have any influence.

## 5 Conclusions

As with global and local accounts of lexical pragmatics, the present investigation sees global and local accounts of embedded implicatures as complementary: the global account has a diachronic dimension and allows a

rational foundation of conversational implicatures; the local account describes the actual, synchronic dimension – it explains how online, incremental interpretation of complex sentences is possible. The connection between the two views results from assuming that the results of global optimization fossilize into a local mechanism of utterance processing. A theory of fossilization has important consequences for overcoming the predominant, synchronic view of language, for assimilating language competence and language performance, and for getting a better understanding of the division of labour between semantics and pragmatics. At present, we do not have a real theory of fossilization, but it appears that OT pragmatics has the appropriate tools in order to formulate such a theory.

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## References

Beaver, D., and H. Lee (2004): 'Input-output mismatches in OT', in R. Blutner & H. Zeevat (eds.): *Optimality Theory and Pragmatics*, Houndmills, Basingstoke, Hampshire: Macmillan/Palgrave.

Benz, A. (2003): 'Partial Blocking, associative learning, and the principle of weak optimality', in J. Spenader, A. Eriksson & Ö. Dahl (eds.): *Proceedings of the Stockholm Workshop on Variation within Optimality Theory*, pp. 150-159, Stockholm.

Blutner, R. (1998): 'Lexical pragmatics', *Journal of Semantics* **15**, pp. 115-162.

Blutner, R. (2000): 'Some aspects of optimality in natural language interpretation', *Journal of Semantics* **17**, pp. 189-216.

Blutner, R. (2006): 'Optimality Theoretic Pragmatics and the Explicature/Implicature Distinction', in N. Burton-Roberts (ed.): *Advances in Pragmatics*, Houndmills, Basingstoke, Hampshire: Macmillan/Palgrave.

Blutner, R., E. Borra, T. Lentz, A. Uijlings, and R. Zevenhuijzen (2002): 'Signalling games: Hoe evolutie optimale strategieen selecteert', *Handelingen van de 24ste Nederlands-Vlaamse Filosofiedag*, Amsterdam: Universiteit van Amsterdam.

Blutner, R., H. de Hoop, and P. Hendriks (2005): *Optimal Communication*, CSLI.

Blutner, R., P. Hendriks, and H. de Hoop (2003): 'A new hypothesis on compositionality', in P. P. Slezak (ed.): *Proceedings of the Joint International Conference on Cognitive Science*, Sydney: ICCS/ASCS.

Blutner, R., and H. Zeevat (eds.) (2004): *Optimality Theory and Pragmatics*, Houndmills, Basingstoke, Hampshire: Palgrave/Macmillan.

Burton-Roberts, N. (2005): 'Robyn Carston on semantics, pragmatics and 'encoding'', *Journal of Linguistics* **41**, pp. 389-407.

Carston, R. (2002): *Thoughts and Utterances: The Pragmatics of Explicit Communication*, Oxford: Blackwell.

Carston, R. (2003): 'Explicature and semantics', in S. David & B. Gillon (eds.), *Semantics: A Reader*, pp. 817-845, Oxford: Oxford University Press.

Carston, R. (2004): 'Relevance theory and the saying/implicating distinction', in L. Horn & G. Ward (eds.), *Handbook of Pragmatics*, pp. 633-656, Oxford: Blackwell.

Chierchia, G. (2004): 'Scalar implicatures, polarity phenomena, and the syntax/pragmatics interface', in A. Belletti (ed.), *Structures and Beyond*, pp. 39-103, Oxford: Oxford University Press.

Dalrymple, M., M. Kanazawa, Y. Kim, S. Mchombo, and S. Peters (1998): 'Reciprocal expressions and the concept of reciprocity', *Linguistics and Philosophy* **21**, pp.159-210.

Dawkins, R. (1983): *The extended phenotype*, Oxford: Oxford University Press.

de Hoop, H., and H. de Swart (2000): 'Temporal adjunct clauses in optimality theory', *Rivista di Linguistica* **12**(1), pp. 107-127.

Dekker, P., and R. van Rooy (2000): 'Bi-directional optimality theory: An application of game theory', *Journal of Semantics* **17**, pp. 217-242.

Dennett, D. (1995): *Darwin's dangerous idea*, New York: Simon & Schuster.

Gazdar, G. (1979): *Pragmatics*, New York: Academic Press.

Hendriks, P., and H. de Hoop (2001): 'Optimality theoretic semantics', *Linguistics and Philosophy* **24**, pp. 1-32.

Horn, L. (1984): 'Towards a new taxonomy of pragmatic inference: Q-based and R-based implicature', in D. Schiffrin (ed.): *Meaning, form, and use in context: Linguistic applications*, pp. 11-42, Washington: Georgetown University Press.

Horn, L. (1989): *A natural history of negation*, Chicago: Chicago University Press.

Jäger, G. (2002): 'Some notes on the formal properties of bidirectional optimality theory', *Journal of Logic, Language and Information* **11**, pp. 427-451.

Kamp, H. (1973): 'Free choice permission', *Proceedings of the Aristotelian Society, New Series* **74**, pp. 57-74.

Kirby, S. (2000): 'Syntax without natural selection: how compositionality emerges from vocabulary in a population of learners', in C. Knight, M. Studdert-Kennedy & J. R. Hurford (eds.): *The Evolutionary Emergence of*

*Language: Social Function and the Origins of Linguistic Form*, pp. 303-323, Cambridge: Cambridge University Press.
Krifka, M. (1995): 'The Semantics and Pragmatics of Polarity Items', *Linguistic Analysis* **25**, pp. 209-257.
Levinson, S. (2000): *Presumptive meaning: The theory of generalized conversational implicature*, Cambridge, Mass.: MIT Press.
Logan, G. D. (1988): 'Toward an instance theory of automatization', *Psychological Review* **95**, pp. 492-527.
Mattausch, J. (2004): *On the Optimization & Grammaticalization of Anaphora,* Unpublished Ph.D. Thesis, Humboldt University, Berlin.
McCawley, J. D. (1978): 'Conversational implicature and the lexicon', in P. Cole (ed.): *Syntax and Semantics 9: Pragmatics*, pp. 245-259, New York: Academic Press.
McCawley, J. D. (1993): *Everything that Linguists have Always Wanted to Know about Logic, 2nd edition*, Chicago, IL: University of Chicago Press.
Merin, A. (1997): 'If all our arguments had to be conclusive, there would be few of them', *Arbeitspapiere SFB 340,* Stuttgart.
Noveck, I. A. (2005): 'Pragmatic inferences related to logical terms', in I. A. Noveck & D. Sperber (eds.): *Experimental Pragmatics*, Houndmills, Basingstoke, Hampshire: Palgrave MacMillan.
Russell, B. (2004): *Against grammatical computation of scalar implicatures*, Brown University, Department of Cognitive and Linguistic Sciences.
Sadock, J. M. (1978): 'On testing for conversational implicature', in P. Cole (ed.), *Syntax and Semantics, Volume 9: Pragmatics*, pp. 281-297, Academic Press.
Sæbø, K. J. (2004): 'Optimal interpretations of permission sentences', in D. de Jongh & P. Dekker (eds.): *Proceedings of the 5th Tbilisi Symposium on Language, Logic and Computation*, pp. 137-144, Amsterdam and Tbilisi.
Sæbø, K. J. (2005): *Focus Interpretation in Thetic Statements: Alternative Semantics and OT Pragmatics*, ms. University of Oslo.
Sauerland, U. (2004): 'Scalar implicatures in complex sentences', *Linguistics and Philosophy* **27**, pp. 367-391.
Smolensky, P., and G. Legendre, (2005): *The Harmonic Mind: From neural computation to optimality-theoretic grammar*, Cambridge, Mass.: MIT Press.
Soames, S. (1982): 'How presuppositions are inherited: A solution to the projection problem', *Linguistic Inquiry* **13**, pp. 483-545.
Sperber, D., and D. Wilson (1986): *Relevance*. Oxford: Basil Blackwell.
Stalnaker, R. (2006): 'Saying and meaning, cheap talk and credibility', in A. Benz, G. Jäger & R. van Rooy (eds.): *Game Theory and Pragmatics*, pp. 82-101, Palgrave MacMillan.
Steels, L. (1998): 'The origins of syntax in visually grounded robotic agents', *Artificial Intelligence* **103**, pp. 133-156.

van Kuppevelt, J. (1996): 'Inferring from Topics: Scalar Implicature as Topic-Dependent Inferences', *Linguistics and Philosophy* **19**, pp. 555-598.
Van Rooy, R. (2004): 'Signalling games select Horn strategies', *Linguistics and Philosophy* **27**, pp. 493-527.
Van Rooy, R. (to appear): 'Relevance of complex sentence', *Mind and Matter*.
Winter, Y. (2001): 'Plural predication and the Strongest Meaning Hypothesis', *Journal of Semantics* **18**, pp. 333-365.
Zeevat, H. (2000): 'The asymmetry of optimality theoretic syntax and semantics', *Journal of Semantics* **17**, pp. 243-262.
Zwarts, J. (2003): 'Lexical Competition: 'Round' in English and Dutch', in P. Dekker & R. van Rooy (eds.): *Proceedings of the Fourteenth Amsterdam Colloquium*, pp. 229-234, Amsterdam: ILLC.
Zwarts, J. (2005): *Om en rond: Een semantische vergelijking*, Radboud, University Nijmegen.

# THE PRAGMATIC NATURE OF GRAMMATICAL CATEGORIES

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**Abstract**

This paper promotes the hypothesis that central grammatical categories must be analysed as pragmatic rather than semantic entities, in order to explain their seemingly redundant typological distribution. A case is made of the relatively complex English past tense system versus the single Russian past tense, and it is shown how the distinctions within the former system can be analysed in terms of pragmatic features like topic and focus, and how it thus can be explained how Russian may do with just a single past tense, without this leading to a communicative asymmetry between Russian and English.

## 1 The pragmatic nature of grammatical categories

The topic of this paper is a seemingly trivial linguistic fact, but it has strong implications for linguistic description: It is the fact that a grammatical category may be compulsory in one language, but absent in another. Compare, for instance, the distinction between the past tense system in English and that of Russian. Whereas English has several tense forms in the past – e.g. the perfect, the preterit and the pluperfect – Russian has only one. This means that the Russian past tense sentence in (1) has three possible English translations:[1]

(1) Ja kupi-l nov-uju kurtk-u.
I buy.PEF-PST.M.S new-ACC.F jacket-ACC[2]
'I have bought a new jacket.' / 'I bought a new jacket.' / 'I had bought a new jacket.'

This seems trivial, because is not the English past tense system just another case of language redundancy? Most marking of grammatical categories seems to be

[1] The fact that Russian makes a distinction between perfective and imperfective aspect, is irrelevant to the asymmetry between the English and the Russian tense systems. A past tense imperfective verb in Russian would have the same threefold translational possibility in English.

[2] The abbreviations found in the glosses are explained at the end of the paper.

redundant, because the interpretations of the different categories would in any case be recoverable from the context. For instance, if a language does not express any tense distinctions at all, the narrative context will nevertheless show whether the sentence you utter should be interpreted as present, past or future tense. Most reasonably, the same must be the case with the asymmetry between the English and the Russian past tense systems. Russian may do with only one past tense form in (1), because the three different interpretations are dependent on three different contexts.

The asymmetry between languages as far as the number of grammatical categories is concerned, is thus mainly dealt with by letting either semantics or pragmatics handle the interpretations in question. If a category C is expressed formally in language X, the interpretation of C becomes a semantic/lexical issue. If the same category C is not expressed in language Y, the context will show us whether an utterance U from language Y would correspond to C or another category C' in language X – thus, an interpretation of U in language Y, entailing the concept in C, must be explained in pragmatic/contextual terms.

This is a very reasonable idea, not at least since the alternative would be to resort to the Whorf-Sapir hypothesis: The presence of a grammatical category in language X, and its absence in language Y, would mean that the concept of this grammatical category would be unthinkable to the users of language Y. For instance, it would follow that the absence of tense in Hopi means that speakers of Hopi do not have any concept of time. Since the Whorf-Sapir hypothesis, at least in its strong form, has been completely rejected by modern linguistics, we would want to avoid such a conclusion, and the alternative is to rely on contextual interpretations.

The pragmatic solution in itself is therefore not a problem. The problem is how linguists have implemented it in practice in semantics and in linguistic typology. First of all, the pragmatic interpretations themselves are rarely described. More work is needed on how the sense of different grammatical categories can be obtained from the context. Secondly, the pragmatic solution has been treated merely as a default option for unexpressed categories, without considering that it also has consequences for the analysis of the overtly expressed categories. If the typology of grammatical categories is such that in any language a given grammatical category may be realised either as an overtly expressed category or as a contextual interpretation, it follows that the semantics of the overtly expressed category must be described in such a way that it can be shown how the same sense could just as well have been retrieved from the context. In short terms, grammatical categories must be analysed as pragmatic rather than semantic entities.

In order to appreciate this point, let us consider the analysis of the past tense. In the traditional Reichenbachian model tenses are described in terms of

the three features E (=Event point), R (=Reference point) and S (=Speech point), and the difference between the perfect and the preterit is a question of whether R coincides with E or with S:

Perfect: E_R,S (E precedes R, which coincides with S)
Preterit: E,R_S (E coincides with R, and they precede S)
Pluperfect: E_R_S (E precedes R, which precedes S)

How do we describe the semantics of the single Russian past tense within this model? We could either give it a very simple semantic representation, by only using the features E and S:

Russian past tense: E_S (E precedes S)

This correctly covers the *semantics* of the Russian past tense, but it fails to describe how the different past tense interpretations like perfect, preterit, etc…, are retrieved from the context. Another possibility would be to take the different contextual interpretations as the starting point, and give them the same descriptions as the English tenses, but this solution fails to explain how the contextual interpretations are related to the lexical semantics of the morphological category itself, which necessarily must be the same in all three contexts. The Reichenbachian "reference point" is at the heart of the problem, but although the term may be understood as some kind of pragmatic concept, this term alone may not necessarily be the ideal solution.

What we need is a model where a simple semantic description is given to the Russian past tense category, but where it is shown how different *pragmatic* structures overlaying that semantic description will lead to the wanted interpretations. But it follows that in order to do so, it will first be necessary to show how the differences between the English past tenses are mainly of a *pragmatic* nature. This analysis will serve to exemplify the said main target of the paper: To show how redundant grammatical categories may, and, whenever possible, *should* be analysed as mainly pragmatic in nature, in order to explain how they may be compulsory in some languages, but absent in others.

## 2 A pragmatic analysis of a complex past tense system

English has three main tense distinctions in the past: The perfect, the preterit and the pluperfect.[3] There has been some discussion about whether the perfect forms should be considered real tenses or subtypes of aspect (cf. Comrie 1976: 5-6, 52-65). For the present discussion the question is irrelevant. The perfect forms do

[3] I will ignore such subtypes as the past conditional in this paper.

not interfere with the Russian aspect, as any Russian aspect can be given both perfect and preterit interpretations in English. The same holds for the perfect tenses in English, which can take both progressive and non-progressive event descriptions as their input ("have been doing" vs. "have done"). Furthermore, the purpose of this discussion is to show how a single Russian form may correspond to both the preterit and the perfect in English, regardless of whether these forms are tenses or aspects.

Comrie furthermore argues that there is an essential distinction between the (present) perfect and the other perfect tenses (cf. Comrie 1985: 77-82). His typology distinguishes between absolute tenses (the present, the past and the future), which by their very nature specify the temporal confines they assign an event to, and relative tenses, which do not specify any temporal confines of their own, but which are defined relatively to some other temporal entity. The pluperfect and the future perfect are *absolute-relative* tenses, as they are defined relatively to an absolute tense (the past and the future respectively). The problem is to classify the perfect into this typology. At first sight it might seem parallel to the other absolute-relative tenses. Where the pluperfect assigns an event to a point in time preceding the absolute past tense, the perfect assigns an event to a point in time preceding the absolute present tense. The problem is that this makes the perfect indistinguishable from the preterit/simple past, which has the exact same definition. Comrie points out several other semantic and typologic features which set the perfect apart from the other perfect tenses, and concludes that the perfect does not take part in his typology of tenses, but is a totally different kind of entity. On this basis Comrie also refrains from defining the perfect in his work on tense (Comrie 1985: 32-35).

Comrie's observation shows that the preterit and the perfect are in some way in conflict. When examining the context-dependency of different past tense forms, a distinction turns up in situations where there is no preceding context, e.g. at the outset of a conversation or narration. Here the perfect is licit (2a) but the preterit is not (2b)[4]:

(2) a. I have lived in Russia.
b. #I lived in Russia.

(2b) forces the addressee to search for a given context in which a past situation is under discussion, so that my living in Russia can be interpreted as coinciding with that point of time. (2a) sounds much better on its own, and even though it might be argued that (2a) also needs a context, it does not have to be a past time context. It follows that the preterit functions like an unbound variable, which

[4] The notation "#" indicates that although the example is grammatically correct, it is contextually illicit.

must be bound sentence-externally or internally (by a temporal adverbial). These types of binding, exemplified in (3a) and (3b) respectively, are able to save the interpretation of a preterit form of the verb "to live":

(3) a. I have met Putin. It happened in my youth. I lived in Russia, and…
b. Last year I lived in Russia.

The perfect, on the other hand, can by itself render an interpretation for its past time event. Its interpretation, however, will always be indefinite. Even when a past time reference is available in the preceding context, the perfect will remain indefinite:

(4) # One day I went to visit the Kremlin, and there I have met Putin.

(4) fails to provide the intended reading that my meeting with Putin happened during the given visit to the Kremlin, or is at least decidedly strange with such a reading. Instead, it simply states that my meeting with Putin could have happened at any time. The reason why this "any time" is hard to connect to the contextually given point in time, may be traced back to Gricean pragmatics. The grammar already contains a form which is restricted to definite readings, the preterit. Avoidance of its use might signal that the point in time provided by the perfect itself cannot possibly coincide with a contextually given time. In either case the perfect's ability to operate even outside past time contexts, and its indefinite sense in such uses, suggests that the perfect in itself contains an existential operator which binds the interpretation of the point in time. Unlike the preterit, which may be paraphrased as "at the given point X in the past, the event Y occurred", the perfect may be paraphrased as "at some point X in the past, the event Y occurred".

While the perfect seemingly always conveys an existential/indefinite reading, a sentence with the preterit does not always have a definite reading. Compare the sentences in example (5):

(5) a. I have slept well today.
b. *I have slept well yesterday.
c. I slept well yesterday.

The perfect tense can be combined with a temporal adverbial and render an existential reading within the adverbial's time frame, provided that the adverbial also includes the point of speech, as it does in (5a). If it does not, as in (5b), the sentence is ungrammatical. However, the intended reading is saved by employing the preterit tense, as in (5c). But this means that (5c) has an existential reading, viz. that for some time yesterday it was true that I slept well.

I will return to this problem, but for now it can be concluded that the perfect tense renders an existential reading, while the preterit has a referential reading, unless it is bound by a temporal adverbial.[5]

The point of the current discussion has been to reveal the opposition perfect-preterit as an opposition between what I will call *existential* and *referential* tense. While the former, like the perfect, predicates the existence of a point in time of its own, the latter, like the preterit, only predicates events holding of a presupposed point in time, to which it refers. In the latter case the given point in time may already be provided through other events, without this interfering with the use of the preterit, cf. (3a), where my living in Russia is a further addition to the point in time for which it happened that I met Putin. In other words, in the existential tense the existence of a point in time is a focus, while in the referential tense it is a topic. This fact can also be disclosed by examining the scope of negation in the two types of tenses:

(6) a. I haven't been inside the Kremlin.
b. I went to visit Putin in the Kremlin, but he wasn't there.

It is an established truth in semantics and pragmatics that the scope of negation coincides with the scope of focus (e.g. Jackendoff 1972: 254-255). Observe the consequences this leads to for the sentences in (6). (6a) conveys the idea that there has never been a point in time for which I have been inside the Kremlin. In (6b), on the other hand, the negation only states that at the point in time when I went to visit Putin, he was not in the Kremlin. Consequently, in the perfect the negation has scope over the existence of a point in time ("there does not exist any point in time in the past at which the event X has occurred"), but in the preterit the negation only has scope over the *event*, which in turn is assigned to a *presupposed* point in time ("at the given point in time in the past, the event X did not occur").

This is not to say that the perfect always has a strict "never"-reading. Take the sentence "Putin hasn't been in the Kremlin", for instance. Our knowledge of the world leads to the conclusion that Putin must at some point in time have been to the Kremlin, consequently the "never"-reading is ruled out. Instead, the sentence would be more natural in a context in which a certain period of time is under discussion (i.e. "Do you know where Putin has been this week?" "Well, he hasn't been inside the Kremlin" (= "there does not exist any point in time

[5]This does not mean that the sentence-internal presence of a temporal adverb automatically forces an existential reading. Imagine the following as an extract from a conversation: "I went to visit the Kremlin, and there I met Putin." "When did this happen?" "It happened last year." In the last sentence "it happened" refers to a definite point in time, and this definite point in time is located within the period of last year. The crucial problem seems to be whether the temporal adverb serves as a topic or a focus for the event.

during this week at which the event X has occurred")). The important point is that the perfect picks out an indefinite point in time, either in the entire past or in a subpart of it, whereas the preterit refers to a given, definite point in the past. It can be concluded that in an existential tense like the perfect, the existence of a point in time is promoted as new/focalised information, while in a referential tense like the preterit, the existence of a point in time must be given/presupposed information, outside the scope of focus.

Having said all this on the perfect-preterit-opposition, let us consider the pluperfect:

(7) a. I had slept well.
b. I had slept well the day before.

Is it existential or referential? The pluperfect seems at first to be referential, in the sense that it cannot occur out of context, but must be bound to a contextually given point in time (e.g. "I felt so fine when I woke up this morning. Obviously I had slept well," where the moment of my waking up is the given point). But notice that the *event itself*, in this case the event of my sleeping, is not bound to the given point, but to indefinite points in the time span preceding my waking up. It appears that the pluperfect is both existential and referential. The most straightforward explanation of this paradox is the morphological complexity of perfect tenses in English. The auxiliary is conjugated in a referential tense like the present or the preterit, while the auxiliary together with the participle constitutes an existential tense (the perfect and the pluperfect), which picks out indefinite points in the time-span preceding the reference point of the auxiliary's referential tense.

But on closer scrutiny it turns out that the pluperfect construction is not exclusively existential. Comrie's observation that the present perfect is distinct from the secondary perfect tenses (the pluperfect and the future perfect), is among other things based on the acceptability of the latter in the presence of temporal adverbials, as seen in (7b). The pluperfect in (7b) deviates from the present perfect, as the latter cannot be used with a temporal adverbial which excludes the reference point of the auxiliary's tense. In (5b) the use of the present perfect is illicit, because the present tense of the auxiliary refers to the point of speech, but this is not included in the adverbial "yesterday", hence the preterit must be used instead, as in (5c). In (7b), however, the past tense of the auxiliary does not refer to a point which is included in the adverbial "the day before", but nevertheless the pluperfect is accepted.

Furthermore, the pluperfect can also be referential in the same way as the preterit, in the sense that the *event* is assigned to definite points in time provided by the context:

(8) I had met Putin the year before. I had gone to visit the Kremlin one day, and there he had shaken hands with me.

It was shown in (4) that the present perfect inevitably yields an existential interpretation to the point in time to which the event is assigned, but both the second and the third token of the pluperfect in (8) have the event coincide with the point in time given in the preceding context. These instances correspond to cases where the present perfect would have failed and would have been replaced by the preterit, due to the opposition between existentiality and referentiality. The pluperfect, however, accepts such usage. Thus the pluperfect seems to accept both existential and referential readings. How is this possible?

I will argue that the function of the pluperfect is to fulfil some additional logically possible roles in the English tense system. It has already been shown how the perfect can predicate the existence of a point in time in the past (i.e. in the time span preceding the point of speech), and how the preterit can refer to the same point afterwards. The pluperfect makes it possible to repeat both these processes: The pluperfect can predicate the existence of a point in time preceding a formerly given point in the past – and, as seen in (8), it can also refer to the same point afterwards. It can even be used to repeat the process a third time, as in the third clause in (9):

(9) I had tried to visit Putin the year before. I had come to the Kremlin, but he had already left.

In theory, the procedure can be repeated indefinitely, but the longer the process is driven, the harder it gets to interpret the results. In most cases the referential part is taken over by the preterit tense, as the latter only demands a past time context, no matter at what preceding level that point has been predicated. Nevertheless, the strict perfect-preterit-opposition only exists at the first step of predicating a point in time; the pluperfect is left with all subsequent steps. In fulfilling this double role, being both existential and referential, the pluperfect is similar to the Russian past tense. The difference is that the Russian past tense covers the existential and referential interpretations at *all* steps of predication in the past tense, i.e. for *all* points in time preceding the point of speech, while the English pluperfect covers existential and referential tense only for secondarily predicated points in time. In any case, this is where the English and Russian tense systems meet – in performing the processes of predicating and referring to points in time. The question now is how it is possible for one tense form, be that the English pluperfect or the Russian past tense, to have both existential and referential temporal functions; how these are kept apart, and how they are repeated.

## 3 A pragmatic analysis of the Russian past tense

As said earlier, the wanted semantic description of the Russian past tense must allow for the intended interpretations to be rendered through different pragmatic structures overlaying that semantic description. The interpretations in question are the existential and the referential tenses, and the difference between the two has been defined as to concern the pragmatic status of the existence of a point in time. In the existential tense its existence is focus information, and in the referential tense it is presupposed information. Thus, in order to predict the interpretational outcome of a single semantic tense, it must be possible to show which parts of its semantic description that are topic and focus.

I will propose a simple semantic description of the Russian past tense, in the shape of a *locative predicate*. By "locative predicate" is meant a predicate which connects an argument *x* with an argument *y*, through a relation which states that *x* is located at/in *y*, i.e. L (x,y). The argument *x* in this case is a point in time, and the argument *y* is the time span preceding the point of speech, so that the Russian past tense simply states that a point in time is located within a time span which precedes the point of speech. The further nature of *x* and *y* will be defined by other semantic entities in the clause or in the immediate context. The point in time *x* will always be the point in time at which the event of the predicate takes place, while the time span *y* may for instance be restricted by temporal adverbs. So, for instance, in a clause like "In 1963 Kennedy was shot", the past tense states that a point in time *x* is located within a time span *y* (which must precede the point of speech), and that *x* is the time at which the event of Kennedy being shot took place, and that *y* is the time span between the 31st of December 1962 and the 1st of January 1964.

I will argue that the distinction between existential and referential tense may simply be described as a matter of whether L (x,y) is the focus together with the event in question, or if only the event is focused, while L (x,y) is the topic. If both L (x,y) and the event constitute the focus (in other words, the new information), it means that the new information is that there exist a point *x* in the time span *y*, and that an event *z* takes place at point *x*. If L (x,y) is topic (in other words, presupposed information), it means that the only new information is that the event *z* takes place at the presupposed point *x*.

These two different pragmatic structures can be further explained through paraphrases in terms of "normal" locative sentences. A sentence like "There is a book on the table" both focalises the existence of an entity at the table, and the fact that this entity is a book, like the existential tense both focalises the existence of a point in time, and the fact that the event *z* takes place at this point. A sentence like "The thing which is on the table is a book" only focalises the description of the entity at the table – its existence on the table is given

information. In the same manner the referential tense only focalises a description of a point in time, namely that the event *z* takes place there – the existence of the point in time is given information. Such a distinction in locative clauses is reflected grammatically in many languages, and is therefore not any *ad hoc* distinction. In both Russian and in Turkish these two types of locative clauses are kept apart by the presence vs. the absence of a grammatical morpheme (*est´* in Russian and *var* in Turkish).

Turning back to how these operations actually are performed, consider the following example:

(10) Putin čita-l "Vojnu i mir".
Putin read.IMP-PST.M.S "War and Peace".
'Putin has read/was reading/had read "War and Peace".'

Without any preceding past tense context in the conversation, there would be no contextually given past time point *x* to which the event could refer. Likewise, the past tense would be in use for the first time in the immediate context, so that L (x,y) would be utterly new information. The existence of a point in time *x* in the past would therefore also be new information. It follows that the perfect tense is preferable in the English translation, given such a lack of past time context: "Putin has read "War and Peace"."

If (10) had been immediately preceded by a context stating that I have met Putin, and that I met him in his private study, the point in time for which it is true that Putin was reading "War and Peace" could easily be interpreted as identical to the point in time mentioned immediately before in the context, e.g. our meeting in his study. In such a context the point in time *x* is presupposed as existent, since it has already been presented in the preceding context. On this interpretation the only new information which is expressed by (10) is that the event of Putin reading "War and Peace" holds for the point in time of our meeting, and the English translation would have used the preterit tense: "Putin was reading "War and Peace"." It follows that the Russian past tense morphology does not predicate the existence of any points in time in this latter case. Arguably, it is instead used to mark a *topic* of the clause, i.e. that the clause gives information about a (topicalised) point in the past.

The definition of the Russian past tense is not yet complete. It must be ensured that the secondary (and subsequent) existential and referential interpretations, like the pluperfect translation of (10), are also covered by the definition. The different levels of existential and referential interpretations depend on the definition of the time span *y*. At the first level (the English present perfect) *y* is interpreted as all points in time preceding the point of speech. The secondary level (the English pluperfect) involves the points in time preceding the point *x* of the *first* level's L (x,y). A third level (like in (9)) can be

established through the *x* of the *second* level, and so it continues, as long as interpretations are practically possible.

Since the definition of the time span *y* is not necessarily lexically expressed (although it may be expressed through temporal adverbials), the context must once again be the defining factor. As demonstrated above, each level is defined relatively to all points in time preceding a presupposed point in time. This point is either equal to the point of speech, or is itself preceding the point of speech, and usually this point is the most recently mentioned point in the context.

Hence, if (10) has a preceding context in which I describe a meeting I had with Putin in the past, during which we discussed the works of Tolstoy, and "War and Peace" was raised as a topic after a while, a pluperfect interpretation of (10) is possible: If the context does not invite the interpretation that Putin is reading the book there and then, a secondary interpretation is called upon – Putin's reading must be assigned to an even earlier moment. In order for this to happen, the L (x,y) of (10) cannot be a topic. If it were, it would have been identical to the L (x,y) in the preceding context, and thus also the *x* of Putin's reading "War and Peace" would, mistakenly, have been identical to the *x* of our discussion of the book. Instead, L (x,y) of (10) must be a focus; it must be new information. It will then predicate a new *x*, which not only precedes the point of speech, but which also precedes the *x* of our discussion. This amounts to saying that context defines the time span *y* as not merely all points preceding the point of speech, but as all points preceding the *x* under discussion.

There is much more to be said on the use of the Russian past tense, especially its interaction with aspect. However, I will only illuminate one particular type of interaction between aspect and tense, which demonstrates the flexibility and the explanatory force of the pragmatic analysis given to the Russian past tense. I will not offer any in-depth analysis of Russian aspect as such, but just rely on the analysis given by Klein (1995). In short terms he describes imperfective aspect as the assertion of a single state, where "state" is understood in its broadest sense, covering both on-going activities and persisting states. Perfective aspect involves the assertion of two successive states: a source state (which is interpreted just as broadly as the state of the imperfective aspect) and a succeeding target state, which appears as a result of the source state. There is much more to be said on his analysis of aspect, but this main distinction between one or two asserted states is what is crucial for the current theory.

Now consider the fact that a series of perfective verbs in the past tense in Russian typically denotes a series of successive events:

(11) Ja nade-l kurtku, otkry-l dver´ i
I put.on.PEF-PST.M.S jacket, open.PEF-PST.M.S door and
vyshe-l.
exit.PEF-PST.M.S
'I put on a jacket, opened the door and went out.'

If imperfective verbs had been used in (11), a reading with successive events would have been hard to achieve. Rather it would imply that all events took place at the same time, or at random times. So there is a question of how successive events are dependent on perfective aspect, but an even more important question concerns the current theory: Given that the past tense in all these verbs is arguably a case of referential tense (given the preterit tense translation), how can the topicalised L (x,y) in all these verbs refer to a presupposed point in time, when the reference point clearly changes for each verb? The event of the donning of the jacket takes place at a different time from the opening of the door, which again is different from the event of walking out the door.

The solution lies in the nature of the perfective aspect. As this aspect involves two successive events, they cannot refer to the same point in time. Consequently, when the source state of the donning of the jacket refers to a reference point *x*, the target state cannot refer to the same point *x*. By default the perfective aspect's target state establishes the existence of another point in time, succeeding the previous point. This default operation of the perfective aspect is functionally the same as using a locative predicate like L (x,y) – i.e. the existence of a point *x* is established in a time span *y*. Consequently, the past tense L (x,y) of the following verb, "opened", may be a topicalisation of the perfective aspect's identical operation. It furthermore follows that the point *x* to which the source state of "opened" refers, is the point which has been established by the previous verb's target state. This operation still satisfies the requirements of the referential tense, i.e. that the existence of a point in time must have been given in the preceding context. Then we see the same operation being performed again, when the target state of "opened" establishes the existence of yet another point in time, to which the referential tense and the source state of "went out" may refer to.

The use of the referential tense is thus not restricted to cases where the presupposed point in time was originally established by a morphological tense as such. The same fact may hold for cases where a referential tense is used together with a temporal adverb, like in (5c). Arguably, the temporal adverb "yesterday" itself establishes the existence of a point in time *x* within the time span denoted by "yesterday". This therefore constitutes an L (x,y), to which a referential past tense may refer, and this in turn explains why the otherwise

purely referential preterit in English seemingly has an existential reading in such cases. The answer is that the tense itself remains referential, but that the existential reading is caused by the temporal adverb's establishing of a point in time *x*.

## 4 Conclusion

In the main discussion in this paper I have demonstrated how the distinction between different past tenses in English may be described as a purely pragmatic distinction, and that by extension of this analysis the single Russian past tense may be given a simple semantic description, but nevertheless be shown to achieve the same interpretations as the different English past tenses, by virtue of the same pragmatic distinctions.

The main idea, though, is that similar analyses are possible, and should be preferred, when analysing other grammatical categories. In Eriksen (2006) I attempt to offer a similar analysis of the distinction between habitual aspect and durative/progressive aspect (as in English "I smoke" as opposed to "I am smoking"), among other reasons in order to explain how Norwegian and Russian may do without such a formal distinction. Other candidates for pragmatic analyses are the distinctions between imperfective and perfective aspect; indicative and subjunctive mood; evidential and non-evidential mood; non-future and future tense, and distinct types of future tense; indefiniteness and definiteness of DPs, etc…

Evidently, not all grammatical categories are suitable for a pragmatic analysis, however. First of all, the traditional division between TAM-categories (i.e. tense, aspect and mood) and PNG-categories (i.e. person, number and gender) is crucial. Only the former can be argued to contribute by themselves to the interpretation of the sentence. Consequently, it is in such cases it must be explained how one language may offer such a contribution through the addition of a category, while another language does not. This is where I have argued that a pragmatic analysis becomes necessary. PNG-categories, on the other hand, are used to index semantic features on one member of the clause, which is syntactically dependent on another member, which again is the source of these features. Thus, the PNG-categories do not necessarily contribute information of their own. Arguably, the same might be said about case.

Turning back to "contributory" grammatical categories again, it must be emphasised that there will still remain several cases for which it would be difficult to offer a pragmatic explanation. This difficulty increases the more specific the contribution of the given category becomes. For instance, the South-American Indian language Toba has a set of so-called directionals, i.e. a grammatical category describing the directionality of the event, but when Toba makes a distinction between a directional meaning "toward water" and a

directional meaning "toward fire" (Adelaar & Muysken 2004: 491), it is difficult to see how this distinction could be explained in purely pragmatic terms. Nevertheless, apart from such extreme cases, the conclusion of this paper stands firm: Whenever practically possible, contributory grammatical categories, like TAM-categories, should be analysed as pragmatic rather than semantic categories, in order to explain their redundancy in the world's languages.

## Abbreviations

| | |
|---|---|
| ACC – Accusative | PEF – Perfective |
| F – Feminine | PST – Past tense |
| IMP – Imperfective | S – Singular |
| M – Masculine | |

## References

Adelaar, W. F. H. and P. C. Muysken (2004): *The Languages of the Andes*, Cambridge: Cambridge University Press.

Comrie, B. (1976): *Aspect*, Cambridge: Cambridge University Press.

Comrie, B. (1985): *Tense*, Cambridge: Cambridge University Press.

Eriksen, P. K. (2006): *On the Typology and the Semantics of Non-Verbal Predication*. Ph.D. Dissertation, University of Oslo.

Jackendoff, R. (1972): *Semantic Interpretation in Generative Grammar*, Cambridge, Massachusetts: The MIT Press.

Klein, W. (1995): 'A Time-Relational Analysis of Russian Aspect', *Language* **71**, pp. 669-695.

# WE CONGRATULATE – BY …

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**Abstract**

The present paper is an inconclusive discussion of questions related to Kjell Johan Sæbø's semantic analysis of so-called criterion predicates and the *by* locution (adjuncts of the form *by V-ing*) often accompanying them. The construction type can be illustrated by the following quotation (from Google) – which, substituting the name of KJS for the anaphor, is not only an illustrative example but also an adequate statement in the present context:

*Als Autoren und Leser können wir [ihn] vermutlich am angemessensten ehren, indem wir uns von seinen Arbeiten faszinieren lassen.*[1]

## 1 Abstract predicates and the *by* locution (Sæbø, to appear)

In his ingenious paper "The structure of criterion predicates", Sæbø (to appear) discusses the semantic representation of constructions with instrumental *by* adjuncts (*by* + V-*ing*) as illustrated in (1); other relevant examples are seen in (2).

(1) a. She kept her promise by dancing.
b. She maddened me by dancing.

(2) a. Kjell Johan planned to celebrate his birthday by taking his family on a bicycle tour.
b. However, his colleagues surprised him by turning up uninvited.
c. Obviously expecting to be invited in, they congratulated him by presenting him with a "Festschrift",
d. By doing so, they almost prevented him from going through with his plans.
e. But finally he made them leave by promising to throw a party some days later.

[1] 'As writers and readers, we can probably honour [him] most adequately by letting ourselves be fascinated by his works.'

Sæbø proposes an analysis where the modified predicate "involves reference to an indefinite predicate and where the function of the instrumental *by* adjunct is to fill that predicate with content by unification" (Sæbø, to appear: 1). Like Kearns (2003), he takes the modified predicates to come in two main variants, subsumed under the terms **abstract predicates**: **manner-neutral causatives** like *madden me, make them leave, prevent him from realizing his plans*, *surprise him*; and **criterion predicates** like *keep her promise, respond, obey an order.*[2] Adjoined to a causative predicate, the *by*-locution identifies the type of event or action having the causing effect specified by the matrix predicate; with a criterion predicate, the *by*-locution gives us the property of the event or action making the abstract predication true – an action matching the conventional criteria laid down by the matrix predicate.

From the perspective of formal semantics, the crucial question is how to account for the meaning of these constructions in a compositional way. Sæbø argues that a compositional analysis is possible only within a formal framework allowing composition to be driven by unification rather than functional application ("flexible composition"). The solution he offers is cast in the format of the presupposition-based two-stage bottom-up version of Discourse Representation Theory outlined in Kamp (2001).

Thus, the adjunct *by dancing* in (1a, b) is represented as in (3) whereas the matrix predicates, abstracting from Tense, Voice and the Agent get the representations shown in (4) and (5), respectively (Sæbø, to appear: 12).

(3) a. by dancing

b. $\langle \{\langle \Pi, \underline{\text{constant}} \rangle\} , \boxed{\Pi = \lambda e \, \boxed{dance(e)}} \rangle$

(4) a. madden me

b. $\left\langle \left\{ \begin{array}{l} \langle e, \lambda \rangle \\ \langle P, \underline{\text{indefinite}} \rangle \end{array} \right\}, \boxed{\begin{array}{l} e_1 \\ P(e) \\ \text{Bec}(mad(i))(e_1) \\ \text{Cause}(\text{Bec}(mad(i))(e_1))(P(e)) \end{array}} \right\rangle$

[2] The term "criterion predicate" was introduced by Kearns, who characterizes such predicates as follows: "The key notion here is some conventional criterion that an action must fulfil in order to qualify as an event of the criterion-matching kind." (Kearns 2003: 599; quoted by Sæbø, to appear: 1). Sæbø's manner-neutral causatives correspond to Kearns' "causative upshot predicates" (ib.).

(5) a. keep a promise

b. $\left\langle \left\{ \begin{array}{l} \langle e, \lambda \rangle \\ \langle P, \underline{\text{indefinite}} \rangle \end{array} \right\}, \boxed{\begin{array}{l} f \; Q \\ P(e) \\ P \subseteq Q \\ \textit{Promise}(Q(\text{pro}))(\text{Agent}(e))(f) \end{array}} \right\rangle$

Here, the box to the right is a DRS representing the **content** of the node in question; to the left is the **store**: a set of pairs[3] consisting of a variable (*e*: event variable, *P*: predicate variable, Π: second-order predicate variable) and a binding condition. When two nodes meet under the bottom-up construction of a representation, unification of store variables is driven by the binding conditions, and the corresponding two content DRSs are merged. Indefinite store variables may stay unbound until the top level, where they enter the DRS as normal (indefinite) discourse referents. The binding condition constant, on the other hand, is introduced by Sæbø as a sub-sort of quantificational binding, and must find an indefinite variable for Π to bind. The λ-condition assigned to the event variable *e* in (4b) and (5b) – likewise an innovation as compared to Kamp (2001) – should be understood as classical abstraction. The bipartite structure ⟨store, content⟩ is characteristic of preliminary nodes: eventually, the store will disappear, and the meaning of the sentence as a whole will be represented as a standard DRS (often in addition to a set of presuppositions seeking jusitification in the preceding context).

In the present case, then, the Π variable of the *by* locution will unify with the indefinite predicate variable introduced by the matrix predicate, thus identifying the indefinite predicate with the constant *dance*. This amounts to substituting the latter for the variable *P* in the content DRS of the node modified by the *by* adjunct. The resulting representations are shown in (4') and (5'):

(4') $\lambda e$ $\boxed{\begin{array}{l} e_1 \\ \textit{dance}(e) \\ \text{Bec}(\textit{mad}(i))(e_1) \\ \text{Cause}(\text{Bec}(\textit{mad}(i))(e_1))(\textit{dance}(e)) \end{array}}$

[3] A simplification of Kamp (2001) where the store is a set of triples: a variable, a constraint DRS, and a binding condition.

(5') $\lambda e$ [ $f$ $Q$ ; *dance*($e$) ; *dance* $\subseteq$ $Q$ ; *Promise*($Q$(pro))(Agent($e$))($f$) ]

In 'normal' words:

(6) a. An event *e* is of the type *A maddens B by dancing* iff *e* is of the type *A dances* and there is an event $e_1$ of the type *B becomes mad* such that *B becomes mad* holds of $e_1$ because *A dances* holds of *e*.[4]

b. An event *e* is of the type *A keeps a promise by dancing* iff *e* is of the type *A dances* and there is an event (action) *f* and an event (action) type *Q* such that *f* is of the type *A promises (has promised) to Q* and *A dances* is included in *Q* (dancing may be just one of several action types matching the promise made by *A*).

Abstract predicates may, of course, occur without a *by* locution or any other adjunct answering the question "How?" that such predicates implicitly give rise to. In that case, the type of the causing or criterion-matching event remains indeterminate at the sentence level but may be identifiable cross-sententially: the indefinite event type referent *P* and the event *e* it is predicated over may in the end be unified with referents established in the following or preceding context. Unification of this kind induces discourse relations known e.g. under the names of Elaboration/Specification (or Explanation?) and Abstraction (or Result?), respectively, between the discourse segments in question (Sæbø, to appear: 18); cf. (7) and (8).

(7) a. The boy insulted me in your bar. He told me to shut up.
b. She really surprised me. She finished her paper on time.

(8) a. You said you didn't go! You lied to me!
b She finished her paper on time. She really surprised me.

Sæbø's analysis is elegant and avoids the drawbacks he points out in earlier approaches to the semantics of criterion predicates and the *by*-locution. Viewed

[4] Note that Sæbø like Dowty (1979) and Bennett (1994) represents causation as a relation between propositions (facts) rather than events. This is a necessary device in order to achieve a unified account of *by* locutions in criterion and causative contexts.

in a broader perspective, however, it raises some questions, partly hinted at in his paper, that I discuss below – albeit without presenting an answer.

## 2 Implications and questions

As can be seen from the representation of *by dancing* in (3), Sæbø does not assign a causal or instrumental meaning to the *by* phrase or the preposition *by* itself; its sole function is to substitute a predicate constant for the indefinite predicate store variable which the modified abstract predicate comes along with. Consequently, combinations of *by* locutions and matrix predicates that do not provide such a store variable should be ruled out for semantic reasons since in such cases the store variable Π of the *by* adjunct will find nothing to bind. But, as Sæbø notes, the *by* locution may in fact combine with predicates that are apparently not of the demanded abstract – manner-neutral causative or criterion – type, without causing any semantic trouble: achievement predicates as in (9) and activity predicates as in (10) (examples from Sæbø). And here "the *by* phrase seems to contribute a causal relation of its own" (Sæbø, to appear: 19).

(9) a. They *find prey* by detecting minute vibrations from a distance away.
b. He claimed that he had *escaped* by crossing the water.

(10) a. Snakes *move* by throwing their bodies into backward-moving waves.
b. It *swims* by flexing its body from side to side.
c. They *feed* by filtering food particles from the water.

Sæbø defends his analysis by arguing that "on closer inspection, predicates which do not appear to be abstract really are, at least in the circumstances; in other words, predicates that may not be intrinsically causative or criterial can, under the influence of certain factors, be interpreted as causative or criterial, one of these factors being the merge with a *by* phrase" (ib.) In cases like (9), then, the (non-causative) achievement predicates are coerced into (causative) accomplishments – something that may happen under other conditions, too; and the matrix verbs in (10) are arguably used in a "derived, more abstract sense" involving an indefinite predicate store variable for Π to bind. So in the end, "there is reason to embrace the idea that criteriality and causativity are not fixed and lexical but flexible and contextual categories" (ib.). But then again, some predicates, e.g. *Fred combed his hair / polished his nails / put on his top hat*, "are simply too concrete or manner-specific to be interpreted as providing an indefinite predicate variable playing a part in their interpretation", i.e. too concrete to be modified by a *by* phrase (Sæbø, to appear: 17).

However, do we really want to say that the predicates *move*, *swim* and *feed* have a somewhat different, more abstract meaning in (10) than e.g. in (11), where they are modified in other ways (b, d, f) or not modified at all (a, c, e)?[5]

(11) a. Some bivalves can *swim*.
b. Many decapods *swim* using paddle-like limbs called swimmarets on the abdomen.
c. The men were so fatigued they could hardly *move*.
d. A few desert snakes *move* across the hot sand in a series of sideways steps known as sidewinding
e. The red-billed quelea scatter during the day to *feed*.
f. During the winter months flocks of redpolls *feed* among the high branches of the trees.

*Move* and *swim* are both "indefinite change-of-state predicates" (in the terms of Dowty 1979), involving iterated change of place along a path, which, in the case of *swim*, is located in water; and living beings have ways of intrinsically bringing about such locomotion that are determined by their genetic equipment. *By* adjuncts may be used to describe how intrinsic movement is brought about for a given species, as in (10a); or they may describe deviations from some standard way, or specify within the agent-dependent range of normal options; etc. But when there is no explicit information in the context, we fill in the picture ourselves, assuming that the causing activity falls within the range of possibilities determined by the nature of the agent and the circumstances described in the context. A similar case can be made for the intransitive predicate *feed*, which – as noted by Sæbø (p. 19) – also involves iteration of an action with a culmination point, viz. getting food inside oneself. Note, by the way, that relevant information may come from other types of adjuncts than *by* phrases; cf. (11b, d, f).

More generally, it may be asked whether the distinction between manner-neutral accomplishment predicates like *she maddens me, we surprise him* etc. and manner-specific ones[6] like *Fred combed his hair / polished his nails / put on his top hat* is as absolute as the explication proposed by Sæbø implies (presence vs. absence of an indefinite predicate variable in the semantic representation of the predicate), or whether manner-specificity is not rather a matter of degree, as Bennett (1994) seems to suggest: a question of the range of values $\pi$ can take for a given $\phi$ and a given agent $\alpha$ in the formula $\alpha$ *$\phi$-s by* $\pi$*-ing*. Speculating on the verb "to nod", for instance, Bennett (1994: 43) claims that it "does not permit

[5] Most of the examples are (in some cases adapted) from the Oslo Multilingual Corpus; see http://www.hf.uio.no/forskningsprosjekter/sprik/english/corpus/index.html.
[6] The distinction was introduced by Pusch (1980).

such a wide range of values of $\pi$ as does 'to raise one's hand'; nor does 'to clap one's hand', 'to kick' and some others. However, these narrower verbs still leave, in their ordinary meaning, *some* room for answers to 'How?' questions other than the answer 'By doing it immediately'", i.e. answers that specify some "mediating" causing action different from $\pi$ itself. At any rate, it is quite conceivable that Fred may put on his hat or polish his nails in non-standard ways that call for a *by* locution; or that the level of descriptive detail demanded in the speech situation makes the use of such a modification natural.

Simple physical acts – whether accomplishments as 'to raise one's hand' or achievements in a broad sense, including "intergressives"[7] like 'to nod' – do not allow much variation as to how they are brought about. Criterion predicates, while specifying "conventional (normative) or intentional criteria", are "unspecific about the physical criteria an action must meet" (Sæbø, to appear: 2). However, as with causatives, (un)specificity or abstractness may be a matter of degree rather than an absolute property. In cases like *break a promise, obey an order*, for instance, there is no default value for $\pi$ in Bennett's (1994) formula $\alpha$ *$\phi$-s by* $\pi$*-ing*: which action types fall under these predicates depends solely on what the agent has promised or been ordered. Predicates like *congratulate* and *celebrate* seem different: in the default case, we take an act of congratulation to involve a specific type of speech act, and we also have more or less stereotypical celebration concepts which we may activate when there are no other clues. But of course, more special ways of congratulating or celebrating are conceivable – specified in a *by* adjunct, for instance, as exemplified in (2a, c) (repeated below).

(12) a. Kjell Johan planned to celebrate his birthday by taking his family on a bicycle tour.
b. His colleagues congratulated him by presenting him with a "Festschrift".

To be sure, the observations made above do seem compatible with Sæbø's analysis: When combined with a *by* phase, predicates that are not inherently abstract in the defined sense acquire a derived meaning that meets the demands of the *by* adjunct, viz. a semantic representation involving an indefinite predicate store variable. And when an inherently abstract predicate is not modified by a *by* phrase, its indefinite predicate variable is turned into an indefinite discourse referent, which, in its turn, may or may not be specified in the linguistic context – or by way of knowledge-based stereotypes (cf. *congratulate, celebrate*). However, we are still left with the problem of how to decide which predicates

[7] Intergressives are bounded events that differ from accomplishments and achievements in the strict sense by not involving a change of state (Egg 1994).

are intrinsically abstract and which are not; on closer inspection that borderline may turn out to be quite arbitrarily drawn.

It should be noted that shifting a non-abstract predicate to a criterion predicate may involve a shift of aspectual class and thematic role assigned to the external argument. The predicate *honour him* is a case in point: When used as in (13a) it is non-abstract, denoting a type of emotional attitude with the subject referent as Experiencer or Holder; modified by a *by* adjunct, as in (13b), however, it is an agentive criterion predicate denoting a set of actions that are (more or less conventionally) correlated with holding such an attitude.

(13) a. As he was valiant, I honour him.
b. We can honour him most adequately by letting ourselves be fascinated by his work.

That is, the meaning of *honour* in (13b) is derived as compared to (13a), involving an indefinite action predicate 'do something [showing that …]'. But how can the representation assigned to *by* by abstracting over (3) have such an effect? In more general terms: How can an analysis that ascribes a purely identifying function to *by* explain the fact that the construction type is restricted to or has a marked preference for action predicates demanding an external Agent?

## 3 Related constructions

The question asked above may seem somewhat unfair since the Agent issue, in addition to Tense, Aspect and Voice, is precisely that part of the formalization story Sæbø explicitly leaves out, referring to Kratzer's (1995) theory of the Agent relation. But the issue is of central importance when we look at other constructions doing the same or a similar job as the *by* locution:

(i) Corresponding *in* locutions (*in -ing*):

(14) a. Ty's dad had shown additional good sense in marrying a plain woman.
b. All these tales suggested that the golem-maker had acquired arcane secrets: yet, in doing so, had transgressed Holy Law.
c. In eating the plants we combine the carbohydrates with oxygen dissolved in our blood and so extract the energy that makes us go.
d. Fibich had, in buying it [the picture], aspired to nobility.
e. In solving one problem we have only encountered a more curious question.

f. He grabbed it and held it before his face and in doing so spilled most of the powder all over the front of his fancy tweed jacket.

(ii) Non-prepositional *-ing* adjuncts:

(15) a. Many decapods swim using paddle-like limbs called swimmarets on the abdomen.
b. Getting rid of the glasses, you`ve become less womanish.
c. They fought against going, enlisting me and their father against Rose.
d. They mistook his gentleness, taking it for what it appeared to be instead of the strength of will.
e. Mostly it was hot chocolate she made, warming the milk in a saucepan on the stove before mixing it.

(iii) Prepositional adjuncts of the type *with* + NP:

(16) a. They congratulated him with a *Festschrift*.
b. We celebrated the event with vintage wine and quiet talk.
c. She silenced him with a sharp remark.
c. I hinted we might seal our new-found solidarity with a dram.
d. He goes outdoors to feed with wild things.

(iv) Various other "event-internal" (Maienborn 2003) prepositional adjuncts:

(17) a. They feed on the sugary nectar of flowers.
b A few desert snakes move across the hot sand in a series of sideways steps.

It would take us too far to discuss the options mentioned in (iii) and (iv), which differ from our main subject by involving genuine prepositional phrases instead of non-finite verb phrases.

As for (i), it is an interesting question whether and how *in* locutions differ semantically from *by* locutions. The two adjunct types seem exchangeable in some contexts, as for instance in (14a); but at the same time, *in* adjuncts might appear to be less restricted with respect to causativity than *by* locutions; cf. (14f); and Kearns (2003: 629) suggests that criterion predicates have a certain preference for *in* locutions. But how to capture such distinctions if we ascribe a purely identifying, non-instrumental meaning to the *by* locution, covering its function with criterion predicates as well as manner-neutral causatives?

Regarding (ii), non-prepositional *-ing* adjuncts have a wider range of interpretation possibilities than our *by* (and *in*) locutions, partly because they are typically used as free adjuncts, i.e. without being fully integrated in the matrix clause, and partly because the interpretation is not restricted by whatever constraints the preposition *by* (or *in*) induces. Behrens & Sæbø (1997) have outlined a semantic analysis of free *-ing* adjuncts within the framework of classical DRT (see also Behrens 1998). They represent the adjunct as a DRS with an anaphoric discourse referent for the controlled external (PRO) argument. The adjunct DRS is merged with the matrix DRS in the usual presupposition-driven way, involving a certain amount of knowledge-based accommodation etc. In this way, Behrens & Sæbø (1997) are able to account for the interpretation of abstract predicates modified by free *-ing* adjuncts, i.e. constructions where the latter can have the same effect as *by* (or *in*) locutions; cf. for instance (15a-b).[8] In the framework of Sæbø (to appear), these cases would represent a non-finite variant of contextual identification of the indefinite event type referent introduced by the abstract main predicate; compare (7) in section 1. With other main predicates, however, updating must proceed in a different way.

Obviously, the classical DRT account of free *-ing* adjuncts to abstract predicates (Behrens & Sæbø 1997) and the analysis to be derived from Sæbø (to appear) deserve a more thorough comparison. It might be that the former is after all more flexible and that it could be adequately exploited for an alternative analysis of *by* locutions.

A look at German and Norwegian may be interesting in this connection (cf. Fabricius-Hansen & Behrens 2001). German has no direct counterparts to the three *-ing* variants under discussion here. Instead it has a finite-clause subordinating connective (subjunction) *indem* 'in that' that covers the semantic domain of *by* and *in* locutions as well as certain usages of free *-ing* adjuncts falling outside the range of the two prepositional *-ing* adjuncts. In addition, *indem* occurs, rather marginally, in a "purely" temporal use, expressing temporal inclusion, and occasionally in an "event-external", i.e. higher-level, causal use corresponding to (causal) *as*/*since*. In Norwegian, we find a prepositional *ved å* 'by to' + infinitive as a counterpart of the English *by* locution as well as a subjunction *idet* corresponding to German *indem*. However, the instrumental use of the subjunction seems to be stylistically somewhat marked in Norwegian, characteristic of non-fictional genres – perhaps due to the existence of a competing instrumental locution (*ved å*). Below are some characteristic examples from the Oslo Multilingual Corpus (OMC).

[8] Except that as free adjuncts, the former do not focus on the (relation between) adjunct (and main predicate).

(18) a. Begab man sich nicht einst auf der Flucht unter den Schutz eines Menschen, *indem* man sich auf dessen Schwelle niederließ?
b. Didn't a fugitive put himself under someone's protection *by* sitting down on his threshold?
c. Når noen var på flukt i den gamle tid, da kunne han gi seg inn under en annens beskyttelse *ved å* sette seg på hans dørterskel.

(19) a. He swung into action at once to make his room his own, *stripping* off the ugly bedspread and stuffing it into a closet.
b. Er ging unverzüglich daran, sich in seinem Zimmer häuslich einzurichten, *indem* er die scheußliche Bettdecke abzog und in den Schrank stopfte.

(20) a. Det grønne fløyelsskjørtet med border nederst delte seg, *idet* hun la celloen mellom knærne.
b. Der grüne Samtrock mit der Borte am Saum teilte sich, *als* sie das Cello zwischen die Knie nahm.
c. The bordered green velvet skirt divided itself *as* she placed the cello between her knees.

(21) a. Det er en nær sammenheng mellom sosialitet og selve idéen om individualitet*, idet* denne idéen bærer i seg spiren til sosialitet.
b. Es besteht ein enger Zusammenhang zwischen Sozialität und der Idee von Individualität, *da* ['as/since'] letztere, insofern sie universelle Geltung beansprucht, in sich selbst den Keim zur Sozialität trägt.
'there is a close connection between sociality and the idea of individuality the latter carries in itself the seedling of sociality'

Accounting for the semantic variation of *indem*/*idet* constructions in an adequate way will demand a very abstract, underspecified semantic representation of the connective and strong general principles of pragmatic reasoning governing the interpretation, e.g. in the spirit of Zeevat 2005; compare also Maienborn (2003). The common denominator might be an abstract notion of "inclusion", covering a set of conceptually related relations (set inclusion, set membership, part-whole relation, …). How this relation is instantiated in a given context depends on the nature (semantic type) of the entities *indem* connects, i.e. on whether the *indem*

clause is an event-internal modifier or adjoined higher up in the tree. – But I shall stop speculations and come to an end.

## 4 An inconclusive conclusion

The comments made in sections 2-3 above do not necessarily represent objections to Sæbø's theory: they are explorative and inconclusive reactions to a thought-provoking paper. However, with a view to competing constructions in English and the cross-linguistic data mentioned above, I am not convinced that representing *by* (adjuncts) as void of instrumental or causal meaning is an optimal solution; it seems worth while to try out possible alternatives within the same framework (cf. Solstad, to appear, this volume). I also suspect that in the end, pragmatics will have even more to say than suggested in Sæbø's fascinating paper.

## References

Behrens, B. (1998): *Contrastive Discourse: An interlingual approach to the interpretation and translation of free ING-participial adjuncts.* PhD thesis, University of Oslo.

Behrens, B. and K. J. Sæbø (1997): 'Events and Context Sensitivity', in *pre-proceedings from 19. Jahrestagung für Deutsche Gesellschaft für Sprachwissenschaft*, Düsseldorf.

Bennett, J. (1994): 'The "Namely" Analysis of the *by* Locution', *Linguistics and Philosophy* **17**, pp. 29-51.

Dowty, D. (1979): *Word Meaning and Montague Grammar*, Dordrecht: Reidel Publishing Company.

Egg, M. (1994): *Aktionsart und Kompositionalität: zur kompositionellen Ableitung der Aktionsart komplexer Kategorien*, Berlin: Akademie-Verlag.

Fabricius-Hansen, C. and B. Behrens (2001): 'Elaboration and related discourse relations viewed from an interlingual perspective', in *Proceedings of Workshop on Text Structure,* University of Austin, Texas, October 2000. Also available as SPRIKreport No.13 http://www.hf.uio.no/forskningsprosjekter/sprik/english/publications

Kamp, H. (2001): 'The importance of presupposition', in Ch. Rohrer & A. Rossdeutscher (eds.): *Linguistic Form and its Computation,* Stanford: CSLI.

Kearns, K. (2003): 'Durative Achievements and Individual-Level Predicates on Events', *Linguistics and Philosophy* **26**, pp. 595-635.

Kratzer, A. (1995): 'Severing the External Argument from its Verb', in J. Rooryck & L. Zaring (eds.): *Phrase Structure and the Lexicon*, pp. 109-137, Dordrecht: Kluwer.

Maienborn, C. (2003): 'Event-internal modifiers: Semantic underspecification and conceptual interpretation', in E. Lang, C. Maienborn & C. Fabricius-Hansen (eds.): *Modifying adjuncts*, pp. 475-510, Berlin: Mouton de Gruyter.

Pusch, L. (1980): *Kontrastive Untersuchungen zum italienischen "gerundio": Instrumental- und Modalsätze und das Problem der Individuierung von Ereignissen*, Tübingen: Niemeyer Verlag.

Solstad, T. (to appear): 'Word Meaning and Sentence-Internal Presupposition', in Ch. Ebert & C. Endriss (eds.): *Proceedings of Sinn und Bedeutung 10*, ZAS Papers in Linguistics vol 42, Berlin.

Sæbø, K. J. (to appear): 'The structure of criterion predicates', in J. Dölling & T. Heyde-Zybatow (eds.): *Event Structures in Linguistic Form and Intepretation*, Berlin: Mouton de Gruyter.

Zeevat, H. (2005): *Optimality-theoretic Pragmatics and Rhetorical Structure*, handout from SPRIK-workshop at Ustaoset, Norway.

# GRAMMAR, GEOMETRY AND BRAIN

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**Abstract**

Man can in some deep sense connect speech, symbols and meaning. This is an everyday experience which we only partly understand. Linguistic theory recognizes three representational modules, phonology, syntax, and conceptual structure. In the first part we explore the relationship between the syntactic and conceptual structures. In the second part we look closer at the conceptual module and stress the importance of its intrinsic geometric structure. In the third part we explore how this geometry could emerge out of brain dynamics. We are far from an integrated account of how man connects speech, symbol and meaning. We may have opinions and stories to tell, but science consists in doing what is do-able – we conclude with some modest remarks and suggestions concerning cognitive architecture and "mid-level" representational formats.

We have in recent years seen great advances in linguistics and the related cognitive sciences. Experimental and observational techniques at all levels from basic neuroscience to the study of grammar and text have been transformed and lifted to new levels of sophistication. Modeling skills and theory have been significantly expanded using increased insights from the mathematical and natural sciences. Simulations have been extensively used to mimic cognitive behavior. But we do not yet fully understand what human beings so effortlessly can do, how to connect into one seamless unit speech, symbol and meaning.

There are no lack of general accounts and strong claims of having found the "final solutions" to this challenge. And, indeed, beyond well confirmed observations and generally accepted facts there are many plausible stories to tell. But too often we see how scientists with sound contributions within their own special domain of expertise, have to resort to a bit of wistful handwaving when sorting out the last pieces of their preferred "solution".

Not every attempt at a synthesis is handwaiving. An interesting overview of current knowledge as seen from the various perspectives of the speaker, the listener and the reader, can be found in a recent book, *The Neurocognition of Language*, edited by C.M.Brown and P.Hagoort (1999). The book also includes a review of the main components of language structure as seen from the

linguist's point of view. And there are several survey articles aiming to link the cognitive architecture of speaking, listening and reading with the neurobiological level. I shall touch upon all of these aspects. But first some remarks on grammar and the representational structure of language.

## 1 The deconstruction of syntax

Linguists generally recognize three main representational modules in the description of language structure, the phonological structure, the syntactic structure, and the semantic/conceptual structure. The disagreement comes when we ask about the inner structure and relative autonomy of the different parts and how the parts are bound together.

There are, indeed, many different stories being told. One version, which I in many ways find attractive, can be found in two recent books *Foundation of Language* by R.Jackendoff (2002) and *Simpler Syntax* by P.W.Culicover and R.Jackendoff (2005); see also the paper by Jackendoff in Brown and Hagoort (1999). In the latter book, starting with Chomsky's *Aspects of the Theory of Syntax* from 1965 Culicover and Jackendoff tell a story of how "mainstream" syntax has developed – or should develop – through various stages of the chomskian enterprise, including the current version of minimalism, ending in a final "flat" structure inspired by the attribute-value formalisms of Lexical-Functional Grammar (LFG), see Bresnan (1982, 2001), and Head-Driven Phrase Structure Grammar (HPSG), see Pollard and Sag (1987, 1994). This is a piece of "deconstruction" where the elaborate tree stuctures and transformations of chomskian syntax are transformed into a relational form, which - and this is a central claim of the authors – is more amenable to interacting with a semantic/conceptual structure.

I would like to tell a somewhat different story – different, but with many points of similarity. Instead of Chomsky I take as my starting point the work on logic and language by K.Ajdukiewicz and A.Tarski in the mid 1930s; for fuller details see Fenstad (1978, 1996, 2004). Ajdukiewicz pioneered the modern study of categorial grammar, Tarski opened up the new field of formal semantics. In Warsaw of the 1930s they met and could have joined forces, but it remaind for H.Reichenbach and H.B.Curry in the late 1940s to connect the syntax of categorial grammar and the semantics of model theory through the formalism of higher order logic. The work of Curry did not receive the attention it merited at the time, and it was the later contributions of R.Montague, see Thomason (1974), that revitalized the links between logic and linguistics. This represents, in fact, another piece of "deconstruction": The tree structure of categorial grammar is mapped into the relational form of model theory. One should not be confused by the complexities of the lambda-terms of logic. Higher order logic defines the map between the tree structure of categorial analysis (the

subject-predicate form) and the flat relational form of model theory – the higher order logic is the tool, not the substance. This use of logic as a connecting map has led to a number of interesting insights. Particularly important is the structural identification between noun phrases and generalized quantifiers; see Fenstad (1978) and Barwise and Cooper (1981).

Higher order intensional logic is a powerful and elegant mathematical tool. But when this instrument is used to establish a map between syntax and meaning there is a tendency to formalize too much. This was a criticism voiced, among others, by J.Barwise and R.Cooper in their study of the relationship between noun phrases and generalized quatifiers; see Barwise and Cooper (1981). The Barwise-Cooper study of generalized quantifiers was an important step forward. Further reflection on the proper semantic structure for the study of natural languages led to the subsequent development of situation semantics; see J.Barwise and J.Perry (1983). Language and formal semantics have been an area of great activity. The full story remains to be told, many interesting overviews can be found in the *Handbook of Logic and Language* (edited by J. van Benthem and A. ter Meulen (1997)). The theory of generalized quantifiers and the development of situation semantics can be seen as simplifications on the semantic/conceptual side. What should be done on the syntactic side? And how should syntax and the new semantics be linked?

The *Center for the Study of Language and Information* (CSLI) was founded at Stanford in 1983. The logician J.Barwise and the linguist J.Bresnan were both leading members of the Center. I happened to be present as visitor at Stanford for the academic year 1983-84. The opening year of CSLI was marked by a general wish to explore the connection between the many disciplines present. LFG was the prominent syntactic theory at CSLI. Situation semantics had a similar status on the meaning side. Syntax and semantics must be related. Thus the question of how to interpret the functional structures of LFG in situation semantics became urgent. The solution, simple when first recognized, was the concept of situation schemata; see Fenstad et al. (1985, 1987). This is a representational form derived from the f-structures of LFG. And in contrast to the lambda-terms of Montague grammar, questions of efficient computability was always an important concern. The technology of situation schemata was later adopted by Pollard and Sag (1987) in their development of HPSG.

Seen in retrospect the story can be slightly rephrased. What we did in developing the theory of situation schemata can be seen as an act of double replacement: replacing the categorial syntax of language with the formalism of LFG and replacing the formulas of higher order logic of formal semantics with the situation schemata format. It is important to point out that the technology of situation schemata is not necessarily tied to LFG and situation semantics. The particular attributes and value slots in the schemata were in our analysis selected

for the task at hand, viz. to link LFG and situation semantics, but the technology is general as e.g. the later application to HPSG shows.

I called this an alternative story to the one told by Culicover and Jackendoff (2005). In both cases a somewhat rigid syntactic tree-structure (in one case minimalism, in the second case categorial grammar) is replaced by an LFG-like simpler structure. In both cases the simpler syntax is linked to a conceptual/semantic structure. And here is the point where the two accounts come together. The similarity between the CS (Conceptual Structures) of Culicover and Jackendoff (2005) and the situation schemata of Fenstad et al. (1985) is deep and immediate. Both are constraint-based formalisms and both allows for partiality, and their basic formats are quite similar.

For the reader who is familiar with the notions of conceptual structures and situation schemata I add the following technical remark: The basic format of a CS, as introduced in Culicover and Jackendoff (2005), is:

$$\text{FUNCTION}(\text{ARG}_1, \ldots \text{ARG}_i); \text{MOD}_1, \ldots \text{MOD}_m; \text{FEATURE}_1, \ldots, \text{FEATURE}_n.$$

The basic format of a situation schema, as introduced in Fenstad et al. (1985,1987), is:

$$\text{REL}, \text{ARG}_1, \ldots \text{ARG}_n, \text{LOC}, \text{POL}.$$

We see the similarities, FUNCTION corresponds to REL; both formats have an ARG-list; FEATURES correspond to LOC. The MOD-list is missing from the situation schema format. This is because we at that time had the task to create a tailormade interface between LFG and situation semantics. In LFG modifiers are basically attached to either the REL, an ARG, or possibly the LOC attribute. Culicover and Jackendoff (2005) argue for a flatter syntax; see as an example the different treatment of NPs in LFG and in *Simpler Syntax*. The need for a semantic/conceptual representational interface is clear; its particular format will have to depend on your choice of syntax and semantic structure. We shall elaborate this issue further below, in particular, in connection with the theory of *Conceptual Spaces*, see Gärdenfors (2000).

Returning from technicalities to the main story let me conclude by one further remark. In Jackendoff (2002) there is a fourth component, the spatial structure (see fig. 1.1 on p. 6 of the book). Precisely how this part is linked to the others components is not explained in any detail. In Fenstad et al. (1985,1987) there is a well-defined fourth component, viz. the model structure or, in other words, the semantic/conceptual space. And there is a well-developed theory of interpreting situation schemata in the model structures; see Fenstad et al. (1987, pp. 52-76). We remind the reader once more that in this work situation

semantics defines the class of models, but the technology is general. It is to the theory of semantic spaces in general that we now turn. We shall – extending the standard approach – explore the role of geometry in understanding semantic structure.

## 2 The structure of semantic space

In logic we make a clear distiction between syntax and semantics. Syntax is the domain of formulas and their structure. A fundamental notion is "provability", i.e. how one formula $\phi$ of a certain well-defined formal language L is provable from a set of formulas $\Delta$ of the same language. Semantics deals with structures or models. Typically, a model consists of a non-empty domain M of objects, which can be finite or infinite. In addition there are sets of relations $R_1$, ... , $R_n$ and functions $f_1$, ... , $f_m$ defined over the domain. The basic notion in model theory is "validity", that some assertion $R_k(a_1, ... , a_v)$ or a functional equality $f_s(a_1, ... , a_v) = a_t$ is true in the domain. It was the great contribution of Tarski to set up a precise formalism and inductive definitions of these notions. The connecting link between syntax and semantics is the notion of "interpretation", i.e. how a formula $\phi$ of L is assigned a meaning over the model M. If $\phi$ is a closed formula (a sentence) of L, then the meaning is a truth-value, true or false.

There are two basic results in (first order) logic, the Gödel completeness theorem, which asserts that a formula $\phi$ is provable if and only if it is valid in all domains, and the Gödel/Church/Turing incompleteness theorem, which asserts that the notion of provability is undecidable. Note that the notion of proof is algorithmic, but that provable, which asserts that there exists a proof, is not necessarily so.

This is, very briefly, the formal tools used in Montague grammar. From categorial grammar via higher order logic to the model structure we have precise constructions and well-defined maps. But there is a price to pay. The class of semantic structures consists of all models of the kind described above. And a general model of this kind is nothing but sets of lists. A first order model is essentially two lists, one list of positive facts, which are basic assertions $R_k(a_1, ... , a_v)$ valid in the model, and a second list of negative facts, i.e. assertions $R_{k'}(a'_1, ... , a'_{v'})$ which are not valid in the model. As explained in Fenstad (1998) the standard way of extending the notion of model only leads to more lists, e.g. partial models are partial lists, possible world models are indexed sets of lists, and higher order models are just lists of lists. This may be adequate if the aim is technological applications of natural language systems, since in this case the models or semantic structures at the current level of technology are data bases, which in bare structure are nothing but systems of lists. But if the aim is cognitive science, we need something more.

This leads us back to the pairing of LFG and situation semantics discussed in the previous section. We reproduced the basic format of a situation schema above. Let us now be a bit more specific about the semantics, see Barwise and Perry (1983). The starting point is a multi-sorted structure

$$M = (S, L, D, R),$$

where S is a set of *situations*, L is a set of *locations*, R is a set of *relations* and D is a set of *individuals*. Note that in situation semantics all basic types are primitive, which, in particular, means that a relation is not a set of n-tuples of individuals. Sets of tuples may be used to classify relations, but, as argued in Barwise and Perry (1983), this is not sufficient as an analysis in a broader cognitive context. *Basic facts* are either positive or negative,

$$r, a_1, \ldots, a_n; 1$$
$$r, a_1, \ldots, a_n; 0$$

where $r \in R$ and $a_1, \ldots, a_n \in D$. *Partiality* is present in the format since we do not necessarily have either $r, a_1, \ldots, a_n; 1$ or $r, a_1, \ldots, a_n; 0$, for all n-tuples $a_1, \ldots, a_n$. Facts may be *located*,

$$\text{at } l: r, a_1, \ldots, a_n; i \quad (i = 1 \text{ or } 0)$$

where $l \in L$ is a connected region of space-time. A *situation* is determined by a set of located facts of the form

$$\text{in } s: \text{at } l: r, a_1, \ldots, a_n; i.$$

The main contribution of Fenstad et al. (1985,1987) was a formal construction of a method which to every sentence of (a fragment of) a natural language (taken e.g. from some text corpus) gave an interpretation of that sentence in a system of situation semantics *via* its associated situation schema. From one point of view this is a piece of theoretical linguistics, but there were also some early applications of the techniques to natural language technology, in particular, to question-answering systems, see Vestre (1987), and to machine translation systems, see Dyvik (1993). Today techniques have changed and have been vastly extended, but basic insights still remain. For one example of current activity in language technology see KUNSTI (Knowledge Generation for Norwegian Language Technology), which is a research programme with main focus on machine translation and speech recognition financed by the Norwegian

Research Council (see the website www.forskningsradet.no/kunsti, where you will find further links to the individual projects).

The theory of conceptual spaces, see Gärdenfors (2000), is an attempt to provide a theory of semantic structures suitable for linguistics and cognitive science. We noted above that standard model theory is basically a theory of lists. For technological applications, where the equation "model = data base" is still the operating modus, lists may well suffice – for cognitive science it does not. We have seen a refinement in situation semantics, where the location component, representing a connected region of space-time, plays an important role. But situation theory is very much a realistic theory. There is always a given *discourse situation* with a speaker, an addressee, an utterance and a location – and a *described situation* "out there", i.e. in a suitable sense "a situation in the world" (see chapter 5 of Gärdenfors (2000) for a more careful analysis). And the meaning relation in situation semantics is a complex relation between two situations and an utterance, the latter represented, as in Fenstad et al. (1985), by a situation schema; see Barwise and Perry (1983) for an extended discussion. But even with this refinement of standard model theory situation semantics is not exactly right for the analysis of concepts, mind and brain.

The starting point of Gärdenfors (2000) is the insight that *concepts* should be structured relative to several *domains,* which form clusters well separated from each other. *Color* and *shape* are typical examples of such domains. In the case of *color* we usually recognize three dimensions, hue, chromaticness and brightness – thus the *color* domain is a three dimensional space. Concepts are usually related to several domains, "red cube" relates both to the *color* and the *shape* domains (and possibly to many others – what is the cube made of?). A *property*, following Gärdenfors (2000), is a concept related to one domain, e.g. "red" is related to the *color* domain only and can be identified with a subset of color-space.

In standard model theory properties are arbritary subsets – there is no further general analysis. This has caused philosphers endless difficulties in their attempts to give an analysis of notions such as "natural kinds" within the framework of standard logic. The added ingredient in the theory of conceptual spaces (taking a clue from the study of perception) is *geometry*. Each domain carries a geometric structure, e.g. the hue dimension is represented by a cirle, chromaticness and brightness are linear. In this case we have a natural geometric structure, and – to cut the story short – with this insight the property red is immediately seen to be a convex subset of color space. The analysis is general and is related to the analysis of properties as prototypes, see E.Rosch (1978). To sum up, we can now define, following Gärdenfors (2000), a *conceptual space* M as a collection of one or more domains $D_1$, ... , $D_n$, where each $D_i$ represents a quality dimension of the total space.

From one point of view the analysis presented by Gärdenfors can be seen as an extension or enrichment of standard model theory. In standard model theory there is a perfect match between syntax and semantics, every relation and function on the model domain has a name in the language. In the theory of conceptual spaces red as a region in a quality domain has an intrinsic geometry, whereas red as a syntactic entity has no geometry. Many years ago I argued for the need to enrich standard model theory with geometry, see Fenstad (1978), and pointed to the analysis of R.Thom (1970,1973), but I did not pursue the matter further at that time. In situation schema theory the LOC attribute may hide some geometry not visible in the syntax, see the analysis of prepositional phrases by E.Colban in Appendix A of Fenstad et al. (1987). There are close connections between the theory of conceptual spaces, cognitive grammar, and the geometric approach to semantics by R.Thom, see the discussion in Gärdenfors (2000) and Petitot (1995).

The theory of conceptual spaces lies in the middle ground between language stucture and brain dynamics. From the linguistic side we seem to have the technology available to connect a syntactic analysis in an LFG format to the semantics of conceptual spaces, using an attribute value formalism extending the approach used in connection with LFG and situation semantics – we note that refinements such as multi-dimensionality of domains and geometry are no serious technical obstruction. Explicit constructions, however, need to be supplied to turn this opinion into a solid fact. But far more challenging is the interface between conceptual level and actual brain. How is the geometry of conceptual spaces generated by an underlying brain dynamics?

## 3 Beyond simplicity

If we are to succeed in the task of explaining how meaning and mind are grounded in the physical brain, we first of all need detailed models of brain structure and functioning. This is a very active area of research. Much is now known about structures, less about functions.

Out of a vast literature let me mention a few general surveys which may be usful as a background to our speculations about grammar, geometry and brain: G.Marcus (2004), *The Birth of the Mind. How a Tiny Number of Genes Creates the Complexities of Human Thought*; P.Gärdenfors (2003), *How Homo became Sapiens. On the Evolution of Thinking*; and M.Donald (2001), *A Mind So Rare. The Evolution of Human Consciousness*. The books all report many facts and observations. They all try to weave this information into a coherent story connecting mind and brain. The stories may be plausible, but it is not "hard" science. Current research is regularly reviewed in journals such as *Nature* and *Science*. Some recent examples are: "Language Development", *Science* vol. 303, February 2004; "Neuroscience: Higher Brain Function", *Science* vol. 2306,

October 2004; and "Neuroscience: System-Level Brain Development", *Science* vol. 310, November 2005. At regular intervals we have handbook-type comprehensive reviews, of special relevance is M.S.Gazzaniga (2004).

Closer to our immediate concern are the review articles in the book *The Neurocognition of Language,* Brown and Hagoort (1999). Of particular interest are the reviews in the section on the neurocognitive architecture of language, dealing with the basic brain architecture underlying the process of written and spoken word forms, the functional and neural architecture of word meaning and the neurocognition of syntactic processing. As the word architecture indicates, we are here dealing basically with structure. Other sources deal with the dynamics of brain modeling; we may mention D.J.Amit (1989), *Modeling Brain Function. The World of Attractor Neural Networks*, A.Scott (2002), *Neuroscience – A Mathematical Primer*, and C.Eliasmith and C.H.Anderson (2005), *Neural Engineering: The Prinicples of Neurobiological Simulation*. These books are attempts to model brain and cognitive behavior in general. One attempt aimed directly towards language behavior, is D.Loritz (1999), *How the Brain Evolved Language*. Loritz uses systems of non-linear reaction equations to model linguistic behavior. He has some successes with phonology and certain morphological and syntactic phenomena, but is rather vague when moving from syntax to semantics. In this area there is a recent attempt by C.Eliasmith (2000), *How Neurons Mean. A Neurocomputational Theory of Representational Content*. This is noteworthy, but it is fair to say that we are only in the very early stages in our quest for understanding.

Let me for a moment retreat to simplicity and some early attempts to model language and brain based on neural network models. One example is the work by J.Elman on recurrent networks for grammatical discrimination; see the review of this work in P.M.Curchland (1995) and, for further references, the comprehensive survey of network models in P.S.Churchland (2002). Let me also recall a proposal within the context of optimality theory, A.Prince and P.Smolensky (1997), "Optimality: From Neural Networks to Universal Grammar", in *Science* vol. 275, March 1997. This is interesting reading, but details have, as far as I know, not yet appeared in print. There has been a heated debate between rule-based approaches versus network models. Stated in a very crude way the proponents of the first approach want to extend chomskian type syntactic rules into the brain, whereas the network camp believes that recurrent networks do indeed model brain in a faithful way and that language structure can be explained as an emergent behavior of such networks.

Some years ago I sketched an attempt to close the gap between meaning and brain, the missing link being geometric structure, see Fenstad (1998). Via a more gently executed rule-based approach we are now in a position to move from phonology and syntax to a conceptual structure; see the first section above.

The conceptual part has two components, first, the representational form in the form of an attribute-value matrix (e.g. a situation schema), and, second, the model structure, where we have opted for the format of conceptual spaces. A conceptual space is a collection of domains, where each component domain is a standard model structure enriched with an intrinsic geometric structure; see the second section above.

And it is geometric structure which points to a link between concept and brain, see Fenstad (1998). We spell this out in some detail: A natural kind is, as explained above, a property related to one of the domains of a conceptual space, more specifically a natural kind is a convex region of a domain. This is the view from the language side. Seen from the brain modeling side we recognize that the various dynamic processess in the brain have associated geometric constructs. This was explicitly used by Thom in his early attempts towards a topological semantics for language, Thom (1970, 1973). Thus similar to the prototypes and convex regions in the domains of a conceptual space we have attractors and domain of attraction in the "potential surfaces" of topological semantics. If one identifies the two, and there are certainly mathematical theorems to prove in this connection, a link is established between language, concept and brain. Note, that this is an account very much consistent with the discussion in P.M.Churchland (1995) of coding and pattern recognition. There is also some recent research on attractor dynamics and memory which can be taken to support our account, see T.J.Wills et al. (2005). But one need to be extremely careful in chosing the "right" geometrical representations on both the conceptual side and the brain side to make sense of the connection.

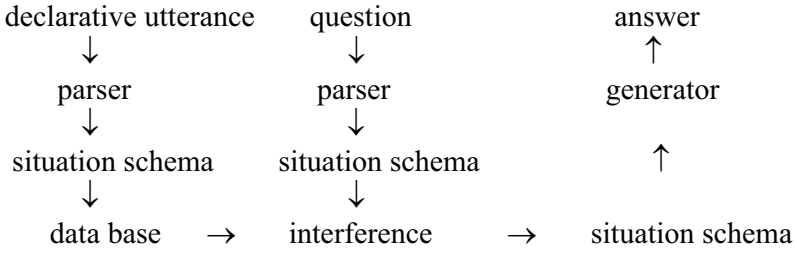
At this point we need to return from simplicity to the real world. Much of current global brain modeling employ neural network models. But despite their rich mathematical structure – see Amit (1989) – they are too simple to catch the complexity of a real brain – see the critical discussion in Scott (2002). Doubts about this simplicity do not only concern the structure and dynamics of the network models, it extends even to the choice of basic unit, the neuron, see the recent critical assessment article by T.H.Bullock et al. (2005). The cognitive neurosciences have, indeed, made rapid progress. And this includes sophisticated modeling of structures and functions on many levels. But what we really need, and what some popular texts pretend to supply, is a connected story – with experiments and mathematical models at the level of Hodgkin and Huxley (1952) – reaching from basic anatomical structure up through the various stages of complex cognitive behavior, and ending up with high-level phenomena such as attention, consciousness, and speech.

## 4 Representations at mid-level

Science consists in doing what is do-able. We will, therefore, abstain from further speculations, scale down the grand visions, and conclude with a few simple remarks on cognitive architecture and representational formats.

A convenient starting point for these remarks is the "neurocognition of language" book edited by Brown and Hagoort (1999). The surveys in this book separate into three levels. At one end we see the perspective of the linguist, which rests on a long research tradition in the classical disciplines of phonology, syntax and semantics. At the other end we have the perspective from the neuroscience research community, which by now is in command of a vast and extremely detailed knowledge of brain structures. But when the linguists try to reach deeper into mind and brain and the neuroscientists try to explain how higher cognitive functions emerge out of bare structure, we are in a somewhat uncertain middle ground. The two middle parts of Brown and Hagoort (1999) survey various attempts to bridge this gap. In one part the linguistic analysis is supplemented by an account of cognitive architecture, building on a rich research tradition in cognitive psychology. Here we find mid-level blueprints of the speaker, the listener and the reader. In a second part we find a survey of steps towards a neurocognitive architecure of language, aiming to connect the blueprints of cognitive psychology with basic brain structure. What is particularly attractive with the Brown and Hagoort (1999) book is the effort to spell out the interaction between the different parts. On the one side the blueprints are so constructed to be consistent with the linguistic analysis, and on the other side the blueprints serve as guiding principles in the identification of the basic neural architecture.

Language, blueprints and structure bear some analogy to our discussion in the first part of this paper. We have advocated the use of an LFG type syntactic format. This is very much consistent with the grammatical analysis used by J.M.Levelt (1999) in his blueprint for the speaker, where a unification-based grammar formalism is a tool in the transformation of meaning into speech. This unification-based analysis was first developed by G.Kempen and T.Vosse (1989); see also the account in Fenstad (1998). But at mid level there are many strctures interacting, not only meaning and speech. Placed in a particular context you may listen, observe, speak and write. All of this interact at many levels in the brain to create meaning and response. To fix ideas let us return to an early example of language technology, a question-answering system developed by E.Vestre (1987 – in Norwegian); see the exposition in Fenstad et al. (1992). The basic architecture follows a familiar pattern:




This is a technology application based on the simple assumption that "model = data base". The system can be updated by new facts as indicated by the left column. Sentences are represented by situation schemata, and a special algorithm was developed to extract basic facts from the schemata and to add them to the data base. A question is asked resulting in an incomplete schema. This schema acts as a query to the data base and produces an answer in form of a complete schema, which in turn generates the appropriate response.

If we are allowed a brief moment of speculation, we could argue that at a very general level this architecture can also be used in a cognitive context. The right column will then have to be modified to represent a "blueprint" for a speaker or, more generally, an actor. The left column must in a similar way be modified to "blueprints" for the reader or the listener. And we must in addition make allowance for visual and other types of perceptual inputs. The middle column will represent some "attention mechanism" and will determine the appropriate context and form of response. The main move would be to replace the data bases of simple language technology with the category of conceptual spaces. And, as a concequence, the situation schemata need to be enriched to a suitable attribute-value matrix form. We could even entertain the thought that this is a possible architecture for memory recall, pointing to the similarity between recall and the above sequence: questions – incomplete representational form – data base – inference – answer.

But this is speculation and yet far from respectable theory. As pointed out above we seem best prepared at either end, we are at a loss in the middle ground. But we are slowly gathering the tools in our quest for a deeper understanding. On the brain side we have seen interesting mathematical models; I want, in particular, to point to various forms of neuronal assembly theories, see Scott (2002), and to the approach in Eliasmith and Anderson (2005); see also the recent book, *Neuromimetic Semantics*, H.Howard (2004). The aim is not neccessarily to build global brain models, but to model specific functions at their appropriate level. On the other side we have the theory of conceptual structures. It is now neccessary to study specific examples and try to understand how the intrinsic geometry in these examples can be generated by brain mechanisms, themes in color and vision come immediatley to attention; for vision see

E.T.Rolls and G.Deco (2002). I submit that proper attention to the larger architectural structure is needed to guide this quest.

At mid-level we also need a more detailed study of the space of representational forms, in particular, its dynamical structure; see the unification spaces of Kempe and Vosse (1989) for some early algorithms, see also the discussion in Fenstad (1998). Algorithmic concerns should always be a focus of attention; we need to exploit the fact that the representational level is the interface between the linear processing of speech and the parallell processing of brain; see Donald (2001, chapter 5) for a general discussion.

To take command of the middle ground is, in my view, the main challenge. We can, as we did above, argue for this within a cognitive science context. But barriers to progress in language technology – in machine translation and speech recognition – tell us with equal urgency that we need to conquer the middle ground. Incremental progress in current language technology is still important for viable applications. But real progress in the technology needs an understanding that is far beyond theory today. No amount of wistful handwaving can hide this fact.

## References

D. J. Amit (1989): *Modeling Brain Function*, Cambridge Univ. Press.

C. M. Brown and P. Hagoort (eds.) (1999): *The Neurocognition of Language*, Oxford Univ. Press.

J. Barwise and R. Cooper (1981): *Generalized quantifiers and natural languages*, Language and Philosophy **4**.

J. Barwise and J. Perry (1983): *Situations and Attitudes*, The MIT Press.

J. van Benthem and A. ter Meulen (eds.) (1997): *Handbook of Logic and Language*, North-Holland.

J. Bresnan (ed.) (1982): *The Mental Representaion of Grammatical Relations*, The MIT Press.

J. Bresnan (2001): *Lexical-Functional Syntax*, Blackwell.

T. H. Bullock et al. (2005): 'The Neuron Doctrine, Redux', *Science* **310**.

N. Chomsky (1965): *Aspects of the Theory of Syntax*, The MIT Press.

P. M. Churchland (1995): *The Engine of Reason, the Seat of the Soul*, The MIT Press.

P. S. Churchland (2002): *Brain-Wise*, The MIT Press.

E. Colban (1987): 'Prepositional phrases in situation schemata', in J. E. Fenstad et al.: *Situations, Language and Logic*, D. Reidel Publ. Company.

P. W. Culicover and R. Jackendoff (2005): *Simpler Syntax*, Oxford Univ. Press.

M. Donald (2001): *A Mind So Rare*, W. W. Norton & Company.

H. Dyvik (1993): *Exploiting Structural Similarities in Machine Translation*, Univ. of Bergen.

C. Eliasmith (2000): *How Neurons Mean*, Washington Univ.
C. Eliasmith and C. H. Anderson (2005): *Neural Engineering*, The MIT Press.
J. E. Fenstad, (1978): 'Models for Natural Languages', in Hintikka et al., *Essays on Mathenatical and Philosophical Logic*, D. Reidel Publ. Company.
J. E. Fenstad (1996): 'Remarks on the Science and Technology of Language', *European Review* **4**.
J. E. Fenstad (1998): 'Formal semantics, geometry and mind', in Arrazola, *Discourse, Interaction and Communication*, Kluwer.
J. E. Fenstad (2004): 'Tarski, truth and natural languages', *Annals of Pure and Applied Logic* **126**.
J. E. Fenstad, P. K. Halvorsen, T. Langholm and J. van Benthem (1985): *Equations, Schemata and Situations*, CSLI, Stanford.
J. E. Fenstad, P. K. Halvorsen, T. Langholm and J. van Benthem (1987): *Situations, Language and Logic*, D. Reidel Publ. Company.
J. E. Fenstad, T. Langholm and E. Vestre (1992): 'Representations and interpretations', in M.Rosner et al., *Computational Linguistics and Formal Semantics*, Cambridge Univ. Press.
M. S. Gazzaniga (ed.) (2004): *The Cognitive Neurosciences III*, The MIT Press.
P. Gärdenfors (2000): *Conceptual Spaces*, The MIT Press.
P. Gärdenfors (2003): *How Homo Became Sapiens*, Oxford Univ. Press.
A. L. Hodgkin and A. F. Huxley (1952): 'A quantitative description of membrane current and its application to conduction and excitation in nerve', *J.Physiol*. **117**.
H. Howard (2004): *Neuromimetic Semantics*, Elsevier Press.
R. Jackendoff (2002): *Foundation of Language*, Oxford Univ. Press.
G. Kempen and T. Vosse (1989): 'Incremental syntactic tree formation in human sentence processing', *Connection Sciences* **1**.
J. M. Levelt (1999): *Producing spoken language: A blueprint of the speaker*, in Brown and Hagoort (1999).
D. Loritz (1999): *How the Brain Evolved Language*, Oxford Univ. Press.
G. Marcus (2004): *The Birth of the Mind*, Basic Books, N.Y.
J. Petitot (1995): 'Morphodynamics and attractor syntax', in Port and van Gelder (eds.), *Minds as Motion*, The MIT Press.
C. Pollard and I. Sag (1987): *Information-Based Syntax and Semantics*, CSLI, Stanford.
C. Pollard and I. Sag (1994): *Head-Driven Phrase Structure Grammar*, Univ. Chicago Press.
A. Prince and P. Smolensky (1997): 'Optimality: From Neural Networks to Universal Grammar', *Science* **275**.
E. T. Rolls and G. Deco (2002): *Computational Neuroscience of Vision*, Oxford Univ. Press.
E. Rosch (1978): 'Prototype Classification and Logical Classification', in E. Scholnik (ed.), *New Trends in Cognitive Representations*, L. Erlbaum Ass.

A. Scott (2002): *Neuroscience - A Mathematical Primer*, Springer-Verlag.
R. Thom (1970): 'Topologie et Linguistique', in *Essays on Topology*, Springer-Verlag.
R. Thom (1973): 'Langage et Catastrophes', in J. Palis (ed.), *Dynamical Systems*, Academic Press.
R. Thomason (1974): *Formal Philosophy, Selected Papers of Richard Montague*, Yale Univ. Press.
E. Vestre (1987): *Representasjon av direkte spørsmål*, Univ. of Oslo.
T. J. Wills et al. (2005): 'Attractor Dynamics in the Hippocampal Representation of the local Environment', *Science* **308**.

# NORWEGIAN BARE SINGULARS: A NOTE ON TYPES AND SORTS

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**Abstract**

The distribution of bare singulars in Norwegian was thoroughly examined in Borthen (2003). The present paper outlines an account of these data in a type-logical semantics of the Neo-Carlsonian kind. The focus is primarily on the syntax-semantics interface, which here, somewhat simplified, amounts to assigning semantic types in the appropriate sortal domain to bare singulars. I argue that bare singulars can have their denotation both in the domain of ordinary individuals and kinds. Furthermore, they can either be used with their property type or function as names. This explains why bare singulars can be both predicates and arguments. Concerning bare singulars in the direct object position, the phenomenon of incorporation also seems to play a role. The various restrictions on the use of bare singulars can basically be accounted for in terms of competition with more marked grammatical forms, notably (in)definite DPs.

## 1 Introduction

In the Montagovian tradition, common nouns – or bare nominals – are basically properties, that is, the NP "semanticist" denotes for each world or situation the set of individual semanticists in that world. In English, count nouns are rarely used in the pure form of the lexical entry, but turn up in variants like the DPs "a semanticist", "the semanticist" or the bare plural "semanticists". The interest in bare nominals in the semantic community was given an impetus when Carlson (1977) proposed that bare plurals in English basically refer to kinds:

(1) Semanticists are rare in Mainland Scandinavia.[1] *(kind reference)*

(2) Semanticists are observed in Kjell Johan's garden. *(object reference)*

[1] 'Semanticists' can, of course, always be replaced by 'dogs' or by the reader's favourite well-established kind.

In examples like (2), the context suggests that concrete individuals might realise the abstract kind we find in (1). With a stage-level predicate ("to be observed"), we get an indefinite reading of the bare plural, which in the Carlsonian analysis can be paraphrased as existential quantification over (spatio-temporal) stages of objects realising the kind "semanticist". Carlson's ontology is thus richer than the standard Montagovian machinery: ordinary individuals (objects) interact with stages and kinds.

The Neo-Carlsonian approach of Chierchia (1998) maintains the idea of bare nominals being kind-denoting, now through a covert "down-operator", which turns a property into a kind. For contexts such as (2) above, Chierchia introduces covert operations in several steps; first "semanticists" is shifted from a property to an atomic kind (the down-operator) in order to fill the subject position of the sentence; next, a rule labelled "derived kind predication" repairs – in two steps – the mismatch between the object-level predicate "to be observed" and the kind-denoting subject. An "up-operator" takes the kind entity as input and returns, once again, a property – the set of semanticists (Arnim, Cathrine, Ede, Torgrim, etc.) now conceived as a "mass", and, finally, existential quantification ensures that at least some of these guys can be found in Kjell Johan's garden. Chierchia no longer talks about "stages", so the Neo-Carlsonian ontology merely distinguishes between ordinary individuals (objects) and kinds.

Chierchia's paper is important in many respects, not the least because it shifts focus from English bare plurals to cross-linguistic investigations into the nature of bare nominals. The conventional wisdom says that in languages without articles, such as Russian, bare singulars do double-duty as indefinites and definites:

(3) Pozdnej osen'ju v seredine dnja s rejsovogo "Ikarusa" [...] soshel [molodoj muzhchina]$_j^{[\text{bare singular}]}$. Byl [on]$_j$ odet v sportivnye botinki i dzhinsy [...] [Muzhchina]$_j^{[\text{bare singular}]}$, ne obrashchaja vnimanija na veter i na dozhd', [...] postavil chemodan mezhdu nog i tak ostalsja stojat' tam, gde soshel. (Uppsala Corpus)

Late in the autumn, in the middle of the day, [a young man]$_j$ got off the "Ikarus"-express. [He]$_j$ wore jogging shoes and jeans [...] [The man]$_j$, not paying attention to the wind and rain, [...] put his suitcase between his feet and remained standing where he got off.

In such languages, type shifting in the sense of Partee (1987) occurs relatively freely. More generally, however, a universal *blocking principle* is invoked both for Partee's covert operators (such as ∃ and ι – producing indefinite and definite

interpretations, respectively) and Chierchia's operators (mediating simultaneously between types and sorts):

> *NP denotations can be type shifted freely, unless the type shift is lexicalised (marked) in a language through the existence of an overt determiner.*

This kind of iconicity is in line with a common principle of current Optimality Theory: marked forms should be used for marked expressions.

Chierchia makes an additional claim concerning the category of number: the down operation – which produces kind entities – is undefined for singular terms. Hence, bare singular kinds are ruled out in his system.[2]

Concerning Germanic languages, Chierchia's theory makes the following strong prediction, which is presented as a "fact" in (Chierchia 1998: 341): "[In Germanic,] bare singular arguments are totally impossible". Arguments are prototypically referring expressions of type <e>, but since a covert shift to $<e_o>$ is blocked by (in)definite determiners and a shift to kinds $<e_k>$[3] is barred for singular terms in Chierchia's theory, bare singulars can only be predicates.

Nevertheless, as the readers of this volume dedicated to a Norwegian semanticist probably are aware of, Norwegian is a Germanic language, which, interestingly, does exhibit bare singulars both in predicate and argument positions. In the Neo-Carlsonian literature, Chierchia's theory is constantly challenged and refined as more "exotic" languages are under scrutiny. And now time is ripe for us to have our say.

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[2] This blocking is not due to the existence of a kind-forming determiner (no languages have special determiners for kinds), but is related to the ontological status of kinds in Chierchia's theory. Chierchia argues that properties whose extensions do not have a greatest individual cannot be mapped to a kind. Concerning our initial example "semanticist", it does not make any sense to say that Kjell Johan is greater than Arnim or that Arnim is greater than Kjell Johan; they are both atomic entities from a semantic point of view. This is contrasted with the bare plural "semanticists", where the greatest individual equals the sum of all semanticists in the world of evaluation. I do not share this assumption, and follow Krifka (2003) who finds Chierchia's restriction to plural kinds unjustified. Imagine, 30 years from now, that every linguistic department in the world decided to abandon semantics due to some global quality reform. Despite this deplorable situation, the kind "semanticist" would still be defined and well-established (in memory of happier days) even though the specimen making up this kind could possibly be reduced to the singleton set {Kjell Johan}, an untouchable professor emeritus at the department of German studies.

[3] I use the familiar type <e> for entities with subscripts 'o' and 'k' distinguishing sortally between ordinary individuals and kind individuals, whenever necessary. For simplicity, I will typically omit the world parameter and stay within an extensional semantics. This means that I tend to gloss over the distinction between, say, the property type <s,et> and the predicative type <et>.

## 2 Calling Up Norwegian

A serious treatment of the thorny data was given in Kaja Borthen's dissertation (2003) on bare singulars in Norwegian. She distinguishes four main cases:[4]

(4) I: *the "conventional situation type" construction*
  a. Kjell Johan holdt på med doktorgrad[bare singular] i 1984.
     'Kjell Johan was working on a doctoral degree in 1984.'
  b. Kjell Johan var doktorgradsstudent[bare singular] i 1984.
     'Kjell Johan was a PhD-student in 1984.'

(5) II: *the "profiled have-relation" construction*
  a. Kjell Johan har gul ytterfrakk[bare singular].
     'Kjell Johan has a yellow coat.'
  b. Kjell Johan, det er hammer[bare singular] i verktøykassa.
     'Kjell Johan, there is a hammer in the toolbox.'

(6) III: *the "comparison of types" construction*
  a. Kjell Johan, hammer[bare singular] er et nyttig verktøy.
     'Kjell Johan, a hammer is a useful tool.'
  b. Den beste typen framkomstmiddel er t-bane[bare singular].
     'The best type of conveyance is the subway.'

(7) IV: *the "covert infinitival clause" construction*[5]
  a. Bil[bare singular] er kjekt.
     '(Having) a car is handy.'
  b. Trenger du bil[bare singular]?
     'Do you need (e.g. to borrow) a car?'

The question which will be our main concern here, is how these data can be related to a type-logical framework. Borthen does not address this issue, but points out that bare singulars are prototypically *type-emphasizing*, cf. the minimal pair below:

[4] Limitations of space force me to refer the reader to Borthen's dissertation for a justification of this classification and the *raison d'être* behind her labels. Below I illustrate each class with two examples, which, like most of the Norwegian data presented in this paper, are borrowed from Borthen's work (with minor modifications, basically "modulo Kjell Johan").

[5] In the following, I will ignore this particular construction, which from a semantic point of view perhaps should ultimately be grouped together with other constructions. There is a certain overlap also in Borthen's work, where data belonging to the "covert infinitival clause" construction also show up in the discussion of the "profiled have-relation" construction.

(8) Kari fikk en fin sykkel[indefinite singular]. Den var blå. (*token reference*)
'Kari got a nice bike. It was blue.'

(9) Kari fikk sykkel[bare singular]. Dét fikk Ola òg. (*type reference*)[6]
'Kari got a bike. Ola got one too.' *(literally: "That Ola got too").*

It might seem paradoxical, but characteristics like "type emphasis" or "type reference" do not belong to the jargon of type-logical semantics, as they do not tell us *which type* we should assign to bare singulars. In this respect, consider also the following remark from Gerstner & Krifka (1993: 970):

> "The well-known *type/token* distinction can be treated as a case of this ambiguity of count nouns. For example, *book* may refer to individual books ('tokens'), like the book with the red cover on the top of my shelf, or to a subspecies of books ('type'), like Milton's *Paradise lost*. In a sentence like *This book sells well* it is obviously the latter reading which is selected."

However, this is presumably not what Borthen has in mind, as she does not adhere to a kind-interpretation of Norwegian bare singulars, cf. for instance this little footnote: "A *type discourse referent* must not be confused with a *kind* in the sense of Carlson (1977)" (Borthen 2003: 23). What, then, does Borthen mean by "type"? Is "type" referring to types or sorts? If it's not the sort *kind*, it must be the type <et>, the *predicative type*. Or maybe the term is intended to be ambiguous, an ambiguity which, perhaps, is rather welcome and indeed reflects the essence of the proposal I will sketch below.

My approach will share many features with Neo-Carlsonian approaches – including a *type-logical framework* and the idea of *competition*, but it will be more conservative and less complex than Chierchia's iterated covert type shifts. As pointed out by Krifka (2003: 177) with respect to rules like the "derived kind predication", simpler derivations are possible and preferable. The big question is what makes it possible for bare singulars to appear in argument positions despite the existence of (in)definite determiners in Norwegian? I will claim that *kind reference* and *incorporation* are two independent ways of avoiding the blocking by articles, and both these phenomena seem to play a role in the Norwegian grammar.

[6] The peculiar pronoun "dét", which according to Borthen signals "type reference", is not the whole story, since "Dét fikk Ola òg" is a possible follow-up of the first sentence in (8) as well. Borthen is, of course, aware of this fact.

## 3 Two sorts and two types

The exact ontological status of kinds and how they relate to ordinary individuals is a matter which cannot be addressed properly in this setting. As noted in a recent paper on bare nominals by de Swart, Winter & Zwarts (2004), the Neo-Carlsonian community is currently rethinking and redefining the notion of kind. Still, everybody seems to agree that we need both kinds and ordinary objects, and here I will simply assume that these two domains coexist without addressing possible interactions. This is basically also the stand taken in (Dayal 2004) and (Katz & Zamparelli 2005).

Following these authors, I further claim that NPs (common nouns) can be *ambiguous* between an object-level and a kind-level interpretation. More specifically, this ambiguity is what we observe in the case of so-called well-established kinds. The denotation of a bare nominal is split into a property of objects and a property of kinds:

> [[dog]] = {Fido, Lassie, Pluto, …} *or* {$\text{dog}_k$, German $\text{shepard}_k$, Golden $\text{Retriever}_k$ , …}

This accounts for different readings such as:

(10) A dog is barking in Kjell Johan's garden. (*object level*)

(11) A dog was selected for its special features. (*kind level*)

In (11), we get the so-called subkind or taxonomic reading. Note that the "superkind" '$\text{dog}_k$' is part of the set denoted by the bare nominal; however, the indefinite DP "a dog" in (11) clearly picks out one of the subkinds (say, '$\text{German shepard}_k$') from the dog-taxonomy. As we will see in section 5, the definite article picks out the superkind itself, when the context selects a kind interpretation. Thus, the standard determiners combine compositionally with the relevant property – be that in the domain of ordinary individuals or kinds.

The question is, of course, how bare singulars in Norwegian relate to these properties. The answer is twofold. As expected, bare singulars can, in principle, occur in predicative positions (see section 4). But, importantly, I will argue that bare singulars lead a double life not only with respect to their sorts, but also with respect to their types. Following various works by Krifka, I claim that common nouns can function as *names* and are thus able to apply to their kind directly. An exceptional case from English illustrates this phenomenon:

(12) Man has lived in Africa for more than two million years. (Gerstner & Krifka 1993: 967)

I will not invoke type shifting for such cases. Type shifting by, say, the ι -operator should be ruled out in (12) on principled grounds due to the existence in English (and Norwegian) of a definite determiner. Instead, I will simply assume that common nouns are inherently ambiguous in the sense that they can be used in the appropriate context with this additional naming function.

Furthermore, at the end of the next section I will also argue that this naming function is *not* restricted to the kind domain.

## 4 Bare singulars in the domain of ordinary individuals

But let's not rush ahead. Let's first see how far we can get with our standard assumptions, starting with the predicative type. Examples like the following are, of course, just what we expect in a compositional semantics.

(13) Kjell Johan er professor[bare singular] i tysk.
'Kjell Johan is a professor of German.'

A predication such as the one in (13) expresses a membership relation, where the predicate NP ("professor i tysk") denotes a set of <e>-type entities, and the speaker claims that the subject of the sentence, "Kjell Johan" of type <e>, belongs to this set. This is also known as *quantitative* predication. We can truthfully assert that Kjell Johan belongs to the set of professors of German, but there is more to say. Let's *qualify* him as in (14):

(14) Kjell Johan er en utsøkt semantiker[indefinite singular].
'Kjell Johan is a distinguished semanticist.'

Of course, one would like to know *why* a bare singular cannot be used in the last example. For some reason, Norwegian patterns with English in (14), but not in (13). It is natural to assume an underlying competition, but since no covert type shift is involved in (13), I predict that the indefinite article, expressing qualitative predication as in (14), is the marked form which should be accorded the more specialised meaning.[7]

Many of Borthen's examples can be treated compositionally just as straightforwardly as in (13). For instance, in the following case, the correlation with the predicative type falls out on a standard semantic analysis of the existential *there*-construction:

(15) Det er lege[bare singular] i Mandal.
'There is a doctor in Mandal.'

[7] See de Swart, Winter & Zwarts (2004) for an alternative view and a discussion of the relationship between these two kinds of predication.

The sentence in (15) expresses a relation of non-empty intersection between *the set of doctors* and things in Mandal. Another point worth making is that the felicity of the bare singular in (15) can actually be considered an argument against treating bare singulars as *bona fide* kinds (i.e. [[lege]] = $\text{lege}_k$) since kind terms are definite, and definite (strong) expressions are known to be ruled out in this environment (the so-called weak/strong distinction).

Finally, we come to the question of when and why we get bare singulars in argument positions. First we recall that such cases are unexpected since arguments are of the basic type <e> or the type of generalised quantifiers <et,t>, and a covert shift from the inherent predicative type of bare singulars to an argumental type is blocked by the existence of determiners in Norwegian.

However, let's push the predicative type still a bit further. It is sometimes claimed that transitive verbs come with different type requirements on their objects. For instance, Zimmermann (1993) argues that certain intensional verbs actually take properties as direct objects on their opaque interpretation. In the case of Norwegian, this gives a quite straightforward compositional semantics for minimal pairs like the following:

(16) Jeg ønsker meg sykkel[bare singular]. *(only narrow scope reading)*
'I want a bike.'

(17) Jeg ønsker meg en sykkel[indefinite singular]. *(both narrow and wide scope readings)*
'I want a bike.'

Bare nominals always have narrow scope, as with the property argument in (16). This is to be contrasted with (17) on a transparent, wide-scope reading, where an indefinite generalised quantifier has to be invoked, conveying the meaning that the speaker has a specific bike (token) in mind. If (17) only had this wide scope reading, we could have argued that the wide scope reading, which triggers a shift from the property type to type <et,t>, is overtly encoded by the article, while the bare singular is preferred when the property type is required (narrow scope reading in intentionalised contexts). However, this competition perspective does not explain why a narrow scope reading exists also for indefinite DPs as in (17). Indefinites (the preposed article "en" in Norwegian) must express more than just existential quantification. Krifka (2003: 127) briefly addresses this issue with respect to Brazilian Portuguese, which patterns with Norwegian in allowing bare singulars in argument positions despite having a full inventory of determiners. Krifka mentions a possible solution to this competition problem: A possibility would be to let indefinite expressions introduce a choice function, in which case we get a wide-scope interpretation of the existentially bound choice function also on a narrow scope reading of the NP.

In any case, it should be clear that the common noun "sykkel" is not a *bona fide* indefinite (even if one assumes that indefinites have the basic type <et> as in various DRT-based approaches). Unlike true indefinites, bare singulars cannot take wide scope. They are *scopally inert*, to use the expression of Farkas & de Swart (2003). At the same time, it seems implausible that the intensional/extensional distinction should play any major role in the distribution of bare singulars. At least it does not explain why bare singulars are often perfectly natural in purely extensional contexts:

(18) Kjell Johan og Kirsten kjøpte rekkehus[bare singular] på Tveita.
'Kjell Johan og Kirsten bought a row house at Tveita.'

Instead, a large part of the data discussed by Borthen – probably the majority of the cases where the bare singular occurs in a direct object position – invites an analysis in terms of *semantic incorporation*, also referred to as "pseudo-incorporation" in (Dayal 2003). Pace Borthen, I thus propose to distinguish between (19) and (20) below, which both allegedly belong to "the conventional type construction". However, in my view, the syntax-semantics mapping is too different in these cases to allow for a unified analysis.

(19) Kjell Johan er spydkaster[bare singular].
'Kjell Johan is a javeline thrower.'

(20) Kjell Johan kaster spyd[bare singular].
'Kjell Johan throws the javeline.'

The analysis of incorporation proposed by Asudeh & Mikkelsen (2000) for Danish seems to be highly relevant also for Norwegian.[8] In fact, even Dayal's incorporation data from Hindi shows strong similarities with Norwegian bare singulars in object position (and as complements of prepositions). For reasons of space, I will here just mention some of the characteristics valid for semantic incorporation cross-linguistically, exemplified with bare singulars in direct object position as in (18) above: the VP forms a complex predicate with an "institutionalised", stereotypical meaning; the noun phrase is scopally inert (it contributes no quantifier, hence a wide-scope reading with respect to operators such as negation and intensional elements is impossible); the bare singular is

[8] Contra Asudeh & Mikkelsen, I prefer the term "semantic incoporation" instead of "syntactic incorporation", since the incorporated noun – at least in Norwegian – can often move quite freely, e.g. to topic positions:

(i) Bil[bare singular] er kjekt å ha.
'Having a car is handy.'

semantically number neutral[9]; and the bare nominal has reduced discourse transparence.

The last point is interesting and much debated. Let's look at some relevant data from Borthen:

(21) Kari kjørte bil[bare singular] til hytta forrige fredag. ??Den står der fortsatt.
'Kari drove her car to the cottage last Friday. It is still there.'

(22) Kari sparket fotball[bare singular]. ??Den var blå.
'Kari was playing soccer. It was blue.'

These incorporation constructions with the bare nominals "bil – car" and "fotball – soccer" in direct object position show full discourse opacity, as expected given an analysis of incorporation where the bare nominal does not contribute any discourse referent (in the sense of DRT). But then, what about Borthen's counterexample in (23) below?

(23) Kari har bil[bare singular], men hun bruker den aldri.
'Kari has a car, but she never uses it.'

One possibility would be to give a different analysis of (21) and (23), such that only the former is treated as a case of incorporation, but then we should argue that verbs like "å ha – to have" differ in their inherent logical type from transitive verbs like "å kjøre – to drive" in taking complements of type <et>. A second option would be to treat both cases as incorporation and consider the anaphor ("den – it") in (23) as an "inferable" (or "bridging" in a broad sense), similar to discourses like (24), where the pronoun "hun – she" lacks an overt antecedent:

(24) A: Kjell Johan er gift. B: Det visste jeg ikke. A: Jeg tror hun heter Kirsten.
'A: Kjell Johan is married. B: Oh, I didn't know. A: I think her name is Kirsten.'

[9] Number is a highly important, but rather tricky issue for any theory of bare nominals. Pragmatically, sentences like (18) will of course be interpreted as involving a single house, but as shown by Borthen (2003: 146), in the appropriate context a plural interpretation may emerge:

(ii) Per har hatt hund[bare singular] i ti år. Alle har vært veldig snille.
'Per has had a dog for ten years. They have all been very kind.'

Finally, in recent analyses of semantic incorporation there have been several attempts to incorporate (sic!) a certain limited dynamic potential into incorporated nouns, cf. Dayal (2003) and Farkas & de Swart (2003). The proposal of the latter is couched in a DRT-framework in which they distinguish between normal discourse referents and thematic arguments. Determiners (or the plural morpheme) are the locus for introducing discourse referents, hence in the case of an incorporated bare singular, we merely get a "thematic variable". This enrichment of the DRT-architecture is not so straightforward to implement formally. But even if we assume with de Swart and Farkas that there is such a distinction, and furthermore that discourse referents are better antecedents than thematic arguments, then how do we account for examples like (25), where the pronoun seems to be able to pick up the bare singular despite the presence of a "better" alternative, the full-fledged discourse referent of the definite subject?

(25) Traktoren $_i$[definite singular] til naboen har tilhenger $_j$[bare singular]. Den$_{i/j}$ er lite brukt.
'My neighbour's tractor has a trailer. It is seldom used.'

The issue of semantic incorporation and its formalisation will most certainly receive much attention in the future. Here I can merely suggest that the Norwegian data seems to share all the relevant features with pseudo-incorporation in Hindi (not to say Danish!) – and deserves further investigation. This line of research was ultimately dismissed by Borthen mainly because bare singulars are also found in subject position (sisterhood seems to be required for incorporation). And, indeed, pseudo incorporation is *not all* there is to say about bare singulars in Norwegian.

In section 3, I mentioned the possibility of using bare singulars with a *naming function* in the domain of ordinary individuals. These are the data I had in mind:

(26) Kelner[bare singular], kan jeg få menyen?
'Waiter, can I have the menu?'

(27) Rektor[bare singular] var rasende.
'Our headmaster was furious.'

(28) Vesle[definite singular adjective] mor[bare singular] sto ute i hagen.
'My dear mother was outside in the garden.' *(literally: "little mother")*

These examples are all from Borthen's introductory chapter, where she explicitly excludes this kind of construction from her definition of bare singular

count nouns because of the "definiteness", which, true, shows up in agreeing adjectives as in (28).[10] My claim is that the alleged definiteness is due to the use of the bare nominal in the naming function, which must be of type $<e_o>$. For some reason, the overt definite determiner is ruled out in the examples above, and it is therefore conceivable that this function of the bare singular is due to a covert type shift. However, in this paper, I entertain the possibility that we have a genuine ambiguity: Lexical nouns, which traditionally are thought of as properties, can be used as names of type <e>.

## 5 Bare singulars in the kind domain

There is a subject-object asymmetry with respect to bare singulars in argument position: When the bare singular has the syntactic function of a direct object, we are typically dealing with incorporation, but in a subject position the NP denotation is often in the kind domain (except for cases like (27)-(28) above). Furthermore, I claim that kind reference with bare singulars is achieved through the naming function, which gives us the requisite argument of type $<e_k>$ and saves the type-logical machinery by referring directly to an atomic entity.

The kinship between kinds and proper names is particularly transparent when the verbal predicate itself puts "naming" on the agenda:

(29) Denne arten kalles "ulv"[bare singular].
'This species is called the "wolf".'

Consider finally some examples with bare singulars in subject position:

(30) Bil[bare singular] er ikke det samme som buss[bare singular].
'A car is not the same as a bus.'

(31) Tiger[bare singular] og løve[bare singular] er beslektede arter.
'The tiger and the lion are related species.'

(32) Tiger[bare singular] er i motsetning til løve[bare singular] en truet dyreart.
'The tiger is, unlike the lion, an endangered species.'

Examples like (30) are particularly interesting since the generic definite seems to be blocked ("*bilen", "*bussen"). In other cases, e.g. (31) and (32), the definite generic ("tigeren", "løven") would be a possible alternative. The use of bare singulars as kind-denoting names is in fact quite restricted since this option is typically outranked by the definite generic article:

[10] I find it somewhat odd that semantic effects of "definiteness" or "indefiniteness" should play any role in the demarcation of *bare* nominals. Bare is bare!

(33) Tigeren[definite singular] er truet flere steder i verden. (*tiger[bare singular])
'The tiger is an endangered species in many parts of the world.'

All the examples (30)-(32) of the bare singular in subject position belong to Borthen's third group ("comparison of types construction"). In this respect, it is worth noting that an entity, according to Dayal (2003), qualifies as a subkind only if it belongs to a contrast set.

This is how I propose to account for the observed competition between the bare NP and the definite DP: The definite generic article is nothing more than the definite article applied to the taxonomic domain. As always, the definite determiner picks out the maximal element out of a set, which, in this case, is the superkind itself. The relevant domain of quantification is the domain of subkinds, which includes the superkind, as noted in section 3. This disambiguation of the definite article is a welcome result of our ontological (sortal) distinction between the domain of ordinary individuals and kinds. In other words, there is nothing special about the so-called generic definite determiner; it is the common noun that has two possible denotations, one in the object domain, the other in the taxonomic/kind domain, cf. similar ideas in (Dayal 2003) and (Katz & Zamparelli 2005).

Thus, the speaker has the following choice in examples like (32) and (33) above:

a) $\text{tiger}_k$
*vs.*
b) [[tiger-en]] = ι k. tiger(k) iff 'tiger' is a property of kinds.

Given standard OT-reasoning, the marked form in b), the overt definite article, is the preferred choice, everything else being equal. Then why is the alternative in a) still viable in contexts like (32)? The reason for this seems to be that the definite article comes with an additional *familiarity presupposition* which is absent in the case of the direct kind reference with a bare singular in its naming function. In the case of well-established kinds, the presupposition is readily accommodated in absence of any "distracting factors", hence the definite determiner "wins" in cases like (33). On the other hand, the so-called "comparison of types construction" makes salient taxonomic hierarchies in which the kind denoted by the bare singular is *not* a superkind, but a "proper" subkind. I suggest that this fact reduces the chances of the definite determiner coming out as a winner. For instance, in (32), both the tiger and the lion are conceptualised as subkinds of "endangered species" in a taxonomy of wild animals. Although it would have been possible to refer to each noun in the comparison construction as the maximal element, i.e. the superkind "tigeren – the tiger" of the set of tigers and the superkind "løven – the lion" of the set of

lions, the comparison construction makes the speaker more reluctant to invoke the familiarity presupposition of the generic definite. The question under discussion (topic) is not the otherwise well-established kinds of these wild cats, but a different taxonomy. The comparison of types construction is thus a case of *partial blocking*, where direct reference to kinds by a bare singular is possible despite the existence of the generic definite article. The common feature of (30)-(32), where a bare singular is licensed, is that a different/larger taxonomic hierarchy is under discussion in which the well-established kind of the bare nominal is not a superkind.

## 6 Conclusion

For a common noun N which is considered a well-established kind by the language community, I have argued for the following type-sort ambiguity:

N is of type $<e_{o/k}>$
*or*
N is of type $<e_{o/k},t>$

In this paper, I have left open the question of whether we should reduce this picture by letting some variants be primitive and others arise through coercion.

The existence of (in)definite determiners in Norwegian puts severe restrictions on the use of N in its purest form. However, in the data discussed above, we have encountered 3 out of the 4 admissible variants: $<e_o>$, $<e_o,t>$ and $<e_k>$ with the last two being most frequent, explaining prototypical occurrences of bare singular count nouns in predicative/incorporated positions and in the subject position, respectively.

While a type-logical framework equipped with this sortal distinction shows *why* a bare nominal is possible in various contexts, it cannot explain the restrictions on its use and I have only discussed a subset of the intriguing data presented by Borthen (2003). However, I believe that this paper shows that Norwegian bare singulars do not constitute an isolated phenomenon, but should find their proper place in the Neo-Carlsonian research paradigm.

These somewhat sketchy remarks invite a closer inspection of the competition at each micro level (i.e. for each construction/context) between the bare singular, various determiners, the bare plural form etc. Something like *weak bidirectionality* (see for instance Blutner, this volume) seems to be what we are looking for. This version of Optimality Theory allows for partial blocking, where the unmarked form (the bare singular) "survives" and is accorded its own unmarked meaning. However, since the bare singular competes with different marked forms in different contexts, the set of "unmarked meanings" assigned to the bare singular may become rather large and heteroclite.

**Acknowledgments**

Unfortunately, Kjell Johan can hardly be held responsible for anything said above. But, like some of the kind-referring constructions above, he deserves my *kind reverence* for being the organiser of the circle of theoretical linguistics at the University of Oslo, where a preliminary version of this paper was presented October 5th, 2005.

**References**

Asudeh, A. and L.H. Mikkelsen (2000): 'Incorporation in Danish: Implications for interfaces' in R. Cann, C. Grover & P. Miller (eds.): *A Collection of Papers on Head-driven Phrase Structure Grammar*, Stanford University.

Blutner, R. (2006): 'Embedded implicatures and optimality theoretic pragmatics', *this volume.*

Borthen, K. (2003): *Norwegian Bare Singulars*, dr. art. thesis, Norwegian University of Science and Technology, Trondheim.

Carlson, G. (1977): *Reference to Kinds in English*, Ph.D. Dissertation, University of Massachusetts, Amherst.

Chierchia, G. (1998): 'Reference to kinds across languages', *Natural language semantics* **6**, pp. 339-405.

Dayal, V. (2003): *A Semantics for Pseudo-Incorporation*, Manuscript, Rutgers University.

Dayal, V. (2004): 'Number marking and (in)definiteness in kind terms', *Linguistics and Philosophy* **27**(4), pp. 393-450.

Farkas, D. and H. de Swart (2003): *The Semantics of Incorporation: from Argument Structure to Discourse Transparency*, CSLI.

Gerstner, C. and M. Krifka (1993): 'Genericity', in J. Jacobs, A. von Stechow, W. Sternefeld & T. Venneman (eds.): *Handbuch der Syntax*, Berlin: Mouton de Gruyter.

Katz, G. and R. Zamparelli (2005): *Genericity in natural language*, lecture notes, ESSLLI.

Krifka, M., F. Pelletier, G. Carlson, A. ter Meulen, G. Chierchia and G. Link (1995): 'Genericity: an introduction', in G. Carlson and F. J. Pelletier (eds.): *The Generic Book*, Chicago: The University of Chicago Press.

Krifka, M. (2003): 'Bare NPs: Kind-referring, Indefinites, Both, or Neither?', in *Proceedings of Semantics and Linguistic Theory* (SALT) 13, Cornell: CLC Publications.

Partee, B. (1987): 'Noun phrase interpretation and type-shifting principles' in J. Groenendijk, D. de Jong & M. Stokhof (eds.): *Studies in Discourse Representation Theory and the Theory of Generalized Quantifiers*, Dordrecht: Foris.

de Swart, H., Y. Winter and J. Zwarts (2004): 'Bare predicate nominals in Dutch', in *Proceedings of Sinn und Bedeutung* 9.
Zimmermann, E. (1993): 'On the Proper Treatment of Opacity in Certain Verbs', *Natural Language Semantics* **1**, pp. 149-179.

# JUST ANY PRONOUND ANYWHERE? PRONOUNS AND "NEW" DEMONSTRATIVES IN NORWEGIAN[1]

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**Abstract**

In this paper, I investigate whether the pronominal system of feminine pronouns in Oslo Norwegian – one of very few pronouns to have seeemingly retained some case distinctions – is still a case system. An alternative might be that just any pronoun can occur just anywhere, i.e., that there is a free choice. The investigation has been conducted using new and older spoken language material. I have found two things. First, there is no free choice between the pronouns; while the nominative one can be used in almost any position and with any syntactic function, the accusative one is more limited. The second finding is exciting: The Norwegian deictic system is more complex than hitherto known. In addition to spatial deixis, there is also grammatically encoded psychological deixis.

## 1 Introduction

The pronominal system in Norwegian has been the last set of words in the language to retain some case distinctions, but even here there are few. One might rightly ask whether just any pronoun can occur just anywhere, i.e. whether there is a free choice of pronouns in any given position. In the written variety of Eastern Norwegian, Bokmål, the feminine pronouns have retained their case. In this paper, we shall investigate whether these distinctions prevail in the spoken language. Two corpora of spoken Oslo dialect, recorded thirty years apart, will be used in the investigation: the new Norwegian Speech Corpus-Oslo (NoTa),[2] and the TAUS speech corpus.[3]

[1] I am grateful to Helge Lødrup, Thorstein Fretheim and two anonymous reviewers for valuable comments, and to Anne Marit Bødal, Kristin Hagen and Arne Martinus Lindstad for having been informants on the Sunnfjord dialect of Førde and the Hedmark dialects of Hamar and Stange, respectively.

[2] The NoTa corpus (of spoken Oslo Norwegian) is a web searchable corpus under development at the University of Oslo as of December 2005. It's planned to be finished with 150 informants transcribed, audio and video-taped by March 2006. It is available at present from the web-address in the references at the end of this paper, but is presently only two thirds of the planned full size. The informants have been selected according to socio-linguistic variables such as age, gender, socio-economic, and geographical status. The codes on the examples

After a brief look at the Bokmål pronoun system, we shall investigate to what extent the feminine pronouns are used in various syntactic positions. It turns out that the nominative pronoun can be used in a variety of positions and functions, while the accusative pronoun is rarer. A more interesting result is that one of the uses of the pronoun turns out to be a deictic one. Investigating the data more fully, we see that Modern Spoken Norwegian has psychological deixis in addition to the well-known spatial deixis. More specifically, there is clearly a psychologically distal demonstrative in the Oslo dialect. Some dialects seem to have a proximal counterpart with at least some kinds of nouns (proper names), but this is not the case in the Oslo dialect.

## 2 The pronominal system of Bokmål Norwegian

For an overview of the pronominal system, let us take as a starting point the Norwegian Reference Grammar (Faarlund et al. 1997), which describes the system of the written language. Only the Bokmål variety will be presented here, since this is the one most frequently used in Eastern Norway, and also reflects the Oslo variety to the highest extent.

Table 1: The pronominal system in written Norwegian Bokmål
(Faarlund et al. 1997: 317)

| **Singular** | **Nominative** | **Accusative** |
|---|---|---|
| **1st p.** | jeg | meg |
| **2nd p.** | du | deg |
| **3rd p.** | | |
| **M** | han | han/ham |
| **F** | hun [ho] | henne [ho] |
| **Plural** | | |
| **1st p.** | vi | oss |
| **2nd p.** | dere | dere |
| **3rd p.** | de | dem |

We see that 3rd person singular masculine forms have syncretised (even though there is a separate accusative form still available). Thus, with masculine pronouns we get sentences such as:

sentences are informant codes: F: Feminine, M:Masculine, digits:age, WO:West Oslo, RO: Rest of Oslo, H:High education, L:Low education. All the names taken from authentic sources and referring to non-public people used in the paper have been anonymised to Kjell Johan and Kirsten (for males and females, respectively), and to a smaller extent, to Signe and Andreas.

[3] The TAUS corpus is a collection of Oslo speech from the 1970s, see Hanssen (1986), in the process of being transformed into a modern searchable web corpus.

(1) Kjell Johan fyller år. *Han* blir 50.
Kjell Johan fills years. he (subject) becomes 50
'Kjell Johan is having his birthday. He'll be 50.'

(2) Kjell Johan fyller år. *Han* har jeg kjent lenge.
Kjell Johan fills years. he (object) have I known long
Kjell Johan is having his birthday. Him, I have known for a long time.'

It will be more interesting to focus on the feminine pronouns, where there is supposed to be a difference between *hun* (nominative) and *henne* (accusative).

Faarlund et al. (1997) say that the "main rule for use of the case-forms in modern Norwegian is that the nominative variety is used when the pronoun is a subject, and accusative when the pronoun is the complement of a verb, preposition or adjective" (Faarlund et al. 1997: 318, my translation). However, they also give some exceptions, and state that *hun* 'she' is occasionally used as an object or a preposition object, especially if the pronoun is a) modified by another phrase (their example is a relative clause), b) topicalised (object), c) a conjunct (op.cit. 1997: 322). The loss of case contrasts is not new; a hundred years ago, Larsen (1907: 28) said about the 3rd person plural nominative pronoun *de* 'they' that it had basically taken over from the accusative pronoun *dem* 'them' in the upper layers of the population.[4] Many others have also discussed the pronominal case forms, see e.g. Lødrup (1982, 1984) and Papazian (1983, 1985). In the next section, we shall see what some of the facts are in the present day Oslo dialect.

## 3 The 3rd person singular feminine pronoun, *hun*, in Oslo

In this section, we shall look at various uses of the pronoun *hun*, and find that it is indeed used in many contexts which should clearly not be characterised as subject positions. Furthermore, we shall see that one of its uses is hitherto undescribed.

Let me spend some words on methodology before we continue. When a phenomenon is complicated and at odds with what is stated in the grammar books, it would be a problem to use standard written corpora as a data source, as written texts have clearly undergone critical proof reading following the given norms. At the same time, using one's intuition as a grammarian in a topic like this is bound to be difficult, both since the norms for the written language are

[4] Larsen (1907:28-29)'s exact words: "Vulgærsprog er dette *di* hittil ikke blitt, men opad er bruken derav også utenfor nominativ trængt så høit op, at det vel kun er særlig literært interesserte familier, hvor ikke yngre voksne børn sædvanlig siger: jæi så *di*." [The use of 3pl nom in object position has not become common in the lower classes, but in the higher classes, only the very literary families have no children that use this nominative form in the object position.]

sieving into one's judgements, and since one's data might be too narrow and too uncreative. A corpus of spoken language is a solution to many of these problems. We shall look at the pronoun *hun* as it is used in the NoTa corpus, and even in the older TAUS collection. (Of course the web would also be a good source for non-standardised language, but there we have no knowledge of the dialects of the language users.) In the present version of the NoTa corpus, the nominative *hun* occurs nearly 700 times. Without going into a counting game, it is easy to find this nominative form used not only as a subject, but also as a direct object, the object of a preposition, in right dislocation, left dislocation etc. Most times, the pronoun was used on its own, but it was also used as a head modified by another phrase (15 times), and, suprisingly, as a prenominal determiner (22 times). We will briefly look at some examples from the corpus.

### 3.1 The pronoun *hun* as an unmodified phrase

The nominative *hun*, when functioning as a phrase on its own, can clearly occur in many more contexts than in subject positions. Below are some examples from the NoTa corpus. These contexts are others than those mentioned by Faarlund et al. (1987), and clearly show that the nominative *hun* can be used in a wide variety of positions.

(3) Subject:
*hun* fortjener en god karakter i gym
'She deserves a good grade in gym.' (F,18,RO,H)

(4) Direct object:
så når hun ikke var der så satt de og baksnakka *hun*
so when she not was there then sat they and back-talked her
'So when she wasn't there they sat and talked about her behind her back.' (F,80y,RO,L)

(5) P-object:
jeg lånte filmer på *hun* hele tiden
I borrowed films on her all the-time
'I borrowed films in her name all the time.' (M,21,RO,L)

(6) Right dislocation:
men du vet Kirsten rekker ikke dette *hun*
but you know Kirsten reaches not this she
'But you know, Kirsten won't have time for this, she won't.' (M,58,RO,L)

### 3.2 The pronoun *hun* as the head of a nominal phrase

The nominative *hun* is often modified by a phrase (a relative clause in the examples below), in which case it has some stress or tonal accent.[5] Again, these pronoun phrases can occur in a variety of positions, such as subject, object, preposition complement, left dislocation etc., not just the typical subject positions:

(7) Subject:
*hun som har stiftet Norsk erindringssenter* heter Kirsten
she who has founded Norwegian Memory Centre is-called Kirsten
'The one who has founded the Norwegian Memory Centre is called Kirsten.' (F,85,WO,H)

(8) Direct object:
du vet ... *hun der som trengte noen å snakke med*
you know she there who needed somebody to talk with
'You know, that one who needed somebody to talk to.'
(F,18y,RO,L)

(9) P-object:
nei dem skulle snakke med *hun som hadde* #
no them should talk with she who had
'No, they should talk to the one who had...' (F,79,RO,L)

(10) Left dislocation:
*hun som jeg snakket med i telefonen* hun sier at dette har du betalt siden 2003 she who I talked with in the-phone she says that this have you paid since 2003
'The one who I talked to on the phone, she says that this you have paid since 2003.' (M, 84,WO,H)

### 3.3 The pronoun *hun* as a determiner

Using a corpus gives the added value of bringing examples of use to one's attention that one might have overlooked. In this section, we see examples of the pronoun *hun* used as a nominal determiner. This use is not mentioned in Faarlund et al. (1997). Given that *hun* is a determiner in these examples, it is maybe not surprising that its mother phrase can occur in a variety of syntactic

[5] There are other ways of analysing such examples, e.g. Lødrup (1982) regards similar examples with the pronoun *de* as a determiner plus an elided head noun. I will not pursue that here, but simply note that with such an analysis, there would be no difference between the examples in 3.2 and 3.3, which I think there is, not least semantically.

functions, but it is worth noting that the form is invariably the nominative form of the pronoun.

(11) Subject:
i dag da *hun der vikaren* kom
today when she there substitute came
'Today, when that substitute came...' (F,18,RO,L)

(12) Direct object:
har du spurt *hun Kirsten* om det?
have you asked she Kirsten about it?
'Have you asked that person Kirsten about it?' (F,72,WO,L)

(13) P-object:
hvordan går det med *hun der venninna di*?
how goes it with she there the-friend yours?
'How is that friend of yours?' (F,18,RO,L)

(14) Left dislocation:
*hun von der Lippe* hun e hun e hadde lært seg skikkelig
she von der Lippe she ehm she ehm had taught herself properly
'That woman von der Lippe, she had taught herself properly...'
(F,80,WO,L)

(15) Right dislocation:
det var også en # en dame som ikke var god # *hun moren til venninnen min*
it was also a # a woman who not was good # she the-mother to the-friend mine
'There was also a woman who wasn't very good, that mother of my friend.' (F,72,WO,L)

The pronoun as determiner is a phenomenon that we shall discuss in section 4.

### 3.4 Other feminine pronoun forms

There are also other feminine pronoun forms in Oslo Norwegian, such as *hu, ho, henner* and *a.* They are all much less frequent than *hun*. There are only 77 occurrences of *henne*, the accusative form of the pronoun. It occurs as direct object (fronted once), indirect object and preposition complement in the NoTa corpus, divided equally between the geographical parts of Oslo. It never occurs as a subject. There are no examples of the more colloquial *henner*. There are

some examples of *ho* and some of *a*, both of which are neutralised between nominative and accusative.

The pronoun *a* is not represented in the table in Faarlund et al. (table 1), since it is considered to be part of the spoken, not the written language. But Faarlund et al. (1997: 322) describe it elsewhere, saying that is a clitic pronoun with no case-difference – *a* can be used both as subject and object as long as it is in a clitic position. Bull (1980) similarly says that the clitic pronouns can be used as subject as well as object. In the NoTa material, the examples of use of the pronoun *a* are confined to subject and determiner (the lack of object use is probably linked to the lack of objects throughout the corpus):

(16) Subject:
Tidligere så jobba *a* for et firma som het Galleberg
earlier then worked she for a company that was-called Galleberg
'Earlier, she worked for a company called Galleberg.'
(M,44, RO, H)

(17) Determiner:
Jeg har ... hilst på *a Karoline Bjørnsson*
I have greeted on she Karoline Bjørnsson
'I have met Karoline Bjørnsson.' (F,84, WO, H)

## 4 Pronouns as determiners – a "new" demonstrative

In section 3.3, we saw that the pronoun *hun* can be a pre-nominal determiner. In this section we shall investigate whether this determiner is related to the well-known preproprial determiner found in many Norwegian dialects. We shall investigate its pragmatics, and will see that it is a "new", in the sense of not being mentioned in Faarlund (1997). However, it is mentioned in very recent literature, viz. Delsing (2003) and Julien (2005).

One might be tempted to think that the prenominal determiner above is related to the preproprial determiner attested in many dialects (including older versions of the Oslo dialect). Let us start by exemplifying our determiner by repeating one example, and include one with a masculine pronoun as well, for the record:[6]

[6] The masculine example here could possibly be a an example of the preproprial article, since these have syncretised, but the fact that it occurs only with the second name, not the first, indicates that it is not purely an article (cf the criteria that will be presented below, especially that of obligatoriness).

(18) Direct object:
har du spurt *hun Kirsten om det*?
have you asked she Kirsten about it?
'Have you asked that person Kirsten about it?' (F,72,WO,L)

(19) Men når Andreas og jeg tar en tur blir *han Kjell* så forskrekkelig sur
but when Andreas and I take a trip becomes he Kjell so very sour
'But when Andreas and I take a trip, that person Kjell becomes so sour.'
stp.ling.uu.se/~malwes/esc/lander/norge.html

In the Norwegian Reference Grammar, Faarlund et al. (1997: 338) mention briefly that most Norwegian dialects use a preposed pronoun together with proper names. In the Toten dialect (described in Faarlund 2000), the preproprial article is obligatory before first names and family nouns such as father, mother, grandma etc. I also include an example of the masculine variety, from the Stavanger dialect, just for the record:

(20) Har du sett *a Berit*?
have you seen the Berit
'Have you seen Berit?' (Faarlund 2000: 51)

(21) *Han Kjell* hadde krangla me morå, så han sa: [...]
the Kjell had argued with the-mother, so he said
'Kjell had argued with his mother, so he said...'
stavangerguiden.com/Sted/sletten

The Reference Grammar says nothing directly about the Oslo dialect(s). Hence, we could make a first guess that our *hun* is an instance of the preproprial article. However, there are several reasons to think that this guess is wrong. First, the form of the pronoun is not the same. The unstressed version of the feminine pronoun used to be, and is for many Oslo-speakers, *a* (Larsen 1907: 112, Bull 1980: 53, 69), not *hun*. Second, the two pronouns are different w.r.t. stress. The preproprial article in Norwegian dialects is always unstressed. Our preposed pronouns as they appear in the NoTa corpus are all stressed (see also Fretheim and Amfo 2005 about this fact) (see (20) and (18) above for translations):

(22) Har du sett *a BErit?*

(23) Har du spurt *HUN KIRSten* om det?

This strongly indicates a different grammatical status for these two prenominal determiners. Third, the two determiners are different w.r.t. obligatoriness. The informants who use our preposed article with some names, also choose not to use it with other names. For example, the woman who uttered (i), also uttered (ii) in the same conversation (for translation of (24), see (18)):

(24) Har du spurt *hun Kirsten* om det? (F,72,WO,L)

(25) en gang *Signe* og jeg da ...
one time Signe and I then
'Once Signe and I, then...' (F,72,WO,L)

While the preproprial article is obligatory in some dialects with first names, our prenominal article is never obligatory. But it should be mentioned that the preproprial unstressed articles have different status w.r.t. obligatoriness in different dialects. Faarlund (2000) says that they are obligatory in the Toten dialect, but it seems that in the Hamar and Stange dialects, they are not. Delsing (2003: 22-23) says that they seem to be obligatory in Swedish Norrland, but not in Västerbotten, in the latter case they can only be used when certain pragmatic conditions apply, as we shall see in section 5. However, our preposed pronouns are not obligatory, and are therefore clearly *not* inflectional articles, but are voluntarily added to obtain a certain effect. They are some kind of demonstratives with some meaning attached to them.

Fourth, unlike preproprial articles, our determiners can occur with other types of nominals. We have seen this earlier in section 3.3, and with one new example below, uttered by the same informant as (24). I include one example of the masculine variety, just for the record:

(26) Jeg var skolevenninne med *hun piken der* (F,72,WO,L)
I was school-friend with she the-girl there
'I was a school friend of that.'

(27) *Han professoren* nevnte "zoologi".
he the-professor mentioned zoology
'That professor mentioned zoology.'
www.tvnorge.no/phpBB2/viewtopic.php?p=24242&

## 5 The Semantics and Pragmatics of the Norwegian Demonstratives

We have seen that the preposed pronouns are not inflectional articles, but have some independent meaning that determines their occurrence with a nominal constituent. Being a native speaker of this dialect, I have been able to ask myself and discuss with fellow dialect speakers, and I have arrived at the following:

The preposed pronoun is used to invoke psychological distance to the person referred to by that noun. In other words, they have a deictic use, and can be coined: ”psychologically distal demonstratives” (PDD for short).[7] More detailed descriptions of its meaning and use will be given below.

While it is well-known that Norwegian has spatial demonstratives divided into distal and proximal ones (see Faarlund et al. 1997: §3.2.2), the forms of which are the same as the non-human definite articles *den* ‘that’ and *denne* ‘this’, this psychologically distal demonstrative has only recently been mentioned in the literature. Fretheim and Amfo (2005) discuss some intonational properties that distinguish the animate from the inanimate determiners, but they do not discuss any semantic or pragmatic differences between them. Julien (2005: §4.3) argues for the fact that they are demonstratives, but does not look at their meaning. Delsing (2003: 23) mentions our pronominal determiner in a footnote only. It will therefore be useful to look at the phenomenon of deixis and see how they fit in with different kinds described in the literature for other languages.

Spatial deixis is quite common among the languages of the world, but there are also other types of deixis. Levinson (1992) mentions both discourse deixis and social deixis, The first of these is not relevant here, as it concerns deixis that refers to entities already mentioned in the discourse. The second type, social deixis, on the other hand, seems more relevant.

Levinson (1992: 90) describes the social deixis as either relational or absolute, and the former one, which is the one interesting for our purposes, is further divided into four groups: (i) speaker and referent honorifics, (ii) speaker and addressee honorifics, (iii) speaker and bystander honorifics, (iv) speaker and setting. Out of these, clearly the first group seems most suitable for our deixis, but there are two factors with our psychologically distal demonstrative that do not fit into this group.

First, it is not the case that our demonstratives have anything to do with honorifics, even if this group by Levinson is assumed to extend over such qualities as kinship relations, totemic relations and clan membership. In a modern, egalitarian, social-democratic society such as Norway, everybody is in principle equal, and there are certainly no social differences that have a grammaticalised expression. Indeed, when Norway was less egalitarian, there

[7] One of the reviewers agrees that there is psychological distance when the PDD is used with only a first name, but thinks that used with both a first and a second name, there is *less* psychological distance. I do not get the latter effect at all, and neither do the (admittedly few) people I have asked. I leave open the possibility that this effect can occur, but would like to have it confirmed before I take it into account.

used to be a distinction between formal and informal forms of the second person singular pronoun, but this distinction is not known by the younger generations:[8]

(28) Vet du /De hva klokka er?
know you (informal)/(formal) what the-clock is
'Do you know what time it is?'

Second, the participants that are relevant or our demonstratives are none of the four groups listed by Levinson, but rather [[speaker and/or addressee] and referent]. In other words, the PDD can be used if either the speaker or the addressee or both have a relationship to the referent that the speaker wants to indicate as remote. Thus, the PDD can be used in a variety of contexts. Below, the speaker does not know – or wants to distance herself from -–the mother of her friend:

(29) det var også en # en dame som ikke var god # *hun moren til venninnen min* da
there was also a – a woman who not was good – she the-mother to the-friend mine then
'There was also a woman who wasn't good, that mother of my friend.' (F,72,WO,L)

The PDD can be used even about close relatives, underlining the fact that the PDD is indeed psychological, not social. Delsing (2003: 23) suggests that its core meaning in Swedish is exactly this: for the speaker to indicate uncertainty about the addressee's knowledge of the referent. The sentence below could indicate that the speaker distances herself from her sister, but it may equally well be a case of the speaker knowing that the addressee does not know the sister, and so accomodates to the psychological relationship of the addressee to the referent. Indeed, since this is a posting on an open Internet forum, with an infinite audience, the latter interpretation is the most likely one:

(30) Men *hun søsteren min* er sånn som ser auraer og merker stemninger i hus.
but she the-sister mine is such who sees auras and feels atmospheres in houses
'But my sister is the kind who sees auras and feels atmospheres in houses.' forum.gaiaforum.com/viewtopic.php?p=51584

[8] I am of course not claiming that lack of linguistic distinctions with necessity reflects lack of social distinctions, but the converse holds: It is impossible to keep linguistic distinctions for a missing social distinction.

The PDD can be further modified by the distal adverb *der* 'there'. The effect is not only one of psychological distance w.r.t. how well the speaker knows the referent, but is one of a somewhat negative attitude towards that person:

(31) i dag da *hun der vikaren* kom
today when she there substitute-teacher came
'Today, when that substitute teacher came...' (F,18,RO,L)

We saw many examples of the PDD with proper names in sections 3.3 and 4 (one is repeated below). As with the other uses, the PDD indicates some distance by the speaker towards the referent. Actually, there is one thing that is interesting to note about this use of the PDD. In the Norwegian society, referring to somebody by both first name and surname would indicate that one did not know that person very well. It therefore calls for some kind of explanation that the PDD is used with proper names (especially if the surname is known by the speaker, as it often would be). The reason for this use is probably that the egalitarianism has gained more and more ground. A sentence such as that below would typically be used when the addressee knows the person referred to very well, but the speaker does not. If the speaker chose to use the surname to indicate his or her own lack of intimate knowledge of the referent, the situation would become very uneven between the speaker and the adressee. The use of the PDD makes it possible for both to refer to the referent by first name only, even though their relationship with that person is very different.

(32) Har du spurt *hun Kirsten* om det?
have you asked she Kirsten about it?
'Have you asked this person Kirsten about it?' (F,72,WO,L)

There are also examples of the PDD being used with ordinary noun phrases such as the one below. It is possible that the PDD indicates general, psychological distance between the speaker and the singer referred to – the hearer knows from this that the speaker does not know the singer. But here, the noun phrase contains so much presumably new information that it seems less likely that the speaker would need to indicate distance to the referent. Norwegian definite noun phrases containing an adjectival modifier generally need a pre-adjectival determiner. This is often the distal demonstrative, which is often called the "definite article of the adjective". It is possible that it is the PDD that has taken on the role of being this article in examples such as the one below. It would still be true, though, that the PDD is psychologically distal in such cases, even though it would not be important to communicate this aspect since the rest of the noun phrase also indicates non-familiarity.

(33) og så *hun e kvinnelige solisten* og Bocelli som sku- sang duetter
and then she ehm female soloist and Bocelli who should- sang duets
'and then that female soloist and Bocelli who were to – sang duets.'
(F,74,RO,H)

Finally, one might ask whether there is also a psychologically proximal demonstrative, given that there are both kinds in the spatial system. I have not found any in the Oslo dialect – the preproprial article could have been a candidate, but it seems to have more or less disappeared. There may be dialects that have both, though. In the town dialect of Hamar and the country dialect of Stange, both of the Hedmark county North of Oslo, both determiners seem to be present, and the same seems to be the case as far away as in the Sunnfjord dialect of Førde in West Norway. In the example in (34), from the Stange dialect, the preprprial *a* indicates familiarity with the referent, while the pronominal *hu* indicates the by now well-known psychological distance. Interestingly, these dialects seem to differ from the Toten dialect mentioned above, in which the preproprial article is obligatory. Julien (2005: 124) reports that both varieties exist in the Solør dialect near the Swedish border, but does not characterise them semantically. Delsing (2003: 23) reports that the preproprial article is used in many dialects only with the names of people that the speaker knows well. However, he does not mention whether these dialects have the something like the PDD.

(34) Jæ såg a/hu Kirsten
I saw her/she Kirsten
'I saw our/that Kirsten.'

However, the parallellism is only partial, because there is no psychologically proximal article to be used with nouns and noun phrases other than proper names.

## 6 How old is the psychologically distal demonstrative?

One might be tempted to think that the PDD is new in Norwegian. This seems to be the opinion of Fretheim and Amfo (2005: 106): "[...] has become a popular alternative [...] in urban and rural dialects alike". But it is actually possible to test this, to some degree, since there exists spoken language data from the early 1970s Oslo, the "TAUS" material (Hanssen: 1986). If it can be found there, it must be at least 30 years old. And indeed, there are many examples of the PDD from that time:

(35) jæ vill ikke akkrat vekke *hun vennindn min*
I will not exactly wake she the-friend mine
'I don't want to exactly wake up my friend' (TAUS: F,21,EO,H)

(36) da hadde *hu dama* kåmmet løpne ut etter å vært så læi sæ får å ha tatt træddve krone få mye få kjoln #
then had she woman come running out after to have been so sad herself for to have taken thirty crowns too much for the-dress
'Then that woman had come running out after having been so sad that she had taken thirty crowns too much for the dress.'
(TAUS: F,20,EO,H)

Dyvik (1979: 73) mentions the use of *han* 'he' as an alternative to *den* (the spatial distal demonstrative) in some example sentences, but does not discuss the difference between them (the focus of his discussion at this point is the adverb *der* 'there'):

(37) Lykkelig er *han/den der(re) mannen* som får deg til kone
happy is he/that there the-man who get you as wife
'The man who get you as a wife will be happy.' (Dyvik 1979: (67b))

(38) Han var blitt *han/den der(re) fine mannen*
he was become he/that there fine man
'He had become an incredible fine man.' (Dyvik 1979: (67d))

Lødrup (1982: 55) also mentions the pronouns *han* 'he' and *hun* 'she' as determiners, and compares them with the distal demonstrative *den* 'that'. He does not discuss them from our perspective, but instead discusses their ability to have specific or non-specific reference (only *han/hun* apparantly can have the former).

We can conclude that the PDD is not brand new, since it occurs several times in the (relatively small) material of spoken Oslo dialect from the 1970s. Going further back into history is difficult, since it is very much a feature of spoken language, and we have no older spoken language data. Looking in written sources is futile. The PDD is non-existent even in the Oslo Corpus of Tagged, Norwegian Texts, and in the Bokmål Lexicography Corpus, both of which contain a substantial number of novels that have dialogues that at least to some extent would attempt to replicate spoken language. However, we can call it "new", given the missing descriptions in the existing grammatical literature.

## 7 Conclusion

In the title and the introduction, we asked the question whether just any pronoun can be used anywhere, i.e. whether the speaker has a free choice. We saw that this is not the case. While the nominative feminine pronoun *hun* 'she' can occur in a variety of positions and functions, the accusative *henne* 'her' is much more limited.

However, during the investigation we discovered a demonstrative that has not been described previously in the literature. This demonstrative means that the system of deixis in the Oslo dialect, possibly in all Norwegian dialects, is more complicated than has been previously known. In addition to spatial deixis, there is also psychological deixis, which is grammatically encoded.

## References

Bull, T. (1980): *Språket i Oslo*, Oslo: Gyldendal Norsk Forlag.

Delsing, L.-O. (2003): 'Syntaktisk variation i nordiska nominalfraser', in Ø. A. Vangsnes, A. Holmberg & L. O. Delsing (eds.): *Dialektsyntaktiska studier av den nordiska nominalfrasen*, Oslo: Novus Press.

Dyvik, H. (1979): 'Omkring fremveksten av artiklene i norsk', *Maal og Minne* **1-2**, pp. 40-78.

Fretheim, Th. and N. A. A. Amfo (2005): 'Reference, determiners and descriptive content', *Working Papers ISK 2*, pp. 87-112, Trondheim: NTNU.

Faarlund, J. T. (2000): *Toten-målet*, Østre Toten kommune: Kulturetaten.

Faarlund, J. T., S. Lie and K. I. Vannebo (1997): *Norsk referansegrammatikk*, Oslo: Universitetsforlaget.

Hanssen, E. (1986): *Talemålsundersøkelsen i Oslo (TAUS) 1-4,* Oslo.

Julien, M. (2005): *Nominal phrases from a Scandinavian perspective*, Amsterdam: John Benjamins.

Larsen, A. B. (1907): *Kristiania Bymål. Vulgærsproget med henblik på den utvungne dagligtale*, Oslo: Bymålslaget. Cammermeyers Boghandel.

Levinson, S. C. (1992): *Pragmatics*, Cambridge: Cambridge Textbooks in Linguistics.

Lødrup, H. (1982): 'De og Dem i dialekten på Oslo vestkant', *Norskrift*, pp. 54-58, University of Oslo.

Lødrup, H. (1984): 'Enda mer om De og Dem i dialekten på Oslo vestkant', *Norskrift,* pp. 69-76, University of Oslo.

Papazian, E. (1983): 'Mer om de og dem som ikke-subjekt i normalisert Oslo-mål', *Norskrift,* pp. 20-47, University of Oslo.

Papazian, E. (1985): 'Hvordan har Dem det? ', *Norskrift,* pp. 39-75, University of Oslo.

The NoTa Speech Corpus
http://omilia.uio.no/nota
The TAUS Speech Corpus
http://omilia.uio.no/taus

# LANGUAGE TECHNOLOGY AND THE SCIENCE OF LINGUISTICS

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## 1 Technology and science

In the growing field of language technology, a reemerging issue is the proper place of linguistics—whether language technology should be based on linguistic insights, models and theories or not. An equally interesting question arises when we turn the question around and ask how language technology may and should influence linguistic theory and practice.

Let us first take one step to the side and consider the relationship between science and technology in other fields. Our first thought is that science is primary, while technology combines scientific insights from several fields and applies them to specific cases. The construction of suspension bridges, to take one example, applies Newtonian mechanics to calculate the optimal arcs of the deck and the bearing wires and the height of the towers and the suspender cables. At the same time the mass and strength of the materials used must be taken into consideration to make sure the bridge can hold itself and its load. In addition, it is mandatory to test a model of the bridge in a wind tunnel to see how well it will perform under varying conditions.

But the interaction between science and technology is not unidirectional. First, technological developments result in better tools which open opportunities for new scientific insights, as witnessed from Galileo's telescope to the PET scanner. Second, in many cases the scientific results are not available beforehand. The quest for a technological solution to a certain task may initiate research leading to new scientific results. Today, we can witness this in the biotechnological fields. Third, methods from technology, in particular simulations, enter the sciences. Returning to the suspension bridge, there is no easy way to calculate the behavior of the bridge under different wind conditions. But it is possible to see what happens by simulations in a wind tunnel. Lately, computer simulations have supplemented physical simulations, and they are becoming accepted as scientific discovery procedures in several fields, including population dynamics, climate studies, quantum chemistry and nuclear physics.

In the sequel, we start by considering some experiences from one particular effort, the LOGON project, and relate them to the field of language technology as a whole. We will then discuss possible consequences for linguistics as a scientific enterprise.

## 2 The LOGON project

### 2.1 Machine translation

The focus of the LOGON project is machine translation from Norwegian to English of texts from the hiking domain (Oepen, Dyvik, Lønning, Velldal et al. 2004, *LOGON* web page). The project, which is supported by the Norwegian Research Council's KUNSTI program for the advancement of language technology in Norway, lasts for roughly 4 years, involves three universities, Bergen, Trondheim and Oslo, and employs on average three researchers on the post doctoral level and 4 doctoral students in addition to 5 (part time) principal investigators.

Machine translation (MT) started as a research field already in 1949 when Warren Weaver (2003) circulated a memo proposing to use the emerging computer technology for automatic translation. A year later Yehoshua Bar-Hillel was employed as the first machine translation researcher at MIT. The field grew rapidly during the 1950s with active research groups in several countries and various international conferences. The earliest approaches to MT were later classified as the *direct approach*. Somewhat simplified, the basic idea is to use a dictionary to find the proper translation of each word. In addition, the source language input is partly analyzed morphologically to identify features like number and case, and the target language output is rearranged to get the word order correct.

It was soon observed that this approach was insufficient and that a deeper understanding of the linguistic structures of the two languages was required. At about the same time, Noam Chomsky (1957) introduced and argued for generative grammars in linguistics; finite mechanisms sufficient for generating an unlimited number of different sentences. Generative grammars, in particular the non-transformational variants, came to play a large role in the development of MT and later in computational linguistics in general. Chomsky's concern was not machine translation, but linguistics and psychology. Apparently, this is an example of a technology (MT) applying an available theory (generative grammar), but it is tempting to speculate whether it was more than a coincidence that generative grammar was first conceived at MIT, where there was already active MT research.

In the next approach to MT, the source language sentence is translated into a semantic representation language, a lingua franca or *interlingua*, and a target language sentence is generated from this representation. Not only a morphological, but also syntactic and semantic analyses of the source sentence are applied in the construction of the interlingua representation. The problem for this approach is to construct a universal interlingua in which the semantic content of any human language can be represented. Different languages use different means to express meaning and to classify the world.

The *transfer* approach tries to take this into consideration. In *semantic transfer* the source language sentence is analyzed syntactically and semantically, resulting in a monolingual semantic representation. This representation is transferred to a similar representation for the target language from which the target sentence is generated. The same semantic representation of the source language sentence may be used for translation into several different languages, while the transfer step is fine-tuned to a particular language pair. In contrast, in a *syntactic transfer* approach the transfer step is done between syntactic representations instead.

## 2.2 Semantically based transfer

The semantic representations in LOGON are expressed in what is called Minimal Recursion Semantics (MRS) (Copestake, Flickinger, Pollard & Sag to appear). The formula (1b) is an MRS representation of sentence (1a).

(1) a. Hver fjellfører skimtet ei hytte.

b. $\langle h0,\ \{h1{:}\text{hver}(x,h2,h3),\ h4{:}\text{fjellfører}(x),$
$h0{:}\text{skimte}(e5,x,y),$
$h9{:}\text{en}(y,h6,h7),\ h8{:}\text{hytte}(y)\},$
$\{h2 =_q h4,\ h6 =_q h8\}\rangle$

The basic units are the elementary predications (EP), e.g., *skimte* $(e5,x,y)$. This represents a formula in predicate logic, with $x$ and $y$ as variables. The argument $e5$ is a Davidsonian event variable which may be modified by an adverb or a prepositional phrase. While it is a goal in logical representations of semantics to get the scope relations right, MRS allows for scope underspecification. Thus the MRS (1b) can be further specified to the MRS (2a) which represents the logical formula (2b), as well as to an MRS corresponding to formula (2c). The last part of the representation is a set of restrictions on scope, here $h2 =_q h4$ and $h6 =_q h8$. The first one expresses that $h4$ must equal $h2$ except that some quantifiers may intervene. Together with some general principles, the equations assure that (1b) cannot represent other formulas than these two.

(2) a. hver($x$, fjellfører($x$), en($y$, hytte($y$), skimte($e5,x,y$)))
b. $\forall x(\mathit{fjellfører}\,(x) \rightarrow \exists y(\mathit{hytte}\,(y) \wedge \mathit{skimte}\,(e5,x,y)))$
c. $\exists y(\mathit{hytte}\,(y) \wedge \forall x(\mathit{fjellfører}\,(x) \rightarrow \mathit{skimte}\,(e5,x,y)))$

One possible translation of this sentence is shown in (3a) with the associated MRS in (3b).

(3) a. Every mountain guide saw a cabin dimly.
b. $\langle h0, \{h1{:}\text{every}(x,h2,h3),\ h4{:}\text{compound}(e9,x,z),$
$h10{:}\text{udefq}(z,h11,h12),\ h13{:}\text{mountain}(z),\ h4{:}\text{guide}(x),$
$h0{:}\text{see}(e5,x,y),\ h9{:}\text{a}(y,h6,h7),\ h8{:}\text{cabin}(y),\ h0{:}\text{dim}(e12,e5)\},$
$\{h2 =_q h4,\ h6 =_q h8,\ h11 =_q h13\}\rangle$

We observe that there are many one-to-one correspondences between words in sentence (3a) and sentence (1a), and recognize them as correspondences between EPs in (3b) and (1b). There are also some mismatches. The morphological compound *fjellfører* is expanded to *mountain guide*, and the simple verb *skimte* is translated to the complex *see... dimly*.

Such mismatches are harder to handle in an interlingua system. Since the interlingua is in principle intended to work with many different languages, it has to anticipate the possible variations and contain a rich enough inventory of expressions. Moreover, the mapping between a language and the interlingua must be constructed independently of the other language. For example, whether *skimte* should be decomposed in the interlingua has to be decided independently of its translation in English. In the transfer system, on the other hand, the transfer module is particularly constructed to handle the mismatches between two specific languages.

In addition, many properties which are unique to one of the two languages, like idiosyncratically chosen prepositions, do not show up in the MRS representation at all. They are taken care of by the monolingual parsing and generation modules between the surface realization and the MRS. This is an advantage over a purely syntactically based transfer system.

Minimal recursion semantics was originally developed in the context of Head-Driven Phrase Structure Grammars (HPSG), a strongly lexicalized unification-based grammar formalism (Pollard & Sag 1994). In the modern form of HPSG, all feature structures are typed and respect type constraints, and unification is between typed feature structures (cf. e.g. Sag, Wasow & Bender 2003). For the English generation, LOGON has adopted and developed further the large, publicly available, HPSG-based English resource grammar (ERG) implemented in the LKB system (Flickinger 2002, *ERG* web page).

For analysis, LOGON has made use of and extended an existing grammar for Norwegian, NorGram, developed within the framework of Lexical-Functional Grammar (LFG) and implemented in the XLE system from PARC (Dyvik 2000). The slightly unconventional choice of using both LFG and HPSG was partly practically motivated; we wanted to reuse ERG and NorGram, and partly theoretically motivated; we wanted to use semantic transfer and abstract away from the particular grammar formalism. A first challenge was to combine MRS semantics and Lexical-Functional Grammar. This was done successfully by the use of LFG's projection mechanism (Oepen et al. 2004).

The transfer formalism has been developed and implemented specifically for the project. The transfer is done by rewriting rules. They are written in a type-based formalism and implemented in a system on top of the LKB. Finally, the three different components for analysis, transfer and generation are built together into one functional system. Technically, this is a fairly large and complex system gluing together several different processes running simultaneously in different programming languages.

## 2.3 Stochastic ranking

During the 1990s, two new approaches to machine translation appeared; *statistical machine translation (SMT)* and *example based machine translation (EBMT)*. Instead of founding MT on linguistic models and hand-crafted rules, the two approaches start with large collections of translated texts and try to extract, or learn, regularities. When new text is to be translated, they exploit the similarities with previously encountered translations. More specifically, an SMT system tries to learn two types of probabilities during training: how likely a word $w'$ is as the translation of a word $w$ by counting how frequently $w$ gets translated as $w'$, and how likely a sequence of words is as a sentence in the target language. Later on, when given a sentence in the source language, the SMT system will, in principle, consider all possible strings of words in the target language and calculate the joint probability of it being a sentence and its words being translations of the words in the source sentence.

In many ways, SMT can be considered a return to the earliest, direct, word-based approach to MT. At the same time, by adding the stochastic component, it also introduces a new dimension compared to all earlier approaches. It is essential for an SMT system that it can consider huge amounts of translated text during training, and the computations involved are so resource-consuming that they would not have been possible twenty years ago. Pure SMT is an extreme representative for language technology without linguistic theory (Jelinek 2005). The initial results of SMT were quite promising, and by some evaluation mea-

sures, SMT seems to outperform traditional rule-based systems. At the same time SMT also has clear limitations. A fair amount of the output produced is ungrammatical or it totally misrepresents the content of the source sentence—ceiling effects which cannot be overcome by pure word-based SMT.

In the LOGON project we try to combine insights from SMT with the rule-based transfer system. For one Norwegian sentence, the transfer system may produce 10, 20 or even several hundred different translations in English. A string may be ambiguous and get several different analyses. During transfer, there might be many different alternative translations for many words. And finally, one MRS may have many different realizations in English. So far we have experimented with ranking the output on the basis of English text (Velldal & Oepen 2005). The first results of these rankings are promising, and clearly better than a random selection. During the remaining project period we plan to apply ranking of the Norwegian analyses on the basis of a tree bank for Norwegian to get the most likely grammatical structure as input to the translation process. Finally, we should calculate the probability of the output sentence as a *translation* of the input sentence. But to get this step right, we will need large amounts of translated text as training material, and we will probably not reach that stage within the remaining project period.

### 2.4 Profiling and regression testing

Constructing large-coverage grammars, like NorGram and ERG, is a stepwise and gradual process. The language engineer continually extends the grammar to increase the coverage. But this may lead to overgeneration and false analyses. After a while the grammar becomes so big and complex that it is impossible for her to oversee all the consequences of her changes. She has to test the grammar empirically. To do this efficiently, in LOGON we apply a method of systematic regression testing (Oepen & Flickinger 1998) together with an advanced programming package, [incr tsdb()] (available from *Delphin* web page). A test suite is a set of sentences with optional annotations. After a round of changes to the grammar, all the sentences in the test suite are parsed in a batch process and the results recorded and stored in a database. By comparing the results of a batch run to earlier results in the database, the language engineer gets immediate feedback to the changes to the grammar. She immediately sees which new analyses have appeared and which old analyses have disappeared.

In the LOGON project, we use this method in the development of each of the different grammars and the transfer module. But we have also taken the method one step further (Oepen, Dyvik, Flickinger, Lønning, Meurer & Rosén 2005). Not only may the changes to a grammar influence the performance of

that component, it may also influence other components. We have adapted the method of profiling and the [incr tsdb()] system to the translation process as a whole. We repeatedly batch translate test suites and compare the outcome with earlier rounds. This is particularly important since the development of the system involves about ten researchers at three different sites working on different modules, including grammars and software for parsing, transfer and generation.

The test material used in LOGON consists of some hand-constructed test suites of between 100 and 300 sentences, one for simple grammatical constructions and one for closed class vocabulary. In addition, we have selected a corpus of about 3000 authentic Norwegian sentences from the hiking domain. We have two or three different English reference translations of these sentences. This reference corpus is a useful guide for the writers of the transfer rules, even though it is not a goal to reproduce the example translations in all cases. In addition, it is used for continuous regression testing. Parts of the corpus are kept aside for evaluation purposes.

## 3 Philosophy of linguistics

### 3.1 Holism

At first look, the LOGON project fits well with the idealistic view of the relationship between science and technology. Where the bridge engineer applies theories from physics and provides specific lengths and other parameters, the language engineer applies theoretical syntax and semantics and provides a lexicon of words and their properties. But the contribution from the language engineer amounts to more than this. From theoretical syntax, she gets some general principles, and she gets detailed analyses of some specific phenomena. Each detailed analysis typically considers a limited set of data, data intended to illustrate exactly these phenomena. But when the language engineer tries to glue together these different detailed analyses, she often experiences that they do not fit together. To get a working system, she has to make adjustments and corrections and also invent analyses for several phenomena not considered in the theoretical literature. In addition, the language engineer departs from the theoretical linguist with respect to the data on which she tests her grammar. Besides carefully chosen, tricky (but typically short) test sentences, the language engineer considers sentences from a corpus. And often a grammar which seems to work on the shorter sentences gets problems on longer sentences where several phenomena interact.

It is easier for the theoretical grammarian who considers a more limited set of data to "verify" her proposal. The language engineer serves the job of an

experimental scientist testing the theoretical proposals under harder conditions and more realistic settings than what the theorists do. This confirms Quine's (1961) thesis that one cannot test theoretical statements in isolation. What has to be tested are whole theories and systems. Rather than being a consumer of theoretical grammar, the language engineer adds to the field. In this respect, the use of computational implementations serves as a tool for advancing generative grammar. The computer serves a similar function as Galileo's microscope, and could be named a "macroscope" for theoretical linguistics.

By taking this holistic approach, it not only becomes harder to "verify" a grammar than what is sometimes assumed in the theoretical literature, it also becomes harder to falsify *individual* grammar rules. Most often there is more than one way to fix a shortcoming in a grammar. For example, whether a particular PP should be considered an argument or adjoined to the verb, whether the word *down* in (4a) should be described as a particle, an adverb or a preposition with no complement, and what the role of *down* is in (4b), can only be determined by reference to the grammar as a whole.

(4) a. The Titanic went down.
    b. Sam went down to the supermarket.

### 3.2 Syntactic theorization

Quine (1961, p. 46) in his description of holism envisaged "our so-called knowledge or beliefs" as "a man-made fabric which impinges on experience only along the edges." Statements closer to the periphery are most likely to be revised to accommodate observations. Statements further from the periphery are less prone to revision, but might get revised because of their logical interconnections to other statements. In a similar vain, Lakatos in his description of research programs talked about a protective belt of less firm statements that were apt to revision to accommodate observations and at the same time protect the core of the program from changes. Theories of generative grammar can be considered such research programs. Within these theories we can recognize several layers: from the most basic assumptions which cannot be changed without rejecting the theory, through intermediate principles which may be changed, but only rarely and after long discussions, to the surface layer of particular grammar rules and lexical entries which may be changed on a daily basis.

There are several different theories of generative grammar alive today, and two of them, LFG and HPSG, are applied in the LOGON project. The two share some basic assumptions. Both are aiming for broad coverage and computational tractablity. They are lexicalized, and they use feature structures and

unification as basic ingredients. They depart, however, on the intermediate principles. In LFG, the principles include the strict separation between the different projections, the relative role of the c(onstituent)-structure and the f(unctional)-structure, and the way arguments are selected by the completeness and coherence principles. In HPSG, the intermediate principles include the sign as an integrated unit of phonological, syntactic and semantic features, taking care of both configurational and functional information, together with the principles for combining signs, like the head feature principle. In addition, HPSG uses types for expressing generalizations. Today, the two theories live more and more separate lives. In particular, they both have their own annual conferences.

As far as we know, LOGON is the first project to apply both theories in the same large computational system. And even though we apply them to two different languages, this gives us a unique opportunity for comparing them. So far, we see no reason for rejecting either of them on empirical grounds. It is also interesting that in spite of the different principles on the intermediate level, which make it impossible to translate grammar rules or lexical entries directly between the two frameworks, there are clear convergences on the surface level. For example, the bracketing of a string or whether a particular PP is an argument or an adjunct can be discussed across the two frameworks.

This convergence is on the one hand encouraging, but it also raises some concerns. What is the substance of the two theories? What is the theoretical status of the intermediate principles? Are there any ways to falsify them? To defend the grammatical theories, one could argue that the situation is not that different from other scientific fields, where basic and intermediate principles can be protected by adjusting the surface statements. But the situation in generative grammar seems more exceptional, as there are several different theories that neither communicate nor compete. In a way, the relationship between LFG and HPSG can be compared to the relationship between English and French, two different languages for talking about the same phenomena.

### 3.3 Semantics and translation

We will turn to the role formal semantic theories play in our technological MT project. Formal semantics tries to get the truth conditions for declarative sentences right, and to calculate them systematically. Though not a necessity, the truth conditions are often calculated by translating sentences into a logically perspicuous notation where formulas "wear their truth conditions on their sleeves". An ambiguous sentence has to be translated into several different formulas which each represent a reading. Conversely, if two different sentences have the same meaning, they should be translated into formulas with the same

truth conditions, and it should be possible to deduce one from the other. More generally, the logical formalism should support inferences and make logical relationships between different sentences visible.

In the LOGON project we try to apply formal semantic representations in MT. But on our way from theory to technology, we also make some adaptations. We have chosen to use underspecified semantic representations. Semantic ambiguities which are not reflected in syntax are not spelled out when translating into MRS. They are kept underspecified in the semantic representations to translate more efficiently. The ambiguities may in many cases be preserved when translating into a closely related language. In cases where the ambiguities cannot be retained, we spell them out during transfer, rather than during analysis. As a result, the MRSs are constructed systematically from the syntax, but not compositionally in the traditional sense.

Like in syntax, the language engineer encounters phenomena which are not fully covered by any theoretical analysis. She has to fill in the details herself. She might also have to make adjustments to get different bits and pieces to work together. There is generally more than one way to solve a problem, and an analysis of a class of phenomena can only be evaluated in the context of the whole system. To take one example, the questions regarding how *down* should best be handled from example (4) is as much a question for semantics as it is for syntax.

In addition, we see one more degree of freedom. The semantic representations may be chosen close to the truth-conditional interpretation and further from the surface form of the natural language, or closer to the surface form and further from the interpretation. To take a simplified example, if one thinks the interpretation of the simple past tense is that the event took place sometime before the utterance event, any of the following might be ways to represent this in logic, where (5a) is quite close to language and (5c) close to the interpretation.

(5) a. $run\,(PAST\,, kim\,)$

b. $\mathbf{P}(run\,(kim\,))$

c. $\exists t'(t' < t_0 \wedge run\,(kim\,, t'))$

The translation process constrains the semantics somewhat, however. In theory it is perfectly possible to make different choices for the two languages. In practice, however, there is much to gain from choosing as similar representations in the two languages as possible. For example, it seems rather unnecessary to write transfer rules for transforming something like (5c) into something like (5a), even though it would be possible.

### 3.4 Simulations

Are there any similarities between our experiences regarding language technology enriching linguistics and how simulation techniques have entered into other sciences? David Marr's (1982) view on methodology has had a large impact on artificial intelligence and computer science. In solving what he calls an *information processing problem* one has to separate the questions about *what* is processed and *why* from the questions about *how* it is processed. The answers to the how-questions can be further split between an abstract representation and algorithm, on the one hand, and the actual hardware and software realization, on the other hand. Marr (1982) also pointed out that Chomsky's then current syntactic theory with its transformations should be taken to be a what-theory and not a how-theory, and related this to the distinction between competence and performance in linguistics. In a lesser known earlier paper, Marr (1977) drew an additional distinction, between what he called a type 1 and a type 2 theory. Type 1 theories are the "how and what" theories described above. Type 2 theories occur "when a problem is solved by the simultaneous action of a considerable number of processes, whose interaction is its own simplest description." It is a goal to construct type 1 theories as they add to our understanding, but not all phenomena may have good type 1 theories. In particular, he pointed out that "[v]iewed in this light, it becomes entirely possible that there may exist no Type 1 theory of English syntax of the type that transformational grammar attempts to define".

In the LOGON project, we have assumed from the outset that syntax has a type 1 theory. Both LFG and HPSG are type 1 theories where a particular grammar is a declarative *what*-level description, telling what is grammatical and and what is to be computed on the *how*-level. On the other hand, our empirical approach to grammar development with repeated batch testing and stepwise extensions bears some resemblance to the testing of a (model of a) bridge in a wind tunnel. This is a type of simulation. Does this parallel indicate that our grammars are simulations of type 2 rather than type 1 theories? Not directly, since what is simulated in the wind tunnel is the *behavior* of the bridge under various conditions, while the bridge itself is a *constructed* artifact. Similarly, the grammar itself is constructed and not (the outcome of) a simulation. The similarity to the bridge shows first and foremost how radically underdetermined the grammatical model is by the observations.

A striking property when a competence grammar is turned into a computational grammar is the large amount of ambiguity, both in parsing and generation. One string of 15–20 words can easily get several hundred different analyses. Still, a human who hears or reads this sentence will most often only get one or

a few different readings. Our use of statistical techniques to rank the outcomes of the parsing, generation and translation, is an attempt to approximate what the human does. Marr pointed out that for a type 2 theory to be interesting, it must show good performance since that is the only way it can show its value. Thus, if our rankings are successful, i.e., correlate well with the preferences of a human, they might be classified as successful type 2 theories. But to get anything like a type 1 theory of how humans choose the best or most likely analysis, we would need more. We would need a theory of what it is the human prefers.

## 4 Prospects

Computer systems for writing and for parsing linguistically motivated grammars have existed for about 25 years. But it is only during recent years that the formalisms have reached sufficient maturity, the computers sufficient power, and the grammars sufficient coverage for applying the systems on real texts. This has resulted in a new tool for grammar writing and testing, bringing a new dimension to theoretical syntax and semantics. This will gradually alter our views on the status of grammars and semantics. We might also eventually have to rethink our views on the relationship between competence and performance, but by now it is still open where this will lead us.

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Kjell Johan might be best known for his work on theoretical linguistics: semantics, pragmatics and syntax. But he has also given valuable contributions to several other areas including computational linguistics, corpus linguistics and the methodology and philosophy of linguistics. This article is an attempt to reflect on some connections between these themes.

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## References

Chomsky, N. (1957), *Syntactic Structures*, Mouton, The Hague.

Copestake, A., Flickinger, D., Pollard, C. & Sag, I. A. (to appear), 'Minimal Recursion Semantics. An introduction', *Research on Language and Computation* . Versions distributed since 1995.

*Delphin* (web page). http://www.delph-in.net/, accessed 22-dec-05.

Dyvik, H. (2000), Nødvendige noder i norsk, *in* Ø. Andersen, K. Fløttum & T. Kinn, eds, 'Menneske, Språk og Fellesskap', Novus, Oslo, pp. 25–45.

*ERG* (web page). http://www.delph-in.net/erg/, accessed 22-dec-05.

Flickinger, D. (2002), On building a more efficient grammar by exploiting types, *in* S. Oepen, D. Flickinger, J. Tsujii & H. Uszkoreit, eds, 'Collaborative Language Engineering', CSLI Publications, Stanford, pp. 1–17.

Jelinek, F. (2005), 'Some of my best friends are linguists', *Language Resources and Evaluation* **39**(1), 25–34.

*LOGON* (web page). http://www.emmtee.net/, accessed 22-dec-05.

Marr, D. (1977), 'Artificial Intelligence—a personal view', *Artificial Intelligence* **9**, 37–48.

Marr, D. (1982), *Vision*, Freeman, New York.

Oepen, S., Dyvik, H., Flickinger, D., Lønning, J. T., Meurer, P. & Rosén, V. (2005), Holistic regression testing for high-quality MT. Some methodological and technological reflections, *in* 'Proceedings of the 10th Annual Conference of the European Association for Machine Translation', Budapest, Hungary, pp. 198–204.

Oepen, S., Dyvik, H., Lønning, J. T., Velldal, E., Beermann, D., Carroll, J., Flickinger, D., Hellan, L., Johannessen, J. B., Meurer, P., Nordgård, T. & Rosén, V. (2004), Som å kapp-ete med trollet? Towards MRS-based Norwegian–English Machine Translation, *in* 'Proceedings of the 10th International Conference on Theoretical and Methodological Issues in Machine Translation', Baltimore, MD, pp. 11–20.

Oepen, S. & Flickinger, D. (1998), 'Towards systematic grammar profiling. Test suite technology ten years after', *Journal of Computer Speech and Language* **12**(4), 411–436.

Pollard, C. & Sag, I. A. (1994), *Head-Driven Phrase Structure Grammar*, CSLI & University of Chicago Press, Stanford & Chicago.

Quine, W. V. O. (1961), Two dogmas of empiricism, *in* 'From a Logical Point of View', 2 edn, Harper, New York, pp. 20–46. First published in 1953.

Sag, I. A., Wasow, T. & Bender, E. M. (2003), *Syntactic Theory. A Formal Introduction*, 2 edn, CSLI Publications, Stanford.

Velldal, E. & Oepen, S. (2005), Maximum entropy models for realization ranking, *in* 'Proceedings of the 10th Machine Translation Summit', Phuket, Thailand, pp. 109 – 116.

Weaver, W. (2003), Translation, *in* S. Nirenburg, H. Sommers & Y. Wilks, eds, 'Readings in Machine Translation', MIT Press, Cambridge, Massachusetts, pp. 13–17. Reprinted after a memorandum from 1949.

# DISPENSING WITH SUBORDINATION IN TRANSLATION – CONSEQUENCES ON DISCOURSE STRUCTURE

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**Abstract**

The paper first outlines some motivations of translational upgrading of subordinate clauses to independent sentences in a German-Norwegian / Norwegian-German parallel corpus of popular science text. Taking German non-restrictive relative clauses as a frequent type of example in the German-Norwegian corpus fragment, I then discuss some consequences shifts from syntactic subordination to paratactic sentence sequences have on the interpretation of the target language vs. source language text.

## 1 Introduction

There is little doubt that the sentence, the textual unit between two full stops (or comparable punctuation marks), forms the basic unit for translation, and in fact there is usually a high degree of correspondence between sentence boundaries in a source language (SL) and a target language (TL) text. However, almost every translation contains instances where the translator has chosen to deviate from this general strategy by rendering one SL sentence as two (or more) TL sentences (sentence splitting), by combining two (or more) SL sentences into one TL sentence (sentence fusion), or by shifting sentence boundaries through combinations of the two. These deviations from the default translation strategy can often be put down to different options (typological differences) and preferences between languages as concerns the (hypotactic or paratactic) linking of clauses or language-specific options and preferences for information packaging within clauses.

The questions to be addressed in this paper are how shifts from hypotactic to paratactic clause structure in translation are motivated and which consequences they have for the discourse organisation of the translation as compared to the original text. I shall investigate examples of sentence splitting in translation where a SL clause complex containing a subordinate clause is translated by a paratactic sentence sequence in the target language. The study is

part of my PhD project on adjustments of sentence boundaries in translations and is based on a Norwegian-German and German-Norwegian parallel corpus of popular science texts. The main corpus is a collection of 17 popular science articles on various aspects of the history of German-Norwegian relations written by different authors (Simensen 1999) which is available in a Norwegian and a German version, each of about 200 pages in length. The corpus contains original texts in both languages, fourteen of the texts are Norwegian original texts translated into German, while three of them are German original texts translated into Norwegian.

In the German-Norwegian corpus fragment, syntactically subordinate clauses, such as adverbial clauses, complement or relative clauses make up the most frequent type of SL structure leading to sentence splitting in the Norwegian translation. In the Norwegian-German corpus fragment this type of adjustment is much less frequent. This may be due to typological differences between the two languages, namely restrictions on hypotactic complexity for Norwegian as compared to German. I will comment on this in the following section (Section 2) in which possible motivations for the characteristic types of subordination-induced sentence splitting are identified. In Section 3.1 I will give an overview of the formal/syntactic changes in sentence structure for the individual types of SL subordinate constructions translated by TL paratactic constructions. In 3.2 and 3.3 I will then have a closer look at the upgrading of non-restrictive relative clauses and describe the consequences sentence splitting has on the discourse structure and discourse processing of the TL as compared to the SL text. Section 4 gives a summary and closes with some remarks on the possible (in-)adequacy of underlying language-specific discourse organisation strategies reflected in the examples discussed in this paper.

## 2 Sentence splitting in translation and its possible motivations

Why do translators change sentence boundaries in certain cases? Differences regarding the grammatical system of the languages, language-specific options and preferences for information distribution on sentence level and other typological differences, e.g. regarding basic word order, seem to play an important role in this context. In her investigation of cross-linguistic variation between German and English, Teich (2003) makes a methodological distinction between contrasts in the grammatical/semantic *system* of the languages (the research field of language typology) and contrasts observable in instances of the language systems realised in form of *texts* of a specific register for different languages (the research field of contrastive linguistics), where the former is an important but not the only source and motivation for the latter. These contrasts also become visible in *translations* of text (the research field of translation studies), but the situation is even fuzzier here, because features of the SL

language system as well as features specific for the SL register may have influence on the realisation of the TL text, e.g. in form of so-called "shining-through" effects (Teich 2003: 61). Despite this SL shining-through, for a translation to be acceptable at least the rules of the TL language system must be followed and it has to meet certain comprehensibility requirements as a text in the TL.

In the German-Norwegian corpus fragment 43 % of all examples of sentence splitting are clause complexes containing syntactically subordinate clauses translated by paratactic sentence sequences, which is the most frequent type of sentence boundary adjustment for this translation direction. Among these examples are 28 relative clauses, namely 13 non-restrictive relative clauses with a nominal element as antecedent in the matrix clause and 15 so-called "Satzrelativsätze" (I will use the English term "clause-related relative clause" below).

The frequency of sentence boundary mismatches related to relative clauses in the German SL text can to some degree be explained by contrasts between the two language systems, namely by differences in the realisation of relative clauses as far as the syntactic function and the lexical inventory of relative markers is concerned. Whereas relative markers with nominal antecedents in German are pronouns, and the case, number and gender agreement requirement helps to disambiguate potential referents in the matrix clause, the Norwegian relative marker *som* is non-inflecting and usually considered as a subjunction (Faarlund et al. 1997: 866). This lack of disambiguation potential, sometimes in interaction with changes in word order in the matrix clause, often leaves the upgrading of the relative clause as an independent main clause and the re-introduction of the referent as the only option for the Norwegian translation as in example (1a.) vs. (1b.).

(1) a. Von 1905 bis zum Ersten Weltkrieg existierten kaum außenpolitische Berührungspunkte zwischen dem Deutschen Reich und Norwegen, dessen Regierung nach der Unabhängigkeit eine permanente außenpolitische Neutralität anstrebte. […]

b. Fra 1905 til utbruddet av første verdenskrig fantes det få utenrikspolitiske berøringspunkter mellom Det tyske riket og Norge. Etter uavhengigheten ønsket den norske regjeringen utenrikspolitisk nøytralitet, […].

Relative clauses with the whole matrix clause as antecedent, clause-related relative clauses, are the other type of relative clauses frequently rendered as an independent sentence in the Norwegian translation. Norwegian equivalents of

German relative adverbials such as *wobei, weshalb, wodurch* and *wozu* are missing in Norwegian (or are at least highly marked), thus, translation by an independent sentence and rendering the relative adverbial as a corresponding connective expressing the same discourse relation (example (2a.) vs. (2b.)) or delegating the inference of the discourse relation holding between the two clauses to the context (example (3a.) vs. (3b.)) are often the only options. Only the relative marker *was* has a Norwegian quasi-equivalent in *(noe) som* which makes sentence splitting dispensable in many of these cases.[1]

(2) a. Das militärstrategische Primat wird auch daran erkennbar, dass die Militärbehörden durch die Rüstungsprogramme über erhebliche Kompetenzen in wirtschaftlichen Fragen verfügten, weshalb deutsche Firmen auch mit diesen kooperieren mussten, obwohl die Wirtschaftspolitik formell durch das Reichskommissariat gestaltet wurde.

b. Et forhold som reflekterer det militær-strategiske primatet, var at rustningsprogrammene hadde gitt de militære myndighetene en betydelig kompetanse i økonomiske spørsmål. Derfor måtte de tyske firmaene samarbeide med dem, selv om den økonomiske politikken formelt sett ble utformet av rikskommissariatet.

(3) a. Neben diesen engen wirtschaftlichen Kontakten bestanden rege kulturelle, technische und wissenschaftliche Beziehungen, wobei für das norwegische Bildungsbürgertum die deutsche Literatur und die deutsche Sprache den Bezugspunkt darstellte.

b. Ved siden av disse tette handelsforbindelsene fantes det også viktige kulturelle, tekniske og vitenskapelige kontakter. Tysk språk og litteratur stod sterkt i de utdannede borgerlige kretser.

The remaining examples of subordinate clauses in German translated as independent clauses in the Norwegian translation are clause complexes containing adjunct (adverbial) clauses or complement (subject or object) clauses. These examples cannot be explained by general contrasts between the two language systems, since adjunct and complement clauses are organised in comparable ways in the two languages, and most of the German subordinating conjunctions have Norwegian counterparts (although the mapping is not one-to-

[1] See Ramm (2005) for a detailed discussion of the translation of German clause-related relative clauses into Norwegian.

one). In most of the examples where the subordinate clause follows the matrix clause in the SL text, the syntactic upgrading of the subordinate clause as an independent sentence in the translation seems to be related to different preferences for hierarchical/hypotactic (German) vs. non-hierarchical/paratactic (Norwegian) discourse organisation (cf. Fabricius-Hansen 1999), but other structural changes required for the translation of the matrix clause may also play a role, as in (4a.) vs. (4b.):

(4) a. *Als Folge der Weltwirtschaftskrise und der Pfund-Abwertung von 1931* geriet die deutsche Exportindustrie in Skandinavien in eine schwierige Lage, weil sie sich mit einer forcierten und erfolgreichen britischen Handelsoffensive auseinander setzen musste, während die deutsche Exportindustrie innenpolitisch gegenüber den hochprotektionistisch orientierten Agrariern zusätzlich unter Druck geriet.

b. *Da det britiske pundet ble nedskrevet i 1931*, havnet den tyske eksportindustrien i Skandinavia i en vanskelig situasjon. Den måtte konkurrere med en sterk britisk handelsoffensiv, samtidig med at den på hjemmebane ble utsatt for et økende press fra de svært proteksjonistiske landbrukskretsene.

The complex PP with two coordinated genitive modifiers in topic position in the German version (italicised in the example) is sententialised as a subordinate clause in the Norwegian translation (the first genitive modifier is dropped), leading to a more clausal structure of the counterpart of the German matrix clause. This may be one reason why an independent clause without an explicit connective signalling the discourse relation is preferred, avoiding the attachment of a further (causal) subordinate clause in the translation.

The examples of the subordinate (adverbial) clause preceding the matrix clause, on the other hand, can be explained by typological differences between the two languages as regards the options for the realisation of the topic position: Norwegian does not allow "heavy" constituents in sentence-initial position – such as sentence-initial adverbial clauses – in the same way as German does. Thus, sentence splitting is a natural option here. Since, as a matter of fact, all these examples in the corpus are of a concessive/causal type (*obwohl, da, wenn auch*) the upgrading of the adverbial clause is associated with "presupposition extraction" (Fabricius-Hansen 1999), i.e. a change in information distribution where information presupposed in the subordinate clause in the SL text is explicitly asserted in the independent sentence in the translation.

Now turning to the Norwegian-German corpus fragment, the examples with an adverbial clause preceding the matrix clause are an interesting class as well, although different from the German examples of this type: They typically consist of a conditional/temporal subordinate clause followed by a matrix clause containing a kind of cleft/focusing construction which serves to give a reason or evidence for what is part of a presupposition in the subordinate clause as in (5a.).

(5) a. I Grunnlovens paragraf 2 heter det - uforandret fra 1814 til i dag - at "den evangelisk-*lutherske* Religion forbliver Statens offentlige Religion". Når det er nærliggende å velge dette som inngangsportal til vårt tema, er det fordi den formulering grunnlovsfedrene på Eidsvoll valgte, er egnet til å feste oppmerksomheten ved et av de mest stabile trekk ved norsk historie fra reformasjonstiden til i dag, [ ... ].

b. In Paragraph 2 heißt es nämlich unverändert seit 1814 "Die evangelisch-*lutherische* Konfession verbleibt öffentliche Religion des Staates." Es liegt also nahe, diesen Satz an den Anfang meiner Überlegungen zu stellen. Diese Formulierung der verfassunggebenden Versammlung von Eidsvoll bringt nämlich einen der stabilsten Aspekte der norwegisch en Geschichte von der Reformation bis in die Gegenwart zum Ausdruck. [ ... ]

The effect of the choice of this construction in the Norwegian version is to put specific emphasis on the causal relation between the two clauses. Cleft constructions, although possible in principle, are less frequent and much more marked in German than in Norwegian, and in these examples translation by a corresponding German construction would be almost impossible. Instead, the SL subordinate clause is upgraded to an independent sentence in the TL (also here associated with a presupposition extraction) and the causal relation between the two sentences is signalled by the connective *nämlich* (5b.).

In general, however, shifts from subordinated clauses to paratactic sequences of clauses are much more frequent in translations from German to Norwegian than in the other translation direction. This does not come as a surprise and can to some degree be explained by typological differences concerning the options for information packaging within the clause. German allows for more complex and extended NP modification than Norwegian, in particular to the left of the noun (for example by means of extended pre-nominal participial modifiers), and these constructions often have to be translated by more verbal or sentential constructions in Norwegian (cf. Solfjeld 2003).

German is also known for its "nominal" style in certain registers such as (popular) science texts, characterised by a high frequency of nominalisations and other nominal constructions which also typically are translated by more verbal/sentential constructions in Norwegian as in ex. (4) (cf. Solfjeld 2000). This increase in verbal and clausal structures often goes in hand with changes in sentence boundaries in form of sentence splitting.

Before moving on to some consequences the upgrading of subordinate clauses to independent sentences may have for discourse organisation and discourse processing, it should be pointed out that the typological contrasts which systematically seem to favour these shifts are not the only factor determining a translator's choice to shift sentence boundaries. Rather, such adjustments are usually the result of the interaction of other factors as well, such as lexical gaps or mismatches regarding the main verb or other constituents in the SL text, necessary word order rearrangements, or translation problems resulting from the context before or after the actual sentence split in the translation.

## 3 Consequences on discourse structure

Whatever the reasons for shifts of sentence boundaries are, they lead to some kind of change in discourse segmentation in the TL as compared to the SL text. The question is, whether these changes have influence on what is communicated by the text, in how far discourse coherence is affected, and whether these changes lead to a different processing and understanding of the translated text.

### 3.1 Changes of sentence taxonomy

Holler (2005: 129 ff.) suggests a formal classification of German subordinate clauses according to three dimensions/features based on the sentence taxonomy of Reis (1997), ± DEPENDENT, ± EMBEDDED and ± INTEGRATED. The feature ± DEPENDENT relates to the phono-syntactic (in)dependence of the clause, i.e. the feature + DEPENDENT corresponds to the traditional notion of subordinate clause ("Nebensatz") in German (Holler 2005: 120). The feature ± EMBEDDED concerns the syntactic function of the subordinate clause within the matrix clause, and ± INTEGRATED evaluates the prosodic and pragmatic integration of the subordinate clause, i.e. describes whether the subordinate clause provides an information structure ("Fokus-Hintergrund-Gliederung") of its own or not (Holler 2005: 130). Assuming that it holds for Norwegian sentences in a similar way, this sentence classification can be used to characterise the sentence-boundary adjustments discussed here in a general way:

All types of SL examples described above are +DEPENDENT, but they differ as regards the other two features: adjunct and complement sentences

would be classified as +EMBEDDED, +INTEGRATED, whereas the non-restrictive relative clauses (both with nominal and sentential antecedent) are –EMBEDDED, –INTEGRATED. The shift from subordination to sentence sequence in the translation changes the feature +DEPENDENT to –DEPENDENT for all examples, i.e. TL text involves more than one phono-syntactic unit in contrast to the SL which only contains one such unit. Sentence splitting of adjunct and complement clauses additionally changes the other two features, from +EMBEDDED to –EMBEDDED, i.e. the clause upgraded in the translation no longer realises a syntactic function within the counterpart of the matrix clause, and from +INTEGRATED to –INTEGRATED, i.e. the upgraded clause receives an information structure of its own. For the relative clause examples, however, no further general sentence-typological changes can be identified. In the following sections I will show that nevertheless the processing and coherence of the SL vs. TL text may differ decisively.

### 3.2 Upgrading of (non-restrictive) relative clauses

As noted above, apart from the syntactic dependency feature, (non-restrictive) relative clauses do not change their sentence-taxonomic type when translated as independent sentences. But to which degree are sentence sequences equivalent to relative clauses in discourse? In studies on German continuative relative clauses ("weiterführende Relativsätze"), of which clause-related relative clauses are a subtype, their similarity to independent main clauses is often emphasised (Brandt 1990: 46ff., Peyer 1997: 131ff., Laux 2002: 199ff.). What precisely the difference is, and why there exists a choice between the two at all, is only tentatively explained by stylistic preferences (Laux 2002: 201), or by pointing out that continuative relative clauses are a borderline case of subordinate clauses which only formally (syntactically) are subordinate clauses while textually they behave like main clauses (Fabricius-Hansen 1992: 479f., Peyer 1997: 149).

If in fact there was no relevant functional/textual difference, one would expect that translational upgrading from a continuative relative clause to a main clause sequence – an operation similar to monolingual main clause paraphrases/reformulations – would not significantly affect the TL discourse structure as compared to the SL. As shown in Ramm (2005), however, this seems not always to be the case. According to Laux (2002), non-restrictive relative clauses can serve two general discourse functions, dis-continuation and continuation: a relative clause is continuative if a 'consequentiality relation' (Sandström1993) holds between the matrix clause and the relative clause as well as between the relative clause and the following sentence. All other cases are classified as dis-continuative. Although the application of her methodology developed for narrative texts – thus putting the main emphasis on the temporal structure of the events described in the text – on translations of non-narrative,

expository texts is not unproblematic, the continuation/dis-continuation distinction in fact seems to play a role at least for the translation of clause-related relative clauses. According to Laux (2002: 199ff.), continuative relative clauses are more similar to independent main clauses than dis-continuative relative clauses (typically presenting background information or explanations to what is presented in the matrix clause). Thus, it could be expected that the upgrading of continuative relative clauses would have less consequences on discourse structure than the upgrading of dis-continuative relative clauses, and in fact the corpus study showed that sentence splitting either was avoided with dis-continuative clause-related relative clauses (and other translation strategies applied) or led to less coherent texts in the translation, in particular as the interpretation/attachment of the following context is concerned (Ramm 2005) – at least if measured with a standard of coherence for texts in German. In (2a.), repeated below as (6a.), for example, the *dadurch* ('with this') in the sentence following the sentence containing the *weshalb*-clause is ambiguous, i.e. it is open whether it refers back to the whole clause complex (the intended interpretation?) or only to the clause-related relative clause.

(6) a. Das militärstrategische Primat wird auch daran erkennbar, dass die Militärbehörden durch die Rüstungsprogramme über erhebliche Kompetenzen in wirtschaftlichen Fragen verfügten, weshalb deutsche Firmen auch mit diesen kooperieren mussten, obwohl die Wirtschaftspolitik formell durch das Reichskommissariat gestaltet wurde. *Dadurch* wurde nicht die zukünftige Friedenswirtschaft eines "Großraumes" vorprogrammiert, sondern Norwegen in die aktuellen Bedürfnisse der deutschen Rüstungsproduktion eingebaut.

b. Et forhold som reflekterer det militær-strategiske primatet, var at rustningsprogrammene hadde gitt de militære myndighetene en betydelig kompetanse i økonomiske spørsmål. Derfor måtte de tyske firmaene samarbeide med dem, selv om den økonomiske politikken formelt sett ble utformet av rikskommissariatet. *Følgelig* ble ikke Norge programmert for en plass innenfor en fremtidig kontinental økonomisk blokk, men snarere utviklet i samsvar med i de aktuelle behovene til den tyske rustningsproduksjonen.

The *følgelig* ('consequently') in the Norwegian version (6b.), however, has its most likely antecedent in the sentence before, which is the upgraded counterpart of the German *weshalb*-sentence. As a result, the connection between the

economic influence of the German military administration mentioned in the German matrix clause, and which consequences this had on the role Norway played (economically, after the First World War – which is what this text paragraph is about) is much harder or almost impossible to infer in the Norwegian translation.[2]

(7) a. Neben diesen engen wirtschaftlichen Kontakten bestanden rege kulturelle, technische und wissenschaftliche Beziehungen, wobei für das norwegische Bildungsbürgertum die deutsche Literatur und die deutsche Sprache den Bezugspunkt darstellte. Zahlreiche skandinavische Studenten studierten in Deutschland, und zwischen den protestantischen Kirchen existierten enge Bindungen.

b. Ved siden av disse tette handelsforbindelsene fantes det også viktige kulturelle, tekniske og vitenskapelige kontakter. Tysk språk og litteratur stod sterkt i de utdannede borgerlige kretser. Utallige skandinaviske studenter studerte i Tyskland, og det fantes tette bånd mellom de protestantiske kirkene.

In example (3), repeated as (7) above, in which the relative clause is clearly dis-continuative, the sentence splitting does not lead to referential problems, but the Norwegian text seems to be more ”chopped”, and the relations between the three sentences – not signalled by connectives – have to be inferred from the context, thus the Norwegian (3b./7b.) appears less coherent than the German (3a./7a.). Moreover, it might be asked whether the discourse relation changes from *elaboration* in the German relative clause to *background* in the Norwegian translation, but the difference is possibly not that striking.

Since her methodology was developed for non-restrictive relative clauses in general, Laux’ continuation/dis-continuation distinction should be applicable to non-restrictive relative clauses with a nominal antecedent in the matrix clause in the same way as for clause-related relative clauses. However, the analysis of these examples turned out to be more problematic, i.e. in several cases it was difficult to decide clearly whether the relative clause was dis-continuative or continuative. One reason may be that Laux’ criteria are basically designed for texts of the narrative type, where the event structure and its temporal organisation are decisive for discourse structuring and the classification of relative clauses as being continuative or dis-continuative. Many text passages in the actual non-fictional corpus, however, are of non-narrative text types, where other criteria, such as the description of (abstract) objects and their properties

[2] I would classify this example as being dis-continuative, using Laux’ criteria, but due to the complexity of this sentence this issue is actually difficult to decide.

and relations, may guide the structuring of the discourse. The problems of analysis also seem to be related to the fact that in non-narrative texts a noun-related non-restrictive relative clause may express very different types of things, depending on the nature of the entities the relative clause is anaphorically linked to and the contribution of the relative clause itself. In (8a.) for example, the relative clause contains additional information on a nominal discourse participant (*Hitler*), but this description is not continued in the following sentence (although it could have been), which rather takes up (gives evidence for) what is claimed in the matrix clause, namely that Rosenberg's "Außenpolitische Amt" did not have any influence on the "Auswärtige Amt" and Hitler.

(8) a. Das am 1. April 1933 unter Alfred *Rosenberg* gegründete Außenpolitische Amt der NSDAP blieb in der Folge fast ohne Einfluss gegenüber dem Auswärtigen Amt und Hitler,[I] der seit Ende 1933 punktuell in die außenpolitischen Entscheidungsprozesse einzugreifen begann.[II] *Rosenberg* scheiterte wie auch Darré, der selbst ernannte völkische Parteiexperte für den Agrarsektor, damit, seiner Dienststelle in der sich herausbildenden polykratischen Struktur des nationalsozialistischen Staates ein Profil und eine Machtbasis zu verschaffen [III]

b. 1. april 1933 ble NSDAPs utenrikspolitiske kontor grunnlagt under ledelse av Alfred *Rosenberg*, men den fikk svært liten innflytelse over utenriksministeriet og Hitler.[I] Sistnevnte begynte fra slutten av 1933 av og til å gripe inn i de utenrikspolitiske avgjørelsene.[II] På samme måte som Darré, den selverklærte parti-ideologen for jordbruksspørsmål, mislyktes *Rosenberg* i å profilere sitt kontor innenfor den flersidige, kompliserte maktstrukturen som var iferd med å ta form innenfor den nasjonalsosialistiske staten.[III]

In terms of discourse relations as defined in SDRT (Asher & Lascarides 2003), the relative clause would be an *elaboration* of the matrix clause, which is the prototypical case of a *subordinating discourse relation*. This means that the matrix clause as well as the relative clause would be at the "right frontier" of the discourse representation and thus could serve as attachment points for information in the following discourse. In the German version syntactic subordination, here correlating with a subordinating discourse relation, helps the reader to infer the appropriate attachment point for the following sentence (i.e. the matrix clause), thus facilitating the processing of the complex information

presented in this text fragment. In the Norwegian translation (8b.), however, syntactic subordination as a discourse structuring signal is lost, and the discourse structure after (8b.$_{[II]}$) seems to be more open as to where following sentences could attach than in the German version. This leads to interpretation problems (garden path readings) regarding (8b.$_{[III]}$), i.e. one first tries to interpret the sentence as a continuation of (8b.$_{[II]}$) until one has to revise it when reading the subject *Rosenberg*.[3] Thus, the upgrading of the relative clause, although not blocking the right frontier after (8b.$_{[I]}$) semantically – the same subordinating discourse relation can in the end be inferred between (8b.$_{[I]}$) and (8b.$_{[II]}$) – leads to difficulties regarding the identification of discourse referents in the following context, i.e. the Norwegian version appears less coherent than the German, at least as far as reference structure is concerned.

While in (8) the relative clause clearly is dis-continuative, ex. (9a.) is not that clear:

(9) a. Hubatsch *betrachtet* die Besetzung des Landes von 1940 ebenfalls *innerhalb eines Aktions-Reaktions-Schemas*, bei dem das Deutsche Reich aus strategischen Gründen den Briten zuvorkommen musste, um die Rohstoffzufuhr aus Schweden sicherzustellen, während offensive seestrategische Gesichtspunkte für die Kriegsführung gegen England keine Rolle gespielt hätten. Erst in der Fischer-Kontroverse während der späten 60er Jahre wurden *derartige historische Interpretationen* in der Bundesrepublik außer Kraft gesetzt.

b. Hubatsch *tolket* også okkupasjonen av 1940 *som en reaksjon*. *I denne tolkningen* måtte Tyskland av strategiske grunner komme britene i forkjøpet for å sikre råvareleveransene fra Sverige, mens offensive sjøstrategiske synspunkter ikke hadde hatt noen betydning for krigføringen mot England. Det var først under Fischer-debatten mot slutten av 1960-årene at *slike historiske tolkninger* ble satt ut av kraft i Forbundsrepublikken.

The relative clause explains (elaborates on) an "action-reaction scheme" (referring to the German strategy in World War II) mentioned in the matrix clause which is a central topic of the whole paragraph. In this case the following sentence takes up these *derartige historische Interpretationen* ("such historical interpretations"), i.e. what is said in the relative clause and the following

[3] Placing *Rosenberg* in sentence-initial position as in the German version would possibly have facilitated the recognition of this referent, but in my view it would not necessarily have improved the recognition of the hierarchical discourse structure.

contrastive *während*-adverbial clause. In this example sentence splitting in the Norwegian translation (9b.) does not lead to interpretation problems with respect to referential structure. On the contrary, it seems that the nominal style in the German version – the relative/adverbial clause formally/syntactically being only a NP modifier of *Aktions-Reaktions-Schema* – is quite extreme (although not untypical for this genre) but this does not ease the processing of the text. The upgrading of the relative clause from an informationally "heavy" and complex NP modifier to an independent sentence in which the paragraph topic *i denne tolkningen* ("in this interpretation") is taken up as a sentence-initial adverbial makes the Norwegian version easier to understand than the German originalt.

### 3.3 Some implications for discourse coherence and discourse processing

These relative clause examples illustrate that sentence splitting in the Norwegian translation (for which in some cases there is no alternative) can have different effects on the coherence and the processing of the TL text as compared to the original. Two factors seem to play a role in this context: The first is the relation between the relative clause and its matrix clause, more specifically, whether it continues a "main structure"("Hauptstruktur") in the sense of Klein & v. Stutterheim (1991) or rather gives additional or background information on some aspect or participant, i.e. is part of what Klein & v. Stutterheim would call a "side structure" ("Nebenstruktur"). The other is the relation between the relative clause or the matrix clause/relative clause complex and the following context.

The translational upgrading seems to be particular problematic for the maintenance of the referential structure of the TL text in cases where the SL relative clause belongs to the side structure of the text and the following sentence takes up referents mentioned in the matrix clause (belonging to the main structure). Here the independent sentence automatically gets more weight than the subordinate clause of the original and at the same time potentially hinders the accessibility of discourse referents in the counterpart of the SL matrix clause. Continuative relative clauses in Laux' terminology, i.e. cases where the following context continues what is expressed in the relative clause or the matrix clause/relative clause complex, seem to be less problematic when translated as independent sentences. The upgrading does not change discourse prominence ("weight") significantly, since these relative clauses usually do not present background/side structure information but belong to the main structure of the text which is important enough to be taken up in the subsequent sentence. Neither does referential structure usually cause translation problems here, because the following sentence does not refer back to the counterpart of the SL matrix clause alone.

However, the analysis of the examples has also shown that the decision whether a relative clause is continuative or dis-continuative, or whether it is part of the main structure or the side structure of the text is far from straight forward in many cases. As mentioned above, this may be related to the fact that the criteria these distinctions are based on are claimed to hold for narrative texts, and their applicability to non-narrative text types is not necessarily given.

## 4 Summary and outlook

In this paper I have discussed some motivations and discourse consequences of the translational upgrading of subordinate clauses to independent sentences. A study of a German-Norwegian and Norwegian-German parallel corpus of popular science text has shown that shifts from hypotactic clause complexes to paratactic sentence sequences are much more frequent in the German-Norwegian corpus fragment, and that the upgrading of non-restrictive relative clauses and adverbial and complement clauses makes up the most frequent type of sentence boundary adjustment in this translation direction, whereas this type of adjustment is not very frequent in translations from Norwegian to German. In the case of relative clauses, contrasts in the German vs. Norwegian language system often seem to trigger upgrading, whereas in the case of adjunct and complement clauses no general typological difference can be identified.

I have then taken a closer look at changes in discourse interpretation which the upgrading of non-restrictive relative clauses leads to. It seem that relative clauses contributing additional or background information to the matrix clause and which are not taken up or continued in the following context cause more problems for transferring referential structure and discourse relations when translated as independent sentences than “real” continuative relative clauses which both continue the matrix clause and are themselves continued in the following sentence.

The relative clause examples also illustrate a property often claimed to be typical of German texts of this (popular-)science genre, namely the preference to organise discourse and information units hierarchically, e.g. by hypotactic clause linkage and/or extensive pre- and post-nominal NP modification. In the Norwegian translation this hierarchisation is often broken up and replaced by paratactic clause linkage and less complex nominal (phrase) structures, and also Norwegian original texts of this genre seem to be more paratactically structured and informationally less complex. But does this say anything about the general adequacy of such discourse organisation strategies? The discourse purpose of texts of this genre usually is to convey complex and often hierarchically organised information or to argue for a specific view on a complex state of affairs. At a first glance it might seem that the complexity of information-oriented text is best accounted for by a discourse organisation strategy that

mirrors this complexity to some degree, e.g. by syntactic hierarchisation on clause and phrase level. Many of the relative clause examples indicate that relativisation in German can in fact be an elegant linguistic means to syntactically signal a hierarchical organisation of chunks of possibly complex information. On the other hand, this discourse-structuring signal may also be misleading, i.e. not correlating to a corresponding organisation of some state of affairs. (9a.) above can be seen as an example where stylistic conventions characteristic of the genre (and possibly also individual preferences of the respective author), i.e. to use a nominal, impersonal style and to present as much information as possible within a single sentence, not necessarily contribute to the comprehensibility of the text. The methodology used in this study, however, does not allow to systematically evaluate whether one of the discourse organisation strategies really is superior to the other with respect to the comprehension and memory of this type of text by the reader. Here, clearly, psycholinguistic methodology is called for.

## References

Asher, N. and A. Lascarides (2003): *Logics of Conversation,* Cambridge: Cambridge University Press.

Brandt, M. (1990): *Weiterführende Nebensätze. Zu ihrer Syntax, Semantik und Pragmatik,* Stockholm: Almqvist & Wiksell International.

Faarlund, J. T., S. Lie and K. I. Vannebo (1997): *Norsk referansegrammatik,* Oslo: Universitetsforlaget.

Fabricius-Hansen, C. (1992): 'Subordination', in L. Hoffmann (ed.): *Deutsche Syntax: Ansichten und Aussichten,* pp. 458-483, Institut für Deutsche Sprache, Jahrbuch 1991, Berlin, New York: Mouton de Gruyter.

Fabricius-Hansen, C. (1999): 'Information packaging and translation: aspects of translational sentence splitting (German – English/Norwegian) ', in M. Doherty (ed.): *Sprachspezifische Aspekte der Informationsverteilung*, pp. 175-214, Berlin: Akademie Verlag.

Holler, A. (2005): *Weiterführende Relativsätze. Empirische und theoretische Aspekte*, Berlin: Akademie Verlag.

Klein, W. and C. v. Stutterheim (1991): 'Text structure and referential movement', *Sprache und Pragmatik (Arbeitsberichte)* **22***,* Lund: Germanistisches Institut der Universität Lund.

Laux, B. Dalen (2002): *Die nicht-restriktive Relativsatzkonstruktion im Deutschen: Diskursfunktion und temporale Interpretation,* Trondheim: NTNU, Det historisk-filosofiske fakultet, Germanistisk institutt, http://www.ub.ntnu.no/dravh/000054.pdf.

Peyer, A. (1997): *Satzverknüpfung – syntaktische und textpragmatische Aspekte,* Tübingen: Niemeyer.

Ramm, W. (2005): 'Satzrelativsätze im Deutschen und ihre Übersetzung ins Norwegische. Zum Zusammenhang zwischen Satzteilung und Diskursfunktion', *Estudios Filológicos Alemanes,* Revista del grupo de Investigación *Filología Alemana* **9***,* pp. 250-277.

Reis, M. (1997): 'Zum syntaktischen Status unselbständiger Verbzweit-Sätze', in C. Dürscheid, K. H. Ramers & M. Schwarz (eds.): *Syntax im Fokus. Festschrift für Heinz Vater*, Tübingen: Niemeyer.

Simensen, J. (ed.) (1999): *Tyskland-Norge: Den lange historien. / Deutschland-Norwegen: Die lange Geschichte*, Oslo: Tano Aschehoug.

Solfjeld, K. (2000): *Sententialität, Nominalität und Übersetzung: Eine empirische Untersuchung deutscher sachprosatexte und ihrer norwegischen Übersetzungen*, Frankfurt/M.: PeterLang.

Solfjeld, K. (2004): Zur Wiedergabe deutscher erweiterter Attribute in authentischen norwegischen Übersetzungen, *Hermes* **33**, pp. 89-115, also available as SPRIKreport no. 19 http://www.hf.uio.no/forskningsprosjekter/sprik/docs/pdf/ks/SolfjeldReport19.pdf

Teich, E. (2003): *Cross-Linguistic Variation in System and Text*, Berlin, New York: Mouton de Gruyter.

# UNIFICATION AND WORD-INTERNAL PRAGMATICS

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**Abstract**

Recent important developments within Discourse Representation Theory include a more elaborate formalisation and account of presuppositional phenomena, as well as the integration of unification as a mode of composition. Focusing on these issues, the following claims are made: (i) the varying compositional impact of some adverbials, ranging from merely constraining the properties of a predicate to radically altering them, is suitably modeled applying unification, and (ii) pragmatic mechanisms like bridging, presupposition verification and accommodation can apply word-internally for some lexical items. To substantiate these claims, the analysis will centre around the German causal preposition *durch* ('by', 'through', 'by means of').

## 1 A challenge to strict compositionality

An adverbial can be said to be a free syntactic constituent which modifies a predicate semantically. However, some adverbials not only modify a predicate, but may even radically alter its properties. Prepositional adjuncts headed by the German causal-instrumental preposition *durch* ('by', 'through', 'by means of') belong to one such class of adverbials (cf. section 5 for further examples). One of the main functions of *durch* is to mark its complement as the causing event in a causal relation between two events, as exemplified below:

(1) Der Polizist wurde getötet durch einen Schuss aus der eigenen Dienstwaffe.
'The policeman was killed by a shot from his own service weapon.'

(2) Der Polizist starb durch einen gezielten Schuss.
'The policeman died through an accurate shot.'

In (1), the causative predicate *töten* ('kill') is used, which implies the existence of a causing event without specifying it, i.e. it is manner-neutral. The semantics of

a phrase such as *einen Polizisten töten* ('to kill a policeman') can be specified as in (3), ignoring aspects which are not of immediate relevance here:

(3) $\lambda e_1 \exists e_2[\text{BECOME}(\textit{dead}(p))(e_2) \wedge \text{CAUSE}(e_2)(e_1)]$

In prose: the set of events $e_1$ such that there exists an event $e_2$, which is a death of $p$, and where $e_1$ causes $e_2$. The modifying *durch*-adjunct provides a specification of the event $e_1$: the death of the policeman is caused by the event of a shot from his own service weapon.

In (2), the inchoative predicate *sterben* ('die') is used. Inchoatives like *sterben* are not generally assumed to imply a causative relation. The semantics of *sterben* ('die') may be represented formally as in (4), i.e. without a CAUSE predicate:

(4) $\lambda y \lambda e_2[\text{BECOME}(\textit{dead}(y))(e_2)]$

Still, in combination with the *durch*-adjunct, a semantics parallel to the one indicated for (1) is desirable: a shooting event is the cause of the policeman's death. Additionally, an inchoative like *sterben* does not associate with an agent on its own. But sentence (2) clearly implies the presence of an agent, as the specification of the shooting event as being 'accurate', indicates. Thus, the *durch*-phrase can be said to have altered the properties of the inchoative predicate *sterben*.

Accordingly, the semantics of both (1) and (2) can be represented as indicated in (5), again leaving out information not relevant to the discussion here:

(5) $\lambda e_1 \exists e_2[\text{BECOME}(\textit{dead}(p))(e_2) \wedge \text{CAUSE}(e_2)(e_1) \wedge \text{SHOOT}(e_1)]$

However, since inchoatives are not assumed to imply causation, there must be two different sources for the abstract predicate CAUSE: with causatives it originates in the predicate itself, but with inchoatives, the preposition seems to be the most plausible candidate for its introduction. But if *durch* in some cases should include a CAUSE of its own, principles of strict compositionality would seem to force us to assume an ambiguity between two *durch* prepositions since no iteration of the CAUSE predicate is assumed after the composition of *durch* with causatives: We do not get an interpretation involving indirect causation in a cause-to-cause-relation. Assuming ambiguity would, however, clearly be somewhat counter-intuitive, given the parallel interpretation of (1) and (2). Thus, other means of composition for *durch*-phrases and the predicates they modify, should be explored.

## 2 Alternative approaches

There exist approaches which could be seen as avoiding the problems posed by the data in (1)-(2). In the following, I will comment briefly on two of these, offering further arguments for the view to be taken here.

A first alternative is to assume a principle of *temporal coherence* as e.g. Wunderlich (1997, p. 36) does. This way a CAUSE predicate can enter into semantic composition whenever there is a constellation where a process (immediately) precedes a resultant state, where the predicate BECOME occurs. From this perspective, the CAUSE element occurs as a result of the combination of the BECOME predicate in the representation for inchoatives like *sterben* and the event of the shot, introduced by the *durch*-phrase. This means that *durch* itself does not need to contain a CAUSE element for inchoatives and causatives to come out much the same when combined with *durch*.

In another alternative it is assumed, somewhat simplified, that every change involves a CAUSE at some level, under the assumption that "even if no specific causing entity or action is expressed, something must be responsible for the change of state in the affected entity" (Härtl 2004: 899 ff.). Härtl, arguing for a division between a semantic and a conceptual level, claims that whenever a CHANGE predicate is present, a CAUSE predicate is introducable.

However, I think there are some facts concerning *durch* which render these approaches less attractive. In addition to the combinatorial possibilities of causal-instrumental *durch* briefly discussed in the previous section, the preposition may also be combined with stative predicates, as in (6):

(6) Auch der durch diese Haltung hohe Luftwiderstand kann auf längeren Strecken ganz schön schlauchen.
'The high air resistance due to this posture may put you through the mill over longer distances.'

In cases like (6), one gets an interpretation where the state expressed in the lexical anchor *hoch* (Eng. *high*), is the resultant state of the eventuality expressed in the internal argument of *durch*, in this case: *Haltung* (Eng. *posture*).[1]

If the *durch*-phrase is left out, as illustrated in (7), the stative *hoch* should not be interpreted as a resultant state as such – though this could be achieved by (intonationally) focussing *hoch*, introducing a set of alternatives which are related to *high* through scales or negation.

[1] *Haltung* has both a stative and an eventive reading. It has an eventive, intergressive (Egg 1995) reading in contexts where the position is upheld deliberately, as in (6).

(7) der hohe Luftwiderstand
'the high air resistance'

In the light of the noun phrase in (7), it seems reasonable to claim that *durch* has a similar effect in the case of the stative *hoch* in (6) as with inchoatives. A CAUSE can be assumed to be present, and *durch*'s internal argument expresses the causing event in the causing relation.

If one were to follow the above approaches, one would be left in a situation where one would have to do a lot of reinterpretation, in order to get a CAUSE element introduced into semantic composition. But in (6) it is hard to see what could plausibly trigger the reinterpretation, apart from *durch*.

An intuitively more plausible analysis can be achieved if we allow *durch* to introduce the CAUSE element. This CAUSE element would be the driving force of reinterpretation. If a CAUSE relation is present, one would expect a stative predicate to be reinterpreted as being a resultant state (Kratzer 2006). The reinterpretation of the stative predicate would thus follow automatically from the presence of the CAUSE element in *durch*, as in standard counterfactual analyses (Lewis 1973).

Another point in case for the plausibility of including a CAUSE in the semantics of *durch* is the reinterpretational effects *durch* has on its internal argument, which is the semantic correspondent of the preposition's syntactic complement. Normally, the internal argument of *durch* is an event noun. But *durch* can also have non-event-nouns as arguments, in which case these nouns will be reinterpreted as involving events (the relevant *durch*-phrase is printed in boldface):

(8) Wer über das nötige finanzielle Langzeitpolster verfügt, kann durch die Wahl des Wohnortes und die Gestaltung der Wohnung den Risiken auszuweichen versuchen (oder durch Zweitwohnung, Ferien etc.).
'Whoever has the necessary long-term financial cushion at hand can attempt to avoid the risk through the choice of a place of residence or the set-up of the residence itself (or **through a second house**, vacations, etc.).'

In (8), the phrase *durch Zweitwohnung* ('through a second house') is interpreted e.g. as *through the purchase of a second house*, i.e. as an event which involves the entitity *second house*. If *durch* includes a CAUSE, we will have a straightforward explanation of why this reinterpretation takes place, since CAUSE is a relation between two events.

In light of examples such as (6) and the reinterpretational effects of *durch* in general, it seems reasonable to assume a CAUSE predicate to be included in the

semantics of *durch*. The question I will turn to in the next section, is how this quality of *durch* can be retained for all its causal and instrumental uses, i.e. how one can deal in a compositional manner with the fact that *durch* includes a CAUSE predicate which is not always needed or wanted, as with causatives.

## 3 A unificational analysis

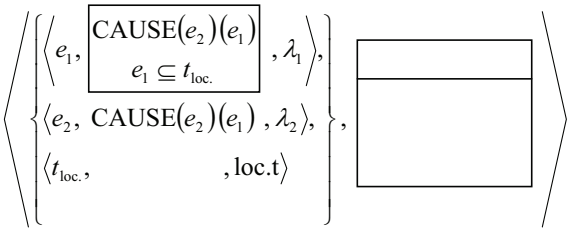
To deal with this challenge, the semantics of *durch* will be analysed by means of unification in Discourse Representation Theory (Bende-Farkas & Kamp 2001), applying principles of the presuppositional analysis of Kamp (2001) and Sæbø's (to appear) analysis of *by*. Building on work by van der Sandt (1992), Kamp assumes that semantic information in a sentence is processed bottom-up via a storage algorithm. Semantic information represented preliminarily in the store part enters a main content part as it is bound, verified or accommodated, for which Kamp uses the general term *justification*. The general representational format of Kamp (2001) for a semantic node in a tree structure is shown in (9):

(9) $\langle \overbrace{\text{Variable, } \boxed{\text{Constraint}} \text{, Binding Condition}}^{\text{STORE}}, \boxed{\text{CONTENT}} \rangle$

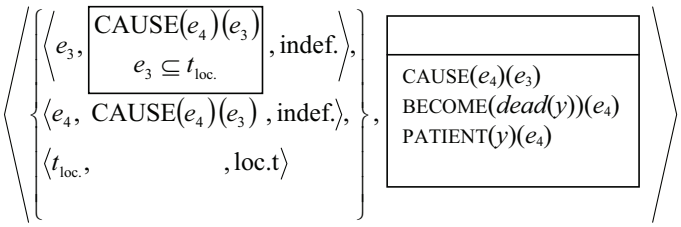
A semantic node representation consists of a pair of a content and a store element. The content is always a Discourse Representation Structure (DRS). The store is a set of one or more elements, each being a triple of a variable, a set consisting of one or more constraints (a DRS) and a binding condition. Binding conditions determine which variables can enter a binding relation, and constraints contain semantic information which restrain the possible bindings further.[2] In addition to the binding mechanism, a principle which unifies variables and constraints when possible, is assumed.

This machinery allows a unified analysis of the above uses of *durch* where the preposition indeed includes a CAUSE of its own. When combined with a causative predicate, the implicit CAUSE of *durch* is not added to the content part since there is a CAUSE present in the predicate. However, the combination of *durch* with an inchoative leads to the projection of the CAUSE element in the content part. The actual formalisation is illustrated briefly below. *Durch* may be represented as in (10):

[2] It might e.g. be the specification of gender features which are crucial for the correct binding of pronouns.

(10) 


*Durch* has no content of its own - its content part is empty -, but it includes two event variables and a temporal variable in the store. The two event variables are further specified as entering a CAUSE relation. The binding conditions $\lambda_1$ and $\lambda_2$ indicate that the variables need to be bound. When the complement of the preposition is added, as in *durch* ***einen Schuss***, the event expressed therein binds $e_1$ and the information in the noun is added as a further constraint on the causing event: SHOT($e_1$) (cf. Chung & Ladusaw 2004, where the term *restriction* is used). When a *durch* phrase is combined with a causative predicate which has a completely parallel store part, the variables of *durch* and their constraints will eventually be unified with or be bound by the variables of the causative predicate. The representation of *töten* is given in (11):[3]

(11) 


The causing event $e_1$ of *durch* will first bind the event in the complement of *durch*, before being unified with the causing event of the predicate ($e_3$), whereas the caused event $e_2$ will bind the caused event of the predicate ($e_4$).[4] Additionally, the constraints of the predicate and the preposition are merged and - where applicable - unified. After binding and unification have occured, the actual contribution of a *durch* phrase, as compared to the information provided by the predicate alone, is restricted to the specification of the causing event given by the constraint SHOT($e_1$). Turning next to the inchoative predicate, its store part includes only one event ($e_5$), which will be bound by the caused event $e_2$ of *durch*:

[3] Under the assumption of a Kratzer (1996) style analysis, no agent is part of the semantics of the predicate itself. The agent is contained in the specifier position of a functional projection termed VOICE, which is situated above the VP, but below any temporal or aspectual projections.

[4] The binding condition *indef* indicates that these variables can, but need not enter a binding relation.

(12) $\left\langle \left\{ \begin{array}{ll} \langle e_5, & \text{, indef.}\rangle, \\ \langle t_{\text{loc.}}, & \text{, loc.t}\rangle \end{array} \right\}, \boxed{\begin{array}{l} \\ \text{BECOME}(\textit{dead}(y))(e_5) \\ \text{PATIENT}(y)(e_5) \end{array}} \right\rangle$

In this case, the variable of the causing event of *durch* will be added to the content, since there is no event for it to be unified with. Furthermore, the CAUSE relation of which the bound event variable of the inchoative predicate will be a part, will also enter the content, along with the aforementioned constraint derived from the internal argument of the preposition.

## 4 Sentence- and word-internal pragmatics

This treatment of *durch* amounts to analysing its implicit CAUSE element as a *sentence-internal* presupposition. A *durch* phrase can be said to *assert* the event included therein and *presuppose* that this event is a cause of some other event. The common basis for generally assumed mechanisms for presuppositional behaviour and the compositional unification-based analysis of *durch* is as follows: When combined with causatives, *durch* seems to lack a meaning of its own. This is due to the unification of the CAUSE of *durch* with the CAUSE of the predicate, which is parallel to presupposition verification. In combination with inchoatives, however, *durch* does seem to make a greater contribution, where a CAUSE predicate is introduced by the causal preposition itself. Here, a parallel to context accommodation can be observed.

Importantly, a pragmatic account of the combinatorial potential of *durch* can capture some further properties of the preposition which have previously been ignored or not correctly identified. Two additional pragmatic mechanisms involved are *bridging* and *acceptability*. In example (6) from section 2, here repeated for convenience as (13), bridging (in the wider sense of Bittner (2001), cf. also Clark (1977)) can be argued to take place. What is seen as bridging here, is the fact that the CAUSE associated with the preposition forces a reinterpretation of the state described in the predicate *hoch* ('high') as being a caused resultant state:[5]

(13) Auch der durch diese Haltung hohe Luftwiderstand kann auf längeren Strecken ganz schön schlauchen.
'The high air resistance due to this posture may put you through the mill over longer distances.'

[5] This is standardly described as *coercion* in the semantic literature on *aktionsart*. Bittner (2001) chooses to describe this as bridging.

In (14)-(15), it can be seen that claims made in the literature that *durch* generally cannot be combined with manner-specific causatives (Härtl 2001) are not correct:

(14) ??Er wurde durch einen Schuss erschossen.
'He was shot dead with a shot.'

(15) Er wurde durch einen Genickschuss erschossen.
'He was shot dead with a shot to his neck.'

The well-formedness of such combinations should not be explained by reference to the semantics of *durch*. A more general account of the distribution in (14) and (15) is achieved by assuming that composition is restrained by a general pragmatic mechanism of acceptability as described by van der Sandt (1992: 367 ff.). The verb *erschießen* is a causative predicate, where the causing event is specified as being a shooting event. Thus, *erschießen* can be said to be a manner-specific causative, as opposed to the manner-neutral *töten*. Modifying a predicate such as *erschießen* ('shoot dead') by an adjunct like *durch einen Schuss* ('with a shot') is uninformative and thus unacceptable. The adjunct contains no information which is not included in the predicate. However, a specification such as *durch einen **Genick**schuss* ('with a shot *to the neck*') renders the adjunct more specific than the shooting event described in the predicate, adding to the content. A *shot to the neck* describes not only a shooting event, but also specifies the direction of the shot. Thus, the distribution of *durch* phrases in combination with manner-specific causatives does not have to be accounted for by reference to the semantics of *durch* itself, but can be seen as fully determined by acceptability restrictions.

The application of pragmatic mechanisms in explaining the compositional behaviour of *durch* has additional benefits as compared to an analysis based on unification alone. This is the case in examples involving indirect causation, where it is plausible to assume that two causes occur:

(16) Der Kommandant ließ die Gefangenen durch eine Sprengung töten.
'The commandant had the prisoners killed by means of an explosion.'

In (16), two causative predicates are used: *lassen* ('let'), which can be compared to the causative uses of *have* in English, and *töten* ('kill'). Two interpretational variants are available for (16). They both have in common that the commander is the agent of some event, which causes someone else to kill the prisoners. In the first variant, which is the most plausible one, it is additionally assumed that the explosion was the event that killed the prisoners. As in the above cases, the

CAUSE-presupposition of the *durch*-phrase would be verified by the CAUSE of *töten*. The other, more marginal interpretational variant of (16), is one where the explosion is not part of the killing event, but rather modifies the causing event of which the commander is the agent, expressed in the *lassen* predicate, i.e. the commandant somehow uses the explosion to make someone else kill the prisoners, in whatever way. In this case, the CAUSE-presupposition of *durch* will be verified by the CAUSE of *lassen*.

A case like (16) would however be potentially troublesome if unification is applied. It is preferrable if unification is allowed to occur whenever it can, limited by general constraints on unification, such as e.g. a demand on non-conflicting features. Thus, in the formalisation described above, as in any other unificational framework, the two CAUSE predicates and the CAUSE of *durch* would be unified unless some (ad hoc) principles are defined to avoid unification.[6] This would run against the actual interpretation of (16).

It has been argued here that the kind of unification which is a plausible basis for the analysis of *durch* can be seen as presupposition justification. This view also allows a restriction of the processes which determine unification in a non-ad hoc way (though still not very clearly defined). Van der Sandt (1992) argues that resolution does not always have to occur. It is certainly the preferred operation over accommodation, but accommodation might under certain conditions occur when resolution is possible. What these conditions are, is not an easy matter to settle, but in the case of (16), it might be argued that there is a simpler expression without *lassen* which is available for direct causation, and that unifying the two CAUSEs of the predicates and resolving the presupposed CAUSE of *durch* with these would imply a lack of belief in the informativity of sentence (16) on the hearer's side.

It should be emphasised that in the above examples, all pragmatic mechanisms assumed to account for the compositional behaviour of *durch* apply purely sentence-internally. What is more, the presupposition resolution which has been argued for here, occurs at a word-internal level, involving a decomposition of the semantics of lexical items by means of the predicates CAUSE and BECOME. Thus, the above approach can be said to truly involve lexical pragmatics (Blutner 2004), where not only the pragmatic aspects of some lexical items are discussed, but lexical composition itself is viewed as being pragmatic in nature.

It might be questioned whether this is really a kind of presupposition. At this point, I have nothing much to say in my defence, this part of the article indeed being work in progress. It is however, not straightforward to establish this relation, since many of the normally applied tests for presuppositions are not

[6] Alternatively, applying *default unification* (Bouma 2006) might be seen as a way of avoiding this problem.

applicable in the case of *durch*.[7] The pragmatic mechanisms which are argued to be relevant here, apply at the word-level, whereas most presuppositional phenomena which have been treated in the literature belong to the sentence-level. They can only be evaluated at the top-most CP-level and often only apply intersententially. But the resolution of the CAUSE-presupposition of *durch* can be argued to rather happen at VP-level, before the topmost eventuality is existentially closed. Thus tests involving e.g. embeddedness do not make much sense in the case of word-internal pragmatics. Connected to this, since the presupposition justification of *durch* applies at a word-internal level, effects involving global, local or intermediate accommodation (Beaver & Zeevat, to appear) are not expected either (but see the two possible modification in example (16) above).

One test which does seem to be more or less straightforwardly applicable, though, is the negation test, which involves a non-entailing context, in which a presupposition should still be true:

(17) Er starb nicht durch einen gezielten Schuss.
'He did not die through an accurate shot.'

Now, it doesn't make sense to consider the truth of CAUSE alone, but it can be observed that the CAUSE of *durch* does seem to survive negation. The most obvious interpretation of (17) is one where the person in question dies, but where the cause of his death is not an accurate shot, i.e. the negation has narrow scope over the *durch*-adjunct. Importantly, (17) is interpreted as claiming that there was a cause for the person's death, but that the reason was not an accurate shot. Thus, the presuppositional part of the *durch*-phrase, consisting of the CAUSE-predicate, can be said to survive negation.

It is possible to get a sentential negation reading of *nicht* in (17), but this is a more unlikely reading. The reason for this could be that it does not make sense to add a causal adjunct like *by a shot* if one wants to express that a person did not die (cf. Solstad, in preparation).

Since presuppositions in general are assumed to be verified also intersententially, it might be an additional argument for analysing the CAUSE part of the semantics of *durch* as being a presupposition if it could also be justified sentence-externally. There is at least one type of occurence where a claim can be made that this is the case:

[7] See Beaver (2001: 18-20) and Geurts (1999: 6-10) for some general comments on the problem of testing for presuppositions and delimiting them from other semantic or pragmatic phenomena.

(18) Sie hat Geld verloren. Es geschah durch Unaufmerksamkeit.
'Sie lost some money. It happened due to lack of attention.'

In the second sentence in (18) containing the *durch* phrase, the abstract event predicate *geschehen* ('happen') is used, which asserts that some event took place. What *durch* modifies semantically however, is the predicate *verlieren* ('lose') in the first sentence. Thus, in the case of (18), part of the presuppositional information in the store of *durch* is bound by an event variable in the preceding sentence.[8]

## 5 A wider perspective

An approach like the one sketched above has applications beyond the analysis of *durch*. First, unification as a mode of composition has been applied in an analysis of the semantics of *by* in English (Sæbø, to appear) using a somewhat different version of the DRT formalism sketched in section 3. Second, there are causal prepositions in other languages which show a behaviour similar to *durch*. In English, *through* can also be combined with both causative and inchoative predicates. More interestingly, given the close relationship between English *through* and German *durch*, a language more remotely related to German such as Bulgarian also has a preposition, *ot* ('from'), which combines with causatives and inchoatives:

(19) a. Toj be ubit ot tri kurshuma.
He was killed from three bullets
'He was killed with three shots.'
b. Toj zagina ot tri kurshuma.
He died from three bullets
'He died from three shots.'

Third, there are other types of adverbial modification, where the above analysis can be applied plausibly, as illustrated in (20):[9]

[8] It may be added that it is possible to see the presupposition of *durch* as purely sentence-internally verified if it is assumed that *geschehen* ('happen') and the event anaphor *es* ('it') are identified with information in the preceding sentence, such that it is available for word-internal modification in the second sentence. This conflicts, however, with the general assumption that event variables are bound before the level of CP is reached, i.e. before any preceding context is considered.

[9] Thanks are due to Christopher Habel for pointing my attention to this example.

(20) a. Kjell Johan ging in das Haus hinein.[10]
DIR+IN DIR+IN
'Kjell Johan went into the house.'
b. Kjell Johan ging in das Haus.
'Kjell went into the house.'
c. Kjell Johan ging hinein.
'Kayjay went inside.'

In (20a) the adverbials *in das Haus* ('into the house') and *hinein* ('inside', in addition to viewpoint information) specify a single path of movement. They are not interpreted as describing two paths which are combined. There is a double specification of an *in* movement (i.e. *into* as opposed to *out of*), once in the preposition *in* and once in the *hinein* element. In addition, directionality is specified twice, both in the combination of the preposition with accusative case, and in the *hinein* element. As can be seen from (20b-c), either of the adverbials in (20a) can occur without the other.

In the framework presented here, the *hinein* element would be assumed to carry the presupposition that there is an object into which movement takes place. In (20a) this presupposition is sentence-internally verified, whereas it will have to be verified in a wider context or accommodated in (20c). The information on directionality and inwards movement of the two adverbials is unified whenever they both occur, as in (20a).

In sum, these data suggest that the presuppositional analyses of Kamp (2001) and van der Sandt (1992) in combination with unification-based composition can be suitably applied in analysing lexical items other than e.g. particles and factive verbs.

## 6 Conclusion

In this paper, it was argued that an analysis applying strict compositionality is not always a viable option. The varying compositional impact of German adverbials headed by the causal-instrumental preposition *durch* was argued to be better rendered in a unificational framework. It was further argued that pragmatic mechanisms are important in describing the combinatorial distribution of some lexical items, and that what seems to be unification may be argued to be rather word-internal presupposition justification.

[10] Until now, I've honoured Kjell Johan by keeping his name out of the violent examples.

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**References**

Beaver, D. (2001): *Presupposition and Assertion in Dynamic Semantics*, Stanford: CFSL Publications.

Beaver, D. and H. Zeevat (to appear): 'Accommodation', in G. Ramchand & C. Reiss (eds.): *Oxford Handbook of Linguistic Interfaces*, Oxford: Oxford University Press.

Bende-Farkas, A. and H. Kamp (2001): *Indefinites and Binding: From Specificity to Incorporation*. Revised version of the lecture notes from a course given at the 13th ESSLLI in Helsinki, Finland. http://www.helsinki.fi/esslli/courses/readers/K29.pdf

Bittner, M. (2001): 'Surface Composition as Bridging', *Journal of Semantics* **18**(2), pp. 127-177.

Blutner, R. (2004): 'Lexical Pragmatics', in L. R. Horn & G. Ward (eds.): *The Handbook of Pragmatics*, pp. 488-514, Oxford: Blackwell.

Bouma, G. (2006): 'Unification: Classical and Default', in K. Brown (ed.): *Encyclopedia of language & linguistics*, Amsterdam: Elsevier. http://www.let.rug.nl/gosse/papers/encyclopedia_unification.pdf

Chung, S. and W. A. Ladusaw (2004): *Restriction and Saturation*. Cambridge, Massachusets: MIT Press.

Clark, H. (1977): 'Bridging', in P. N. Johnson-Laird & P. C. Wason (eds.): *Thinking*: *Readings in Cognitive Science*, Cambridge: Cambridge University Press.

Geurts, B. (1999): *Presuppositions and Pronouns*, Amsterdam: Elsevier.

Härtl, H. (2001): *CAUSE und CHANGE: thematische Relationen und Ereignisstrukturen in Konzeptualisierung und Grammatikalisierung*, Berlin: Akademie-Verlag.

——— (2003): 'Conceptual and Grammatical Characteristics of Argument Alternations: the Case of Decausative Verbs', *Linguistics* **41**(5), pp. 883-916.

Kamp, H. (2001): 'The Importance of Presupposition', in C. Rohrer, A. Roßdeutscher and H. Kamp (eds.): *Linguistic Form and its Computation*, pp. 207-254, Stanford: CSLI Publications.

Kratzer, A. (1996): 'Severing the External Argument from its Verb', in J. Rooryck & L. Zaring (eds.): *Phrase Structure and the Lexicon*, pp. 109-137, Dordrecht: Kluwer Academic Publishers.

——— (2006): 'Building Resultatives', in C. Maienborn. & A. Wöllstein (eds.): *Event Arguments: Foundations and Applications*, Tübingen: Niemeyer.

van der Sandt, R. A.: (1992): 'Presupposition Projection as Anaphora Resolution', *Journal of Semantics* **9**(4), pp. 333-377.

Solstad, T. (in preparation): *Lexikalische Pragmatik: die Spezifikation und Modifikation kausaler Relationen am Beispiel von 'durch' ['Lexical pragmatics: specification and modification of causal relations']*. Ph.D. Thesis, University of Oslo.

Sæbø, K. J. (to appear): 'The Structure of Criterion Predicates', in J. Dölling & T. Heyde-Zybatow (eds.): *Event Structures in Linguistic Form and Intepretation*, Berlin: Mouton de Gruyter.

Wunderlich, D. (1997): 'Cause and the Structure of Verbs', *Linguistic Inquiry* **28**(1), pp. 27-68.

# ANANKASTIC CONDITIONALS AGAIN

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## 1 Plot[1]

The object of our investigation is expressing necessary conditions in natural language, particularly in a certain kind of conditional sentences, the so-called Anankastic Conditionals (ACs)[2], a topic brought into the linguistic discussion by the seminal papers Sæbø (1986) and Sæbø (2001). A typical AC is the following sentence, Sæbø's standard example:

(1) If you want to go to Harlem, you have to take the A train.

Sæbø analyses the sentence by means of the modal theory in Kratzer (1981), according to which a modal has two contextual parameters, a modal base *f(w)* and an ordering source *g(w)*. The modal base contains relevant facts and the ordering source contains an ideal like wishes, moral laws and the like. Normally, the antecedent of a necessity-conditional is added to the modal base. Sæbø's new proposal for the analysis of the AC is that the antecedent without the information 'you want', called *inner antecedent*, is added to the ordering source.

Sæbø's analysis had remained almost unnoticed in the literature for more than a decade. But recently, quite a number of semanticists have discussed his theory. Every alternative account contains one or other material modification of Sæbø's theory.

Our proposal will be this. The inner antecedent is not added to the ordering source. It rather is the antecedent of a Lewisonian necessity-conditional. Equivalently, it can be added to a circumstantial modal base that contains all the facts compatible with the antecedent. Furthermore, the construction is analyzed as a conditional speech act: the sentence expresses an assertion in a context in which you want to go to Harlem.

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[1] This paper was originally written as a reaction to Sæbø (2001). In the meantime, it has undergone various changes. We wish to thank Orin Percus, Sigrid Beck and Wolfgang Klein for inspiring discussion of the topic. It is obvious that we owe crucial insights to the authors quoted in this study; a warm thanks to them.

[2] The term is due to von Wright (1963).

The structure of the paper is as follows. In section 2 we will have a closer look at the data, section 3 will be a review of the literature on ACs and in section 4 we will present a counterfactual account.

## 2 What is an anankastic conditional?

In this section we say what ACs are and that it is easy to confuse them with causative purpose constructions, which have a different meaning. The relevant observations are due to (Bech, 1955/57: 102 ff.), and it is Sæbø's merit to have rescued them from oblivion. In fact, Sæbø's example (1) is a transposition of the following sentence by Bech:

(2) Wenn Müller mit Schmidt verhandeln will/soll, muss er nach Hamburg fahren.
'If Müller wants/is to negotiate with Schmidt he has to go to Hamburg'

Here is a list of different variants of the AC in (1).

(3) a. You have to take the A train if you want to go to Harlem.
b. If you don't take the A train you can't go to Harlem.
c. To go to Harlem you have to take the A train.

Sæbø assumes that these sentences are truth conditionally equivalent and express the idea that taking the A train is a necessary condition for getting to Harlem. This is the most natural interpretation though not the only one. Sentences like (3a) are not restricted to the anankastic interpretation. Compare the following pair from (Hare, 1971):

(4) a. If you want sugar in your soup, you should ask the waiter.
b. If you want sugar in your soup, you should get tested for diabetes.

Whereas (4a) shows all the symptoms of being an AC, (4b) would sound weird on this reading. Rather, it is a normal *must*-conditional saying that in view of the medical facts, in any situation in which you want sugar in your soup and respect the speaker's advice, you get tested for diabetes.

An important observation due to Bech and highlighted by Sæbø is the fact that *um/to*-clauses are ambiguous when they occur together with a modal: they either restrict the modal and thereby produce an AC, or they simply express a goal. Bech calls the first use of *um/to* DETERMINATIVE, the second INDETERMINATIVE. When the *um/to*-clause restricts the modal, it provides the

range of worlds over which the quantifier expressed by *must/muss* quantifies. Thus, (2), which we repeat below in (5a), is a paraphrase of (5b) on its anankastic reading:

(5) a. Wenn Müller mit Schmidt verhandeln will/soll, muss er nach Hamburg fahren.
'If Müller wants/is to negotiate with Schmidt he has to go to Hamburg'
b. Müller muss nach Hamburg fahren, um mit Schmidt zu verhandeln.
'Müller has to go to Hamburg to negotiate with Schmidt'

Indeed, the sentences in (5) seem to express the same meaning, namely, that the complement of *must* is a necessary condition for the truth of the proposition 'Müller negotiates with Schmidt'.

Under the INDETERMINATIVE interpretation, the *to/um*-clause expresses a goal. (5b) then means something like: 'Müller has to go to Hamburg because he wants/is obliged to negotiate with Schmidt'. The purpose interpretation has nothing to do with the overt modal *muss/must*. Indeed, we can omit the modal and still obtain a purpose reading:

(6) Müller is going to Hamburg to negotiate with Schmidt.

This can be paraphrased as: 'Müller goes to Hamburg with the aim of negotiating with Schmidt'. Here the *to*-clause expresses a *causa finalis*. If we adopt Lewis's (1973a) analysis of causation, we can paraphrase (6) roughly as:[3]

(7) 'Müller is going to Hamburg, and he wants to negotiate with Schmidt, and if he didn't want to negotiate with Schmidt, he would not be going to Hamburg'

In sentences without modals, only the causative reading exists, but sentences with overt modals + *um/to*-clauses are ambiguous, and the anankastic reading is easily overlooked.

ACs have a 'contraposed' paraphrase:

(8) Wenn Müller nicht nach Hamburg fährt, kann er nicht mit Schmidt verhandeln.
'If Müller doesn't go to Hamburg he can't negotiate with Schmidt'

[3] This is not quite correct. The paraphrase gives us what Lewis calls causal dependence. Causation should be analysed as a chain of causal dependencies.

(9) Müller kann nicht mit Schmidt verhandeln, ohne nach Hamburg zu fahren.
'Müller can't negotiate with Schmidt without going to Hamburg'

According to Sæbø, (8) and (9) are equivalent to (5). We think that this is not entirely correct; rather they are entailed by it. The semantics for anankastic *must/have to* should account for this meaning relation.

A note on the terminology is in order. Following common practice, we conceive of the *if*-clause of a conditional as the restriction of an overt or covert modal. The *if*-clause is called the antecedent of the conditional and the proposition or property embedded under the modal is called the consequent of the conditional. In (8), the antecedent is "if Müller doesn't go to Hamburg", and the consequent is the infinitival "he negotiate with Schmidt". The modal *can* expresses the logical relation between the two. In the example given, the entire construction is negated in addition. The negation is not part of the consequent. We extend the terminology to modals that are modified by *um/to*-clauses. For instance, (5)b is a conditional with the antecedent "to negotiate with Schmidt" and the consequent 'Müller to go to Hamburg'. The two are mediated by the anankastic modal *must*.

To summarize, an AC consists of a modal *must/have to*, which is either restricted by an *if*-clause containing an expression of intention or obligation or by a *to*-clause. This restriction is the antecedent of the conditional. The restriction expresses a goal of the subject. The entire construction expresses the idea that the consequent has to be true if the goal is to be true. The construction has a *can*-variant. Then it means that the goal can be achieved by making the consequent true. The construction must not be confused with normal purpose constructions that have a different meaning.

## 3 Different analyses of anankastic conditionals

In this section we give an overview of some approaches to the analysis of ACs. Since Sæbø (1986) the goal has been to develop an adequate analysis for this kind of conditionals within the theoretical framework of (Kratzer, 1981). Von Fintel and Iatridou (2005)[4] and von Stechow et al. (2004) refuted Sæbø's analysis by independently showing that it fails in face of inconsistent goals. Their solutions are criticized in Huitink (2005), who discusses certain scenarios with consistent goals and considers them problematic for the former two accounts. By doing this Huitink brings up an important property of ACs – a restricted notion of a necessary condition. Let us look at these analyses more closely and see what lessons we can draw from them.

[4] This is the latest version of the paper. Earlier versions go back at least to 2004.

### 3.1 Sæbø's analysis

Sæbø was the first to identify ACs as problematic data for Kratzer (1981). According to Kratzer, the two contextual parameters for the interpretation of modals are a realistic modal base *f* and an ordering source *g*. For a given world *w*, *f(w)* and *g(w)* are defined as sets of propositions. *f(w)* is a set of facts in *w*, i.e. $w \in \cap f(w)$, hence *f(w)* is a circumstantial modal base, and $\cap f(w)$ are the accessible worlds. *g(w)* contains goals, wishes, regulations that are used to order accessible worlds:

(10) Ordering relations:
Let *g* be an ordering source and let *u,v,w* be worlds
$v <_{g(w)} u$ iff $\{p \in g(w) : p(u)\} \subset \{p \in g(w) : p(v)\}$, where $\subset$ is proper inclusion.

The *if*-clause of indicative conditionals restricts the modal base, i.e. the proposition it expresses is added to *f(w)*.

If we apply this semantics to the AC in (11), it is predicted true in *w* with respect to *f* and *g* iff the condition in (12) holds:

(11) If you want to go to Harlem you have to take the A train.

(12) $(\forall w' \in \cap f(w))$ you want to go to Harlem in w' & $(\neg\exists w'' \in \cap f(w))$ you go to Harlem in w''& $w'' <_{g(w)} w') \rightarrow$ you take the A train in w'
where *f(w)* contains relevant facts, e.g. train schedules, and *g(w)* is a set of your goals/wishes in *w*.

According to (12), the sentence is true iff in all accessible worlds in which you want to go to Harlem and in which as many of your goals are achieved as possible, you take the A train. This fails to capture the intuitive meaning of (11) as Sæbø correctly observes. This is so for the following reason. The relevant fact is that you get to Harlem only if you take the A train and not that you want to go to Harlem only if you take the A train.

To make Kratzer's analysis work for ACs, Sæbø suggests that it is the ordering source that grows as a result of processing the *if*-clause, not the modal base. *Want* in the *if*-clause indicates that the internal antecedent, i.e. the complement of *want*, is added to *g(w)* but not to *f(w)* as it would be in ordinary conditionals.

Sæbø's revised semantics for conditionals consists of two clauses - the first one applies to normal conditionals, the second takes care of the ACs:

(13) (Sæbø, 2001: 442):
$[\![ \textit{(if } \alpha\textit{)(must)} ]\!]^{f,g} = [\![ \text{must} ]\!]^{f+,g+}$ where if $\alpha$ expresses φ then for any w,
(i) $f+(w) = f(w) \cup \cap_{v \in \varphi} F(v)$ and $g+(w) = g(w)$
where F is the general modal base ('the facts', 'what is the case'), **or**
(ii) $f+(w) = f(w)$ and $g+(w) = g(w) \cup \cap_{v \in \varphi} G_\alpha(v)$
where $G_\alpha$ is the ordering source expressed in α (e.g., 'what you want')

The idea behind the qualification (i) is that $\cap_{v \in \varphi} F(v)$ is $\{\varphi\}$, i.e. the singleton containing the external antecedent, and this set is added to the modal base *f(w)* for non-ACs.[5] The qualification (ii) for ACs is best understood by considering the standard example (1). $G_\alpha$ is the information "you want", i.e. $G_\alpha(v) = \{p \mid$ *you want p in v*$\}$. If the content of the wanting is closed under entailment, $\cap_{v \in \varphi} G_\alpha(v)$ is the set $\{p \mid$ *that you go to Harlem* $\subseteq p\}$. This set of propositions is to be added to the ordering source *g(w)*.[6] Recall Kratzers definition of *must*:

(14) $w \in [\![ \text{must} ]\!]^{f,g}(p)$ iff $(\forall j \in \cap f(w))(\exists k \in \cap f(w))(\forall l \in \cap f(w))(l \leq_{g(w)} k \rightarrow l \in p)$[7]

We see two problems with Sæbø's analysis. Firstly the formulation conceals the fact that the interpretation for the anankastic case is not compositional. The problematic feature is the parameter $G_\alpha$. For the example given, $G_\alpha$ is the information 'you want'. There is no systematic procedure to obtain this from the sentence 'you want to go to Harlem'. Since we need a syntactic procedure anyway, a more honest way of formulating the rule is the following:

[5] We understand that $F(v) = \{p \mid v \in p\}$, i.e. the set of all facts in v. Therefore, $\cap_{v \in \varphi} F(v) = \{\varphi\} = \{p \mid (\forall v \in \varphi)\ p \in F(v)\}$, i.e. φ is the proposition that is a fact in every φ-world.

[6] Suppose φ = that you want to go to Harlem and ψ = that you go to Harlem. Then $\cap_{v \in \varphi} G_\alpha(v) = \{p \mid (\forall v)$ If you want to go to Harlem in v, then you want p in v$\}$. In every φ-world, ψ is the case. Hence ψ, the internal antecedent, belongs to this set. By closure under entailment, the consequences of ψ are in the set, too.

[7] We gave a somewhat simplified version of Kratzer, which makes it equivalent with Lewis' semantics, i.e. with the formulation

$$i \in A \,\square\!\!\rightarrow C \text{ iff } (\forall j)\ j \notin A \vee (\exists k \in A)(\forall l \leq_i k)\ l \in [A \rightarrow C],$$

where "$\rightarrow$" stands for material implication.

(15) Sæbø restated:
Consider a complex modal of the form [if α must].
Suppose α splits into β + γ, where β expresses an ordering source, i.e. something like "You want", "Kjell wishes", etc. Then
(i) $[\![ \text{if } \alpha \text{ must} ]\!]^{f,g} = [\![ \text{must} ]\!]^{f,g+}$ with $g+(w) = g(w) \cup \{ [\![ \gamma ]\!]^{f,g} \}$ for any w.
Otherwise,
(ii) $[\![ \text{if } \alpha \text{ must} ]\!]^{f,g} = [\![ \text{must} ]\!]^{f+,g}$ with $f+(w) = f(w) \cup \{[\![ \alpha ]\!]^{f,g}\}$, for any w.

The first case is the anankastic one. Clearly, the syntactic expression of the ordering source must somehow be detected syntactically, and there is no procedure for doing this. Note that the only effect of (i) is that the internal antecedent γ is added to the ordering source. The second part of the definition is more or less identical to the definition of Kratzer (1981).

The second problem, in our opinion, is that Sæbø underestimates the complexity of the ordering source and the role of the internal antecedent as a hypothetical fact. To show why, it is enough to construct a scenario where the goal expressed in the antecedent is in conflict with the real goals of the subject. In this case, the conditional comes out false under Sæbø's analysis, which should not be the case.

One such scenario for sentence (11) is discussed in von Fintel and Iatridou (2005, henceforth vF&I) under the title 'The Hoboken Problem':

(16) The Hoboken scenario
a. You want to go to Hoboken.
b. Harlem and Hoboken are conflicting goals, e.g. for time reasons you can't visit both places on one day.
c. The PATH train goes to Hoboken.
d. The A train goes to Harlem.

vF&I show that if (11) is uttered in a situation like (16) Sæbø's analysis fails. According to this analysis, the sentence is true iff in all the best worlds you take the A train. The best worlds are the Harlem worlds and the Hoboken worlds. But it does not follow from the relevant facts that you take the A train if you go to Hoboken. So you don't take the A train in all the best worlds. There are some worlds in which you take the PATH train, viz. the Hoboken worlds. Therefore the conditional is false, which is a wrong prediction. Von Stechow et al. (2004) brought up the same point independently by discussing the following sentence from Kratzer (1981: 315):

(17) If you want to become the mayor, you must go to the pub regularly.

(18) The mayor scenario
  a. You want to become mayor.
  b. You don't want to go to the pub regularly.
  c. You will become the mayor only if you go to the pub regularly.

If we follow Sæbø and add the proposition 'you become the mayor' to *g(w)* without any restriction of *f(w)*, we get the same problem again. The sentence is incorrectly predicted to be false, because there are *g(w)*-best worlds in which the consequent does not hold. To see this, call the wish expressed by (18a) *m* and that expressed by (18b) $\neg p$. Suppose these are the only wishes of the subject. Therefore $g(w) = \{m, \neg p\}$. Call the fact (18c) $m \leftrightarrow p$. We first notice that the set $\{m, \neg p, m \leftrightarrow p\}$ is inconsistent. It entails *p* and $\neg p$. Therefore this set cannot be satisfied by any world. It follows that any optimal world satisfies the set $\{m, m \leftrightarrow p\}$ or $\{\neg p, m \leftrightarrow p\}$. But in a world of the second kind the consequent *p* is false, i.e. you don't go to the pub regularly.

### 3.2 von Stechow's analysis

In his 2003 lecture notes (von Stechow 2004), von Stechow proposes that the *want* in the antecedent is empty at LF. The antecedent is added to the circumstantial modal base. So it plays the role of a hypothetical fact. Since ACs have the form of indicative conditionals, the antecedent has to be consistent with the modal base. The analysis can cope with both the Hoboken problem and the mayor problem. As Sæbø's analysis, it is not compositional, because the contribution of *want* in the antecedent remains unclear.

### 3.3 von Fintel and Iatridou's analysis

vF&I are guided by the intuition that the antecedent of an anankastic conditional contributes a 'designated goal' to the semantics. Crucially, there should be a mechanism that makes the proposition expressed by the complement of *want* or by the *to*-clause 'override' any other goals in the ordering source. Following this idea they suggest that teleological modals are restricted by the designated goal argument. Their proposal is this:

(19) von Fintel and Iatridou (2005: 15):
  a. *to p, ought to q* is true in w relative to modal base *f(w)* and ordering source *g(w)* iff all the *g(w)*-best worlds in *f(w)* where *p* is achieved are *q*-worlds.
  b. *to p, must q* is true relative to modal base *f(w)* iff all the worlds in *f(w)* where *p* is achieved are *q*-worlds.

The goal expressed by the *if*-clause of ACs contributes the designated goal by filling the relevant argument slot, since it is contextually salient.

If we consider the Harlem sentence, the designated goals analysis correctly predicts that in all circumstantially accessible worlds, in which your goal of going to Harlem is achieved, you take the A train.

This analysis is successful in solving the problem with inconsistencies in the ordering source. In fact, the ordering source doesn't play any role for the analysis. However, the claim that the analysis is compositional is not justified. It works no better in this respect than von Stechow's analysis. *Want* does not contribute to the meaning of the sentence. At the end of their paper, von Fintel and Iatridou speculate on how the external antecedent could be integrated into the truth conditions. One possibility considered is the introduction of a second silent epistemic modal, something like: [If you want to go to Harlem MUST [to go to Harlem, must you to take the A train]]. Or the *if*-clause expresses an additional modification of the circumstantial modal base. None of these proposals solves the compositionality problem, because *want* is ignored for the essential part of the truth conditions, viz. (19).

We cannot see any difference between (19)a and von Stechow's analysis, except for wording. The designated goal is treated precisely as if it were the antecedent of a conditional with circumstantial modal base and teleological ordering source, i.e., it plays the role of a hypothetical fact.

One of the advantages of vF&I's proposal is that it distinguishes between *must*-conditionals and weaker *ought*-conditionals. The difference is that the latter are evaluated with respect to the teleological ordering source, whereas for the former the ordering source can be empty. There is one particular feature in the analysis that strikes us as being correct: the authors assume that the main clause of the anankastic conditional is elliptic: the restriction for the modal is determined by the context and perhaps the *if*-clause itself. We will stick to that idea in the following.

### 3.4 Huitink's analysis

Huitink (2005) is another attempt to solve the puzzle of ACs. Huitink argues that if there are several non-conflicting goals at stake and several ways to achieve the goal in the antecedent, the anankastic reading cannot obtain. So ACs should be false in such cases. However, they are predicted true under vF&I's and von Stechow's analyses. The scenario that should make the argument clear is the following:

(20) The Ruud van Nistelrooy scenario
  a. To go to Harlem, you can take the A train or the B train.
  b. You want to go to Harlem.
  c. You want to kiss Ruud van Nistelrooy (Dutch soccer star).
  d. Ruud van Nistelrooy is on the A train.

The designated goal analysis would predict that the Harlem sentence is true at least in its *ought*-version:

(21) If you want to go to Harlem you ought to take the A train.

What we get is that in the best Harlem worlds, i.e. the worlds in which you kiss Ruud van Nistelrooy, you take the A train. So the sentence is true but it shouldn't be, because taking the A train is not a necessary condition for getting to Harlem in the described scenario.

Huitink follows Sæbø in assuming that the internal antecedent of the conditional is added to the ordering source. In view of potential inconsistencies, she has to make a crucial modification. She assumes that the antecedent alone constitutes the ordering source. This draws on the idea that the ordering source, in contrast to the modal base, must be explicitly stated.

There are two possible problems with Huitink's analysis. The first is that the internal antecedent has to be consistent with the modal base. Otherwise true ACs would be predicted false. The compatibility requirement does not follow from the architecture of Kratzer's semantics for modality. The ordering source typically contains propositions that are not compatible with the modal base. The second problem is how to answer the question about which relevant facts are in the ordering source. If this question is not answered, the theory is virtually empirically empty.

*Problem 1.* The internal antecedent has to be compatible with the ordering source.

Assume a situation $w$ in which the proposition $\neg p$ = 'the water in the pot doesn't boil' is true. Suppose the modal base includes this fact. Huitink (incorrectly) predicts the following AC to be false in $w$:

(22) If the water in the pot is to boil, its temperature ought to be 100° Celsius.

The worlds quantified over by the modal are all $\neg p$-worlds. The goal $p$ cannot be added because it is inconsistent with the modal base. Therefore the truth conditions of the AC is the following statement, which is false:

(23) In every world where the water in the pot doesn't boil, its temperature is 100° Celsius.

It has to be explained why it is not possible for a goal to be in conflict with this very salient fact and the modal base in general.

*Problem 2.* Which are the relevant facts in the modal base?
Consider (21) again. There are many ways to go to Harlem. You can take the A train, you can take a taxi, you can ask someone to give you a ride, you can walk all the way through Manhattan, you can even pretend to be an emergency and call for the ambulance. In other words, the facts are that you will reach Harlem, by taking the A train, by walking through Manhattan and so on. If all of these where equally relevant for the evaluation of the truth of (21), the AC would be predicted false under Huitink's analysis. So how do we know that of all these facts the only thing that matters is that you will reach Harlem if you take the A train? We think the answer is that taking the A train is the easiest way to get to Harlem. The other ways mentioned are more remote possibilities. So we really need a theory that chooses the least remote possibility among several possibilities. We think that Lewis's theory of counterfactuals does precisely this.

Huitink's conclusions are important in one more respect. She insists on the purely anankastic reading which is not available in scenarios like (20). But anankastic sentences are not always false in such scenarios. Quite often we actually have to deal with pseudo-anankastic readings in the sense that we restrict the domain in which necessary conditions hold. We will discuss this point in section 4.5.

## 4 A "Counterfactual" analysis

### 4.1 Anankastic conditionals as Lewis-counterfactuals

The idea behind our proposal is simple. Let us assume that we are dealing with a different source of ordering in the case of ACs. We rank worlds on the basis of comparative similarity to the actual world, in the sense of (Lewis, 1973b). As with counterfactuals, we restrict accessible worlds to those that are closest to the actual world, i.e. make as many of its facts true as possible. To keep pace with the preceding discussion, we remain in Kratzer's framework, where a counterfactual is formalized as a modality with an empty modal base and a totally realistic ordering source. $f$ is an empty modal base if $f(w)$ is the singleton containing the necessary proposition $W$ for any world $w$, and $g$ is totally realistic if $\cap g(w) = \{w\}$ for any $w$. Formally, the truth conditions look exactly as the semantics that vF&I state for *ought to* in (19), which is repeated for convenience:

(24) Anankastic necessity:
*to p, ought to/have to q* is true in *w* with respect to modal base *f(w)* and ordering source *g(w)* iff all the *g(w)*-best worlds in *f(w)* where *p* is true are *q*-worlds (iff all the *g(w)*-best worlds where *p* is true are *q*-worlds)

The *g(w)*-best *p*-worlds are the *p*-worlds that are as similar to *w* as they can be. This semantics is a reformulation of Lewis' (1973b) semantics for the counterfactual operator $\Box\!\!\rightarrow$ in Kratzer's terms.[8] The definition neglects the qualification for vacuous truth and assumes Stalnaker's limit assumption. The truth conditions for the AC (3c) then read as follows:

(25) 'To go to Harlem you have to take the A train' is true in *w* with respect to *g* iff
you take the A-train in every *g(w)*-best world where you go to Harlem.

Note that the problem discussed in Huitink (2005) does not arise under this account. Recall the scenario in (20). If there are two trains going to Harlem, whatever your preferences are, the sentence is false in this situation. We are considering the next Harlem worlds. Not in all such worlds you take the A train, in some of them you take the B train. However, the following sentence comes out true in the given scenario, which is a correct prediction:

(26) If you want to go to Harlem and kiss Ruud van Nistelroy, you have to take the A train.

This analysis strikes us as attractive. We don't need to invent a new semantics for ACs – we treat them as instances of counterfactuals.

### 4.2 Ellipsis resolution: the implicit restriction of the anankastic modal

As vF&I have observed, anankastic *want*-conditionals are elliptic. An explicit statement of the Harlem example was given above and is repeated here:

(27) If you want to go to Harlem, you have to take the A train *to do that*.
= If you want to go to Harlem, you have to take the A train to go to Harlem.

[8] For a comparison between Kratzer's and Lewis' semantics for counterfactuals, see (Lewis, 1981).

The truth conditions we have given in section 4.1 were intended for the main clause that doesn't contain *want*. One function of the *if*-clause is that it delivers the antecedent for the ellipsis. The LF of the sentence is something like this:

(28) If you want to go to Harlem [you have [to go to Harlem] to take the A train]

We claim that it is the *to*-clause that functions as the restriction of *have to*, not the *if*-clause. The complex main clause alone expresses the following AC, and that is all we need:

(29) In all the worlds where the goal that you go to Harlem is achieved and which make as many of the facts true as possible, you take the A train.

It seems to us that this is precisely what vF&I and Huitink have in mind. But we have said more than they have, namely what the relevant facts in the modal base are. The relevant facts are those that are "cotenable with the antecedent".[9]

As for the role of the *if*-clause, we do not think that it is a part of the AC proper. We assume that the *if*-clause in ACs figures as the antecedent of what has been called a conditional speech act in the literature. However, neither of the two kinds of such conditionals studied in the literature - RELEVANCE or FACTUAL conditionals[10] - seem to form a natural class under which ACs could fall according to the standard tests known from the literature.[11] Therefore, we have to leave the precise status of the construction open.

We suggest that the function of the *if*-clause is to reaffirm that the context is appropriate for the following elliptic anankastic statement. It has to follow from the context that the antecedent is somebody's goal or wish for an AC to be felicitous. For our purposes the following crude rule of use is sufficient.

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[9] For the notion of cotenabilty, see (Lewis, 1973b: §2.6). $\chi$ is cotenable with premise $\phi$ in world w if either (1) $\chi$ = W or (2) $\chi$ holds throughout some $\phi$-permitting sphere around w. A counterfactual $\phi \mathrel{\Box\!\!\rightarrow} \psi$ is true in world i iff there is an auxiliary premise $\chi$ cotenable with $\phi$ in world i such that $\phi$ and $\chi$ together logically imply $\psi$. $\chi$ may be regarded as the circumstantial modal base that is needed for the modal analysis of Huitink to work. Each counterfactual can be reformulated as a strict conditional along these lines, but we have a price to pay: the cotenable premise depends on the antecedent of the conditional. Different conditionals require a different cotenable premise. For the same reason the circumstantial modal base cannot be provided by the context alone: it depends on the antecedent. If we assume that the modal base f(w) is just the smallest $\phi$-permitting sphere, we are back to the counterfactual analysis.

[10] The terms *factual/relevance* conditionals are taken from Bhatt and Pancheva (2004). Presumably, the terms go back to Iatridou (1991).

[11] See Bhatt and Pancheva (2004: 37 ff.)

(30) The appropriateness condition
Let c be a context of use. Then $[\![ \text{if } \alpha\ \beta ]\!]^c$ is only defined if $c \subseteq [\![ \alpha ]\!]$
If defined, $[\![ \text{if } \alpha\ \beta ]\!]^c = [\![ \beta ]\!]$.

This trivial pragmatics makes it possible to account for the role of 'you want' in the construction. Consider example (1). $\alpha$ corresponds to the clause 'if you want to go to Harlem'. So the entire sentence can be used only in contexts where you want to go to Harlem. It follows that the "inner antecedent" expresses a goal of the subject of *want*. This explains the oddness of the following sentence:

(31) #If you don't want to go to Harlem, you have to take the A train to go to Harlem.

The *if*-antecedent tells us that the context of use implies the proposition that the addressee doesn't want to go to Harlem. It would be impolite or pointless to utter the consequent, which contradicts the intention of the addressee.

Returning to the first role of the *if*-clause, i.e. providing the antecedent for the ellipsis, it is instructive to note that there are other types of clauses that have this function. Consider the following example with a free relative clause containing *want*:

(32) Wer schön sein will, muss leiden.
'Whoever wants to be beautiful has to suffer'

This sentence is clearly anankastic. Our analysis for anankastic conditionals immediately extends to it. We suggest that (32) contains an elided *to*-clause, and after ellipsis resolution corresponds to:

(33) Wer schön sein will, muss leiden, um schön zu sein.
'Whoever wants to be beautiful has to suffer to be beautiful'

### 4.3 Comparing anankastic conditionals and *would*-conditionals

On hearing the term 'counterfactual analysis' one could think that every AC is expressible as a *would*-conditional. This, however, is not so, and this fact might serve as an objection against our proposal. Recall, however, that the Stalnaker/Lewis counterfactual semantics covers both subjunctive and indicative conditionals, though these seem to have quite different meanings. The difference in meaning is explained by the difference in the felicity conditions: the antecedent of an indicative conditional must be compatible with the common

ground.[12] Counterfactuals "carry some sort of presupposition that the antecedent is false" (Lewis, 1973b: 3), i.e., the antecedent of a subjunctive conditional must be incompatible with the common ground. The ACs considered so far are indicative conditionals and are therefore used in contexts different from those of *would*-counterfactuals. A further distinction is that the restriction of *have to* is an infinitival. Infinitivals under modals are future oriented if they express a non-stative Aktionsart, and *to*-infinitivals seem to be future oriented quite generally.

In many respects, the logical properties of ACs are the same as those of Lewis' counterfactuals. To improve readability, let us use Lewis' notation for counterfactuals instead of Kratzer's:

(34) $\phi \,\Box\!\!\rightarrow \psi$ is true in world w with respect to the ordering relation $\leq$ iff $\psi$ holds in every $\leq$-next $\phi$-world.
$\phi \,\Diamond\!\!\rightarrow \psi$ is true in world w with respect to the ordering relation $\leq$ iff $\psi$ holds in some $\leq$-next $\phi$-world.

Recall that the ordering relation $\leq$ can be defined via an ordering source *g*. Let us denote the anankastic relation by means of the symbol $\circ\!\!\rightarrow$. Our account suggests that the two relations are the same. Indeed, neither of the two relations allows for strengthening of the antecedent, transitivity or contraposition.

(35) No strengthening of the antecedent
$(\phi \circ\!\!\rightarrow \psi) \not\Rightarrow ((\phi \,\&\, \chi) \circ\!\!\rightarrow \psi)$

Consider a scenario in which it takes 3 and a half hours to get to Harlem. Then the following argument does not hold:

(36) To be in Harlem before noon you have to leave at 8 a.m.
$\therefore$ To be in Harlem at 9 a.m. you have to leave at 8 a.m.

Transitivity does not hold for $\circ\!\!\rightarrow$ either. We can show that by using Lewis' examples.

(37) Failure of transitivity
$((\phi \circ\!\!\rightarrow \psi) \,\&\, (\psi \circ\!\!\rightarrow \chi)) \not\Rightarrow (\phi \circ\!\!\rightarrow \chi)$
For Otto to come to the party, Anna has to come.
<u>For Anna to come to the party, Waldo has to come.</u>
$\therefore$ For Otto to come to the party, Waldo has to come.

[12] Here is a relevant quote from Stalnaker (1976) making the point clear: "It is appropriate to use an indicative statement or supposition only in a context which is compatible with the antecedent." Subjunctive conditionals, on the other hand, are argued to presuppose the falsity of their antecedent.

The argument is invalid for reasons similar to those given in (Lewis, 1973b: 33). Contraposition cannot hold either, as an adaptation of another example of Lewis shows:

(38) Failure of contraposition
$(\phi \circ\!\!\rightarrow \psi) \not\Rightarrow (\neg\psi \circ\!\!\rightarrow \neg\phi)$
For Boris to come to the party, Olga has to come.
$\therefore$ For Olga not to come to the party, Boris must not come.

The invalidity of these arguments speaks in favour of the identification of the two relations.

However, trying to paraphrase Lewis' standard example by an AC suggests that there is a real difference in truth conditions between the two constructions:

(39) a. If kangaroos had no tails, they would topple over.
b. For kangaroos to have no tails, they have to topple over.

Here both the antecedent and the consequent are states, and straining our intuitions somewhat, the second sentence may have a simultaneous interpretation, even a tenseless one. We have the feeling that the two mean different things. The second sentence suggests that the habit of toppling over might cause the state of having no tails. This is an absurd idea. Therefore (39b) appears either nonsensical or false. (39a) on the other hand is true. Our analysis cannot explain the difference.

Let us summarize the discussion in this section. With respect to strengthening of the antecedent, transitivity and contraposition, the anankastic relation $\circ\!\!\rightarrow$ and the counterfactual relation $\Box\!\!\rightarrow$ behave alike. An identification of the two relations could explain the behaviour. On the other hand, a plain modal account would have to say something about why these logical properties don't hold.

We observe, however, that *would*-conditionals cannot be paraphrased as ACs and we have to explain why this should be so.

Differences in meaning might come from the different felicity conditions and the difference in temporal orientation.

So far we have been assuming that ACs are indicative conditionals and therefore subject to Stalnaker's restriction. But it is not clear that indicativity is an essential restriction, for ACs can be put into the subjunctive:

(40) To go to Harlem, you would have to take the A train.

The only important difference that might yield an explanation is the difference in temporal orientation. If the antecedent and the consequent of a *would*-

conditional are both about the present, the antecedent will typically be true before the consequent. For an AC, the typical temporal relation is exactly the other way round. The internal antecedent, i.e. the to-clause, will be true after the consequent. This fact suffices to guarantee the difference in meaning in many cases.

This, however, cannot explain all weird examples. The kangaroo-example cannot be blocked because the sentence expresses a sort of law and is therefore timeless. The same can be said for other laws:

(41) If the water is to boil, its temperature must be 100° Celsius.

This is an AC. It would seem then that we need a further relation R that strengthens the counterfactual relation $\phi \; \Box\!\!\rightarrow \psi$. Let us therefore symbolize this strengthened relation in the following way:

(42) $(\phi \; \circ\!\!\rightarrow \psi) :\leftrightarrow ((\phi \; \Box\!\!\rightarrow \psi) \; \& \; (\psi \; R \; \phi))$

The question is of course, what R could be. The first idea that comes to the mind is that the $\psi$ R $\phi$ means something like '$\psi$ is a means for achieving $\phi$'. But does this make sense?

(43) a. Um einen Führerschein zu haben, musst du 18 Jahre alt sein.
'To have a driving license, you must be 18 years old.'
b. Um Bundeskanzler zu sein, musst du Deutscher sein.
'To be the chancellor, you must be German.'

Being 18 years old is a precondition for having a driving license. The age alone is no means for getting into the possession of the license. A similar consideration applies to (43b). So the notion "means for achieving" doesn't always make sense. The consequent of the AC is just a necessary condition for achieving the purpose expressed by the antecedent. It is no more than that. But perhaps the anankastic relation should be defined in a stricter way. We have to leave it as an open question here, what kind of strengthening is necessary for ACs, if any.

### 4.4 "Contraposition" and existential conditionals

Following Bech (1955/57), Sæbø considered a "contraposed" paraphrase to which we turn now:

(44) If you don't take the A train, you can't go to Harlem.

Recall that Lewis' *could*-conditional is defined as the dual of the *would*-conditional:

(45) $w \in (\phi \diamond\!\!\rightarrow \psi)$ iff $w \in \neg(\phi \Box\!\!\rightarrow \neg\psi)$
i.e. $(\exists u \in \phi)(\exists v)[v \leq_w u \,\&\, v \in \phi \,\&\, \psi]$, where $\leq_w$ is comparative similarity with respect to w
Roughly: $Sim_w(\phi) \cap \psi \neq \varnothing$

The formalization of (44) would therefore be the following:

(46) a. $\neg(\neg$you take the A train $\diamond\!\!\rightarrow$ you go to Harlem)
b. iff ($\neg$you take the A train $\Box\!\!\rightarrow \neg$you go to Harlem)

Strictly speaking, (46a) is the dual of the contraposition of (3a), i.e. (46b).

According to Bech and Sæbø, (44) means precisely the same as (3a). Under our analysis it is only a consequence of the AC. The intuitively correct paraphrase of the truth conditions is this:

(47) There is no nearest world where you don't take the A train but where you nevertheless go to Harlem.
= The nearest non-A-train worlds are disjoint from the Harlem worlds

In Stalnaker/Lewis' terms, the truth conditions should be this:

(48) $Sim_w(\lambda w.$you don't take$_w$ the A train$) \cap \lambda w.$you go$_w$ to Harlem $= \varnothing$

In order to see that (48) is only a consequence of the anankastic *must*-conditional, assume that the A-train worlds (A) intersect with the closest Harlem worlds (H) without including them. Furthermore, there are H-worlds closer to the real world than any of the H&A-worlds. This makes the *can*-conditional true but falsifies the *must*-conditional (3). Since it is difficult to find an example of this kind, we leave it open whether our prediction is born out.

### 4.5 Restricting the Modal Base?

Expressing necessary conditions is a context-sensitive matter. One should speak of a necessary condition relativized to certain facts. The following sentence (by Wolfgang Klein, p.c.) illustrates this idea:

(49) If you want to go to Vladivostok you have to take the Chinese train.

Now assume the following scenario: there are two trains, the Russian train and the Chinese train. The Chinese one offers a much better service. For W. Klein, the conditional is true in this situation. But is it an AC? For Orin Percus, the conditional is false in the given scenario. He would have to use the modal "should" for obtaining a true statement:

(50) If you want to go to Vladivostok you should take the Chinese train.

This is not an AC meaning "The only way to go to Vladivostok is to take the Chinese train".

On the other hand, we obtain true anankastic conditionals if we make the condition „to have good service" explicit in the antecedent:

(51) a. If you want to go to Vladivostok comfortably you have to take the Chinese train.
b. To go to Vladivostok comfortably you have to take the Chinese train.

It is an empirical question whether (49) means the same as (51a-b) in the given scenario. If ACs were context dependent in this sense, one would have to restrict the modal base, or strengthen the antecedent, by adding additional facts. In our example *f(w)* would contain information about your preferences, viz. that you travel by trains with the best service. In any case, *should*-conditionals are interpreted with respect to such a personal modal base.

In general, the restriction of the modal base seems to be needed quite often, and not only for *should*-conditionals. One can come up with scenarios where *to*-infinitive constructions or *can*-conditionals have to be weakened in a similar way.

Consider the following example in which the restriction is introduced explicitly:

(52) To go to Harlem you have to take the A train, unless you have enough money for a taxi.

The hypothetical fact introduced by the *unless*-clause „you don't have enough money for a taxi" restricts the modal base. It is not empty anymore but contains an additional antecedent. The sentence is true iff in all the next worlds, in which you go to Harlem and don't have enough money for a taxi, you take the A train.

## 5 Conclusion

The counterfactual analysis of ACs solves most puzzles we have encountered so far in connection with these constructions. We have criticized Sæbø's innovation that the antecedent is added to the ordering source. We claim that it has to be added to the (Lewisonian) modal base, i.e. it is the antecedent of a counterfactual. In this respect, our proposal is different from all other proposals in the literature. It could turn out that wishes don't play any role at all in the semantics of ACs. The puzzles seem to arise if one assumes that the ordering source consists of wishes. For us, at least the primary ordering source is simply a set of facts whose intersection is the singleton containing the world of the context. Wishes play a pragmatic role.

After ellipsis resolution, our analysis is entirely compositional. The role of the *if*-clause with *want/be to* is to introduce a felicity condition on the use of an AC. These modals do not contribute to the truth conditions of an AC.

As we have mentioned above, our approach is not so different from vF&I's or Huitink's. If we make the underlying assumption that for an AC of the form *'to φ you ought ψ'*, *f(w)* should be the smallest φ-permitting sphere (cf. fn. 9) explicit and if the inner antecedent is added to *f(w)*, the approaches become equivalent.

Still, the role of the *want* in the *if*-clause of the AC in (1) remains somewhat mysterious. Our proposal of analyzing the construction as a conditional speech act is certainly open to criticism, because it doesn't meet the usual syntactic tests for these constructions.

If the criticism put forward in the recent literature is warranted, Sæbø's innovation is not tenable, but the increasing interest in the subject demonstrates the fruitfulness of his proposal.

## References

Bech, G. (1955/57): *Studien über das deutsche verbum infinitum*. København: Det Kongelige Danske Akademie av Videnskaberne.

Bhatt, R. and R. Pancheva (2004): *Conditionals*, Manuscript.

von Fintel, K. and S. Iatridou (2005): *What to Do If You Want to Go to Harlem, Notes on Anankastic Conditionals and Related Matters*, Draft for the Rutgers Semantics Workshop.

Hare, R. M. (1971): 'Wanting: Some Pitfalls', *Practical Inferences*, pp. 44-58, London: Macmillan.

Huitink, J. (2005): *Analyzing Anankastic Conditionals and Sufficiency Modals*, Paper presented at SOLE 13.

Iatridou, S. (1991): *Topics in Conditionals*, MIT Working Papers in Linguistics: PhD Dissertation.

Kratzer, A. (1981): 'The notional category of modality', in H. J. Eikmeyer & H. Rieser (eds.): *Words, Worlds, and Contexts*, pp. 38-74, Berlin: de Gruyter.
Lewis, D. (1973a): 'Causation', *The Journal of Philosophy* **70**, pp. 556-567.
Lewis, D. (1973b): *Counterfactuals*, Oxford: Basil Blackwell.
Lewis, D. (1981): 'Ordering Semantics and Premise Semantics for Counterfactuals', *Journal of Philosophical Logic* **10**, pp. 217-234.
Nissenbaum, J. (2005): *Kissing Pedro Martinez: (Existential) anankastic conditionals and rationale clauses*, Handout for Salt XV, McGill University.
Sæbø, K. J. (1986): 'Notwendige Bedingungen im Deutschen. Zur Semantik modalisierter Sätze', *Papiere des Sonderforschungsbereichs 99*, University of Constance.
Sæbø, K. J. (2001): 'Necessary conditions in a natural language', in C. Féry & W. Sternefeld (eds.): *Audiatur Vox Sapientiae: A Festschrift for Arnim von Stechow*, pp. 427-449, Berlin: Akademie Verlag.
Stalnaker, R. (1976): 'Indicative Conditionals', in A. Kasher (ed.): *Language in Focus*, pp. 179-196, Dordrecht: Reidel.
von Stechow, A. (2004): *Schritte zur Satzsemantik*, Tübingen: http://www2.sfs.nphil.uni-tuebingen.de/arnim/.
von Stechow, A., S. Krasikova and D. Penka (2004): 'The Meaning of German um zu: Necessary Condition and enough/too', paper presented at the workshop *Modal Verbs and Modality*, Tübingen.
von Wright, G. H. (1963): *Norm and Action*, London: Routledge.

# ELUCIDATING PROGRESSIVES IN NORWEGIAN

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**Abstract**

This study divides the Norwegian progressive forms into two groups according to the Aktionsart they combine with. In one group the forms predominantly combine with atelic predicates. They yield an interpretation similar to that normally ascribed to English progressive atelic sentences. In the other group the forms combine with telic predicates. These forms refer to a period prior to the end point described by the main verb. In this paper the distributional restrictions are correlated with the differences in meaning between the two groups. The forms' distribution and semantics are furthermore related to their low degree of grammaticalization.

## 1 Introduction

In the present paper I report from a corpus study of the Norwegian pre-grammaticalized progressive forms. The study reveals patterns and properties of these forms that are novel compared to well-studied aspectual systems, such as the system of English and the Romance languages.

The forms and meanings of the Norwegian progressives are here presented with a small set of examples drawn from the corpus (see list of sources). The study shows that the progressives should be grouped into two subgroups, according to their combinatorial and semantic properties. The two groups of progressives are described in some detail. The Norwegian forms are furthermore contrasted with the English progressive. Similarities and differences in the role of the simple verb form of the two languages are elucidated, and related to the differences of the progressives in the two languages. Finally, the Norwegian progressives' level of grammaticalization is discussed and connected to their distribution and meaning. In this paper I recapitulate only the main points from my corpus study. See Tonne (2001) for further details, and for a proposal for a formal semantic analysis.

## 2 Singling out the Norwegian Progressives

The Norwegian Reference Grammar (Faarlund, Lie and Vannebo 1997) divides the Norwegian progressive forms into several types according to differences in aspectual meaning. Here, I delimit the investigation to two of these groups. One group consists of a variety of forms often called "pseudocoordination" (e.g. Johannessen 1998) due to their apparent coordinated structure (with the conjunction *og*). They nevertheless have many syntactic properties that are typical of subordination. Pseudocoordinations are held to have a process meaning, they describe a situation as extended in time without any delimitation, where the agent is in the midst of the described situation. There are some conditions on the use of the pseudocoordinations, or at least a tendency in the way they are used. For example, the subject referent must be such that it can serve as the subject of posture verbs like *ligge* ('lie') and *sitte* ('sit'). Furthermore, the forms are less frequent in formal than in colloquial contexts (Tonne 2001). These tendencies of use are correlated with the forms' degree of grammaticalization, discussed in section 5.

Examples of pseudocoordination are given in the a-sentences in (1) and (2) below. The b-sentences show their simple verb counterparts, which have an ambiguous interpretation with regard to aspect, as reflected in the English translations:

(1) a. Barna satt og leste.
children-the sat and read
'The children were reading.'

b. Barna leste.
children-the read
'The children read/were reading.'

(2) a. Ungene dreiv og samla sammen papir og
kids-the DRIVE-PAST OG collected together paper and
treull ...
wood-wool
'The boys were gathering up the paper and string …'

b. Ungene samla sammen papir og treull ...
kids-the collected together paper and wood-wool
'The boys were gathering up/gathered up paper and string ...'

(3) below is a further example from the corpus, showing the use of the pesudocoordination as a background type of information, a typical use of an imperfective form:

(3) De tre satt og drakk kaffe da skjelvet fikk huset til
the three sat and drank coffee when quake-the got house-the to
å rase sammen.
INF-MARKER slid together
'The three of them were drinking coffee when the quake made the house fall down.'

The forms of the other group of progressives, that I here call the *prospec* group, do not include the conjunction *og*. Examples of these forms are shown in (4) - (6) below:

(4) a. Han holdt på å dø.
he HPÅ die
'He was dying.'
b. Han døde.
'He died.'

(5) a. Han var i ferd med å frakte materialene opp til balkongen ...
he was IFMÅ carry materials-the up to balcony-the
'He was carrying / was about to carry the material up to the balcony …'
b. Han fraktet materialene opp til balkongen ...
'He carried the material up to the balcony ...'

(6) a. Disse var på vei til å bli blant byens verste forbrytere.
These were PVTÅ become among town's worst criminals
'These were about to become some of the worst criminals in town.'
b. Disse ble blant byens verste forbrytere.
These became some of the worst criminals in town.

The main word of each periphrastic progressive form in this group is a word that, when used in other contexts, either describes continuity (the verb which means 'hold', see example (4) above), movement (the noun which means 'journey', see example (5)) or path (the noun which means 'way', see example (6)). They include prepositions (*på* ('on'), *med* ('with') and *til* ('to'), and an infinitival structure that carries the main lexical content of the sentence. The members of this group are held to have two types of imperfective meanings (see e.g. Faarlund et al. 1997), reflected in the translation of (5a) above. Either the interpretation appears to be similar to that of the pseudocoordination, i.e. the subject referent is in the midst of a situation, or the interpretation is that the subject referent is in progress towards a point of change of state that is described

by the infinitival structure. In the latter case, they have what here will be called a *prospective* reading; that is, the subject referent "looks" ahead towards a certain point. I claim, however, as will be seen in the discussion of the distributional pattern, that this latter reading, the prospective reading, is the only reading for the prospec group. I hold that the important information carried by the forms is that there is an orientation towards the mentioned point.

In the set of extracted occurrences of the progressives, I found a pattern: the pseudocoordinations, exemplified in (1)-(3) above, combine almost exclusively with atelic predicates. The atelic predicates are mostly activities, like those we see in the examples (1)-(3), but there are also combinations with various types of statives, like the one we see in (7):

(7) Jeg satt som sagt og var fascinert av det yrende vinduslivet
I sat as said and was fascinated of the teeming window-life-the
'As I mentioned, I was observing with fascination the teeming life in my window'

The prospec forms, on the other hand, exemplified in (4)-(6) above, almost exclusively combine with telic predicates, i.e. accomplishments and achievements. The prospec forms are not well-formed with statives:

(8) #Nicolas var i ferd med å sitte ved bordet.
N. was IFMÅ sit by table-the

The degree to which the mentioned distributional pattern holds is overwhelming; more than 95% of the pseudo forms occur with atelic predicates, and more than 95% of the prospec forms extracted are combinations with telic predicates.

Some so-called activities are ambiguous between an activity and accomplishment reading (e.g. *modne* ('ripen') and *utvide* ('expand')), and others still are ambiguous between activities and ingressives (i.e. a kind of change of state into an activity, therefore differing from activities, e.g. *le* ('laugh'), *smile* ('smile'), see also Santos 1996 and what she calls "acquisitions"). Interestingly, these are the few cases of activities that are found to combine with the forms in the prospec group (see example (12) below).

My corpus confirms the widely held view about divergence in imperfective meanings between the two groups of progressives in Norwegian. Importantly, the new insight drawn from my corpus study, is that such a difference in meaning corresponds closely with the difference in distribution. The prospec forms need a point towards which they are oriented. I therefore claim that the prospec forms have one interpretation, i.e. the prospective interpretation, and do not have the option of a process interpretation. The understanding that the prospec forms in some cases may have either a process reading or a prospective

reading, I hold to be due to *vagueness* (with regard to the start of the event), not *ambiguity*. The difference I then take to lie within the same, prospective, meaning. This explains the impossibility of combining a prospec form with a stative predicate: The lack of a point towards which it can be oriented makes the result impossible to interpret.

## 3 Contrasting the Norwegian Progressives

In addition to the monolingual study described above, I have undertaken a Norwegian-English contrastive study, by way of investigating a parallel corpus. The study consists of Norwegian original texts compared with their English authentic translations, as well as English original texts compared with their Norwegian authentic translations. The goal set for the contrastive study was to gain a better understanding of the meaning and extension of the relatively unknown Norwegian forms by way of a contrast with a well studied aspectual form like the English progressive.

### 3.1 The Pseudo Group and the English Progressive

The contrastive study shows that there is an overlap between pseudo-coordination and the progressive in English. However, the Norwegian pseudo-coordination is more often translated with an English progressive than the other way round. The progressive in English is used as translation of the Norwegian pseudocoordination in as much as 50% of the cases. (2), repeated here, is one example of such a translation pair:

(2) Ungene dreiv og samla sammen papir og treull ...
kids-the DRIVE-PAST OG collected together paper and wood-wool

(2') The boys were gathering up the paper and string and cardboard boxes ...

The pseudocoordination is found as a translation of the progressive only in 11% of the cases. In the vast amount of the cases where the English progressive is not translated by a Norwegian pseudocoordination, the translator has chosen a simple verb form in Norwegian. An example is seen in (9):

(9) all the streams of the forest were tinkling happily

(9') alle bekker klukket og lo
all streams gurgled and laughed

The reason for not choosing pseudocoordination in the Norwegian translation may be related to the conditions on its use, mentioned above. The subject would be odd for a posture verb, in the imagined case where a pseudocoordination were forced as translation.

The study furthermore shows that many of the English progressives in the translation of the Norwegian texts stem from a simple verb form in the Norwegian original, like we see in (10):

(10) Kjerringa ... gikk langsomt hjemover med kørja på armen ...
woman-the walked slowly home-wards with basket on arm-the

(10') Mrs. Pepperpot ... was walking slowly home with her basket on her arm ...

A detailed study of the concordances of the English original texts with Norwegian translations shows that several of the pseudocoordinations stem from a locative or postural expression in the English original, like in (11):

(11) Piglet was lying on his back, sleeping peacefully.

(11') Nøff lå på ryggen og sov trygt.
N. lay on back-the and slept safely

In general, one can observe how the specific meaning of the Norwegian pseudo-coordination restricts the contexts in which it is used. When going from a progressive to the posture-sensitive pseudocoordination, information about posture and position, if not included in the English original, must be added. If it is difficult to deduce such posture information from the context, pseudo-coordination is not chosen in the translation. The relatively specific posture or locative meaning of pseudocoordination restricts its distribution compared to the English progressive, but gives it a match in other types of locative constructions like we see in (11) above. The progressive in English, which has no restrictions with regard to information about location or posture, and no restriction connected to colloquial context, is therefore more frequent than the Norwegian pseudocoordination.[1]

### 3.2 The Prospec Group and the English Progressive

The difference in frequency between the Norwegian prospec forms and the English progressive is also rather great. In the corpus, there are a total of 2570

[1] The frequency of the English progressive found here in this study confirms the figures in Biber et al. (1999).

occurrences of the English progressive, whereas there is a total of 170 occurrences of the Norwegian prospec forms. The restricted distribution of the prospec forms is due to their limited Aktionsart-combinatorial possibilities, as revealed in the monolingual study. The prospec forms never combine with statives, and usually do not combine with activities. The few activity combinations found describe a period prior to the start of the activity. (12) is an example from the (monolingual) corpus:

(12) Også jeg var i ferd med å danse. Jeg kjente den gamle lengselen i
also I was IFMÅ dance. I felt the old longing-the in
meg.
me
'I was about to dance, too. I felt the old longing inside.'

For an activity verb like *dance* with a progressive in English, we therefore do not get a direct translation into a Norwegian sentence with a prospec form, illustrated in (13):

(13) He was dancing. ≠ Han var i ferd med å danse.

The contrastive study shows a low degree of match between the English progressive and the Norwegian prospec forms. Like we saw with the pseudo group, the prospective forms find an English progressive match much more often than the other way round. Only 2.2% of the English progressives in the corpus have a Norwegian prospective correspondence in the authentic translations. 30-40% of the Norwegian prospectives found in the corpus, on the other hand, correspond to an English progressive. The incompatibility of the two expressions in (13) is part of the explanation of the modest match between the English progressive and the Norwegian prospec forms. The matches that are found, involve accomplishments and achievements.

The English progressives that are combined with accomplishments (e.g. *He was eating an apple*) get an interpretation where the subject referent is in the midst of the accomplishment event. A Norwegian counterpart with a prospec form gets a prospective interpretation. The orientation towards a point in such a prospective interpretation means that the described period is prior to the end point, i.e. most likely within the accomplishment event itself. The vagueness mentioned earlier with regard to the understanding of these prospective-accomplishment combinations, refers to whether there is a possibility that the period described is prior also to the starting point of the accomplishment event. As mentioned, I believe that this question is a matter of vagueness, the important thing being that the described period lies before the end point of the accomplish-

ment event itself, we may say that the Norwegian prospec-accomplishment means more or less the same as the English progressive- accomplishment:

(14) He was eating an apple. ≈ Han var i ferd med å spise et eple.

When the progressive in English is combined with an achievement (e.g. *He was reaching the top*), the interpretation of the English sentence is prospective, and a Norwegian prospec form suits perfectly as a translation:

(15) He was reaching the top. = Han var i ferd med å nå toppen.

In accordance with (15), I found in the parallel study that progressive achievements in English are often translated by a form from the prospec group, as in the parallel example shown below:

(16) But now I daren't, because my conscience is killing me.

(16') Men nå våger jeg ikke det, fordi samvittigheten min holder på å ta
but now dare I not that because conscience-the mine HPÅ take
life-the of me
livet av meg.

### 3.3 Summing up the Contrastive Study

In the contrastive study it is found that the progressive in English is far more frequent than the Norwegian pseudo and prospec forms. Furthermore, the simple verb form in Norwegian is often translated into the English progressive, and the English progressive is often translated into a Norwegian simple verb form. For the English progressive to be translated into a Norwegian pseudocoordination, it must be an activity and include information about place or posture. When a pseudocoordination is used in Norwegian, it corresponds felicitously with the English progressive. An English progressive achievement has the same interpretation (i.e. prospective) as the corresponding Norwegian prospec achievement. An English progressive accomplishment has approximately the same interpretation as the corresponding Norwegian prospec accomplishment. Finally, an English progressive activity does not have the same interpretation as the corresponding Norwegian prospec activity.

This study of the correlation between the Norwegian forms and the English progressive partly confirms and partly complements other contrastive investigations. Nordset (1996), for example, investigates the Norwegian translation equivalents of the English progressive. Some of the generalizations I find in my study are not recognized by Nordset (1996), however. She shows that 54.9% of the "double-verb" constructions (i.e. all the progressive forms) are

combinations with activity predicates, 32.4% are combinations with accomplishments and 11.3% are combinations with achievements. The generalization is missed that the pseudocoordinations and the prospec forms are close to having a complementary distribution with regard to Aktionsart.

Since the simple verb form is more frequent in Norwegian than in English, the roles played by the progressive forms are correspondingly different (viz. 'grammaticalization of zero', Bybee 1994). In the following I look more into the role of the simple verb form and how it interacts with the progressive forms.

## 4 The simple verb form and its interaction with the progressive

In English the verbal suffix *-ed* in the simple verb form means past. Often, like with *entered*, it also has perfective meaning, but at other times, like with the verb *lived*, it does not, it rather has an imperfective meaning (see e.g. Boogaart 1999). The simple verb form is used for both perfective and imperfective meaning in Norwegian, too. But the simple verb in Norwegian can have an imperfective meaning even with non-stative verbs, for instance *lese* ('read'). Imperfectivity by way of pseudocoordination was expressed with this verb in the Norwegian sentence (1a), and imperfectivity by way of a simple form was shown in (1b) (as one of its aspectual interpretations), and is also seen in the small discourse in (17):

(17) Barna leste da jeg kom inn.
children-the read when I came in
'The children read/were reading when I entered.'

When the context does not explicitly say otherwise, the first part of (17) conveys imperfective meaning. This contrasts with English. *The children read* has (unambiguous) perfective meaning, and needs an immediate context which matches this reading, for example a direct object, or a subordinate sentence like *when I entered* in (17). *Barna leste*, in (17), may also have perfective meaning in Norwegian. Given the right context, (17) can mean that the children started to read when I entered, i.e. have an ingressive type of meaning (recall the "acquisitions" mentioned earlier). Hence, the Norwegian sentence (17) with a simple verb form is ambiguous with regard to aspectuality.

Not only simple verb activities are ambiguous in Norwegian. *Barna leste en bok* in (18) below is an accomplishment (i.e. telic) due to the direct object (compare with (17)), but an interpretation similar to that of (17) is still possible:

(18) Barna leste en bok da jeg kom inn.
children-the read a book when I came in
'The children read/were reading a book when I entered.'

The English translation reflects the ambiguity of the Norwegian sentence (18); it may mean that the children were already reading a book when I entered, or it may mean that they started to read a book when I entered, depending on the context. In contrast, the English simple verb counterpart to (18) has only the latter, perfective, interpretation.

We see that the lack of imperfectivity/progressive-marking in a sentence has different implications in English and Norwegian. In different ways in the two languages, verb-grammatical marking interacts with other parts of the sentence, like the lexical semantics of the verb and the arguments. Depending on the nature of this interaction, we get a final aspectuality interpretation of the sentence.

An important function of the progressive forms in Norwegian is to disambiguate aspectually ambiguous predicates, selecting the imperfective reading. With the "extreme" Aktionsarten, the aspectuality is clear, that is, a Norwegian simple verb achievement sentence is unambiguously perfective, and a Norwegian stative simple verb sentence is unambiguously imperfective. However, around the telic/atelic borderline, i.e. the border between accomplishments and activities, the aspectuality is ambiguous. By invoking a progressive marker, the aspectual interpretation of such an utterance becomes unambiguously imperfective.

A great part of previous work on these Norwegian forms is concerned with their grammaticalization status. The study of their degree of grammaticalization furthermore reveals additional information about their form and meaning. In the following I discuss some of the grammaticalization issues that are relevant for the Norwegian forms.

## 5 The Grammaticalization Status of the Norwegian Progressives

In the literature, the Norwegian progressive forms are claimed to be pre-grammaticalized. They are not pure function words, void of descriptive, lexical content. Yet, the form-bits are stripped of some of their normal descriptive meaning. A case in point is (1a) in the beginning of this paper. For (1a) to be true, not only must the children be reading, but they must also be sitting. But the verb *satt* is not the main content word in (1a), *leste* ('read') is. Andersson (1979) notes both similarities and differences between the pseudocoordination and auxiliary constructions, indicating the intermediate grammaticalization position

of the pseudocoordination.[2] Similarly, Digranes (2000: 206) concludes in her study of the grammaticalization of the pseudocoordination in Norwegian that on a grammaticalization scale, it falls in the middle between the two extreme points (totally lexical and totally grammatical). Hence she considers it somewhat, but not fully, grammaticalized.

Even less of the original lexical meaning remains in the other Norwegian progressives, the prospec forms, exemplified in (4)-(6). For these, the agent is not usually in a concrete sense on a journey, say, or physically holding something. Rather, the nouns *ferd* ('journey'), *vei* ('way', 'road') and the verb *holde* ('hold') are used in an abstract sense. They are also not fully grammaticalized; they are much less frequent than the English progressive, and they, too, overlap in meaning with the simple verb form.[3]

As mentioned, the relatively low frequency of each of the Norwegian progressive forms is connected to there being restrictions on their use and therefore also connected to their grammaticalization status. The posture verbs of the pseudocoordinations are not pure function words, and therefore their semantics restricts the usage. They are also less frequent in formal than colloquial contexts (although this distributional pattern is not found to be connected to any linguistic feature of the forms). Furthermore, as has been emphasized here, all the forms are almost complementary distributed according to Aktionsart.

The low degree of grammaticalization of the forms gives us new insight into the various aspects of imperfectivity and progressive meaning. For, as one often finds with pre-grammaticalized forms (see Ebert 2000), the Norwegian forms make up a set of several forms. The two groups split between them the pool of sentences to which they can combine. These combinatorial restrictions are correlated with differences in meaning between the two groups, namely a process meaning and a prospective meaning. It is possible to tease apart these two progressive meaning facets due to the progressives' difference in combinatorial possibilities.

## 6 Conclusion

The corpus study discussed here has shown that there is a division of labor among the Norwegian progressive forms, in terms of what Aktionsart they combine with. The "pseudo group", consisting of various instantiations of pseudocoordination, preferably combines with atelic predicates, mostly

[2] He studies the Swedish pseudocoordination, which is very similar to the Norwegian.

[3] For additional details about the grammaticalization status of the Norwegian progressives, and a related discussion of the comparison between the Norwegian pseudocoordination and the Spanish progressive, see Tonne (1999).

activities. On the other hand, the "prospec group", for example the *i ferd med å*-construction, mostly combine with telic predicates. The combinatorial restrictions of the forms are found to be connected to a difference in meaning. Atelic predicates do not have an inherent end point, but the telic predicates do. The pseudo group of progressive forms does not need an end point for their interpretation, while the prospec progressives do.

The pseudo group consistently conveys a "process interpretation" (in the midst of the main verb event) while the forms in the prospec group may be vague with regard to the start of the event. The common denominator for the interpretation of the prospec group is that they have a prospective interpretation with regard to a point, or culmination, of the main verb event.

The simple verb form in Norwegian is often aspectually ambiguous. An important effect of the progressive forms in Norwegian is that they disambiguate aspectually ambiguous predicates in the imperfective direction.

To sum up, the pervasiveness of "ambiguous aspect" with the simple verb form, the progressives' division of labor correlated with different meaning facets are all shown here to be distinct properties of an aspectual system like the Norwegian.

The reported study may throw new light on the phenomenology and theory of aspectuality as known primarily from studies of English. For example, the study of the prospective achievements in Norwegian suggests no process reading, but rather a prospective interpretation with regard to the end, or culmination, of the main verb event. Such information may support and extend general theories of aspectuality, especially those concerned with the interaction between progressive forms and Aktionsarten.

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## Sources

English-Norwegian Parallel Corpus (ENPC) (1999): Department of British and American Studies, University of Oslo. The texts were text extracts of 10,000-15,000 words each. The relevant part of the corpus contains 30 original text extracts in each language and their translations.

HiT-corpus (1998): Developed at the University of Bergen, Norway. Newspaper texts automatically downloaded from www. The size of the corpus was approximately 20 mill. words.

Milne, A. A. (1989): Selected parts of 'Winnie-the-Pooh', extract approx. 20 000 words. Methuen, London. First published 1926. With translation ('Ole Brumm').

Prøysen, Alf (1960): 'Teskjekjerringa på nye eventyr', Tiden, Oslo, excerpt of 2646 words. With translation ('Mrs. Pepperpot').

Oslo Corpus (1998): Developed at the Department of linguistics, the Faculty of Arts, University of Oslo.

## References

Andersson, L.-G. (1979): 'Några V-V konstruktioner', in *Gothenburg papers in theoretical linguistics* **40**, Gothenburg.

Biber, D., S. Johansson, G. Leech, S. Conrad, E. Finegan (1999): *Longman grammar of spoken and written English*, London: Longman.

Boogaart, R. (1999): *Aspect and Temporal Ordering*. Dr.thesis, Vrije Universiteit te Amsterdam, The Hague: Holland Academic Graphics.

Bybee, J. (1994): 'The Grammaticization of Zero. Asymmetry in tense and aspect systems', in William Pagliuca (ed.): *Perspectives on Grammaticalization*, pp. 235 – 254, Amsterdam: John Benjamins Publishing Co.

Digranes, A.-G. (2000): *Mikkel rev satt og skrev: Grammatikalisering av posisjonsverbs-konstruksjonen*, master thesis, University of Oslo.

Ebert, K. H. (2000): 'Progressive markers in Germanic languages', in Östen Dahl (ed.): *Tense and Aspect in the Languages of Europe*, Berlin: Mouton de Gruyter.

Faarlund, J. T., S. Lie and K. I. Vannebo (1997): *Norsk referansegrammatikk*, Oslo: Universitetsforlaget.

Johannessen, J. (1998): *Coordination*, New York: Oxford University Press.

Krifka, M. (1998): 'The origins of Telicity', in S. Rothstein (ed.): *Events and Grammar*, Dordrecht: Kluwer.

Nordset, H. Ø. (1996): *The expression of imperfective aspect in English and Norwegian. An investigation into Norwegian translation equivalents of the English progressive*, Master thesis at the Dept. of British and American Studies, University of Oslo.

Santos, D. (1996): *Tense and Aspect in English and Portuguese: A Contrastive Semantic Study*, dr. thesis, Universidade Técnica de Lisboa.
Tonne, I. (1999): 'A Norwegian Progressive Marker and the Level of Grammaticalization', *Languages in Contrast* **2** (1), pp. 133-161, Amsterdam: John Benjamins Publishing Co.
Tonne, I. (2001): *Progressives in Norwegian and the Theory of Aspectuality*, dr. thesis, 'Acta Humaniora'-series, Oslo: Unipub.

# PRAGMATICS OF THE COMPLEX DP IN ANCIENT GREEK

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**Abstract**

In Classical Greek, complex determiner phrases may be formed in various ways. From a semantic point of view, the different formal patterns seem not to be associated with differences in meaning; in traditional grammars they are all claimed to be equally grammatical and equally definite. The distribution of the varieties of complex DP in discourse has not been studied in detail. In this paper I will discuss the combination of a noun with a modifying adjective. I will investigate the various patterns from semantic, pragmatic and, to a certain extent, syntactic points of view. I conclude that the possible configurations are semantically equivalent, but sensitive to information structure, both within the clause and in the larger context.

## 1 Definiteness in Classical Greek

The definite determiner of Classical Greek developed from the well-known Indo-European demonstrative pronoun **so-*/*to-*. This process of semantic and pragmatic function change has been documented for many other languages, e.g. German and the Romance languages (Lyons 1999). In Classical Greek, this development took place between the writing down of the Homeric epics, the *Iliad* and the *Odyssey* (ca. 700 BCE) and the beginning of the Classical period (500-300 BCE). There are some indications of an emerging definite determiner already in Homer, but it is only in the prose literature of the fifth and fourth centuries that we may observe the full extension of the system.

The definite determiner attaches to its NP as a proclitic and agrees with it in number and case. Clitics of different types, such as sentence particles, may intervene between the determiner and its noun complement. In the case of a complex NP, there are several possible ways of attaching the determiner (1a-e):

(1) a. *ho agathos anêr* (Determiner-Adjective-Noun = DAN)
'The good man'
b. *ho anêr ho agathos* (DNDA)
c. *anêr ho agathos* (NDA)
d. *agathos ho anêr* (ADN)
e. *ho anêr agathos* (DNA)

The patterns documented in (1) are divided by traditional school grammar into two main groups. In (1a-c), the adjective is said to stand in an attributive relation to the noun, while in (1d-e), it is said to be used predicatively.[1] In the following discussion we will be concerned with the first three patterns, and more specifically with (1c). It should be noted at the outset that while (1c) may give the impression of being more intimately related to (1a), the only difference being whether the noun precedes or follows the determiner-adjective complex, the expected variant of (1b), **ho agathos ho anêr* (DADN) is not found in Classical Greek texts.

## 2 Pragmatic roles and information structure

Since we are interested in the possible differences in pragmatic function between the various configurations of the complex DP in Greek, we must outline a model of information structure. We claim, following Kruijff-Korbayová and Steedman (2003), that information structure is best understood by assuming that it consists of two interacting parameters, viz. theme-rheme (or topic-comment) and focus-presupposition. The parameters interact in the following manner (Kruijff-Korbayová and Steedman 2003: 251):

(2) [Theme ][Rheme ]

[[Focus] [Presupposition ][Focus] [Presupposition ]]

According to (2), both theme and rheme may contain focussed elements. Because of a more general principle of informativity, the rheme must contain a focussed element. When the theme contains a focus as well, the result is a contrastive theme (cf. also Büring 2003). When the focus is co-extensive with the rheme, we have 'broad' or 'informational' focus. When the focus domain is smaller than the rheme domain, we have 'narrow' focus.

Following Rooth's (1992) alternative semantics account of focus interpretation, we derive the meaning nuances associated with focus expressions

[1] The term 'predicatively' as used within Classical Philology includes both primary and secondary predication: *ho anêr agathos* 'the man is good', a complete sentence, vs. *ho anêr agathos* 'the man, if/since/when he is good…', a sentence fragment requiring a finite verb.

('counter-assertive focus', 'exhaustive listing focus', etc.) from the interaction of the focus expression with the larger context.[2]

The definition of theme and rheme is a more tricky business. It seems clear that in order to function as theme, a linguistic expression must refer to a specific, already established discourse referent (cf. Karttunen 1976 for discourse referents). Whether it must also refer uniquely to this referent, is not quite clear (cf. Dyvik 1979 on the referential properties of NPs in Old Norse and Modern Norwegian and Kiss 2002: 11 on specific indefinite topics in Hungarian). In general, specific indefinites may not replace definite NPs or anaphoric pronouns, cf. 'I saw a dog yesterday. It/the dog/*a dog tried to bite me.'

Below, we will approach the main question of the paper by a somewhat circuitous route. First, we will take a look at the use of the definite article with proper names in an attempt to separate the pragmatic use of the determiner from its semantic core meaning. After that, we will return to the question of the semantics and pragmatics of complex DPs.

## 3 The definite determiner with proper names

A clear example of a pragmatic use of the definite determiner in Classical Greek is its use with proper names.[3] If proper names are taken to refer to unique individuals, they must by definition always be definite from a semantic point of view. Hence, the determiner would seem to be superfluous. In a context which involves several people who have the same name, the semantic interpretation of the definite determiner as denoting a uniquely identifiable referent, would predict that it should in fact be disallowed. Consequently, the function of the determiner with proper names cannot be to identify a referent for the name to the exclusion of other possible candidates. Alternatively, we may take the determiner to indicate that the person referred to with the name is already established as a discourse referent. The meaning of the name *ho Kuros* would then be something along the lines of 'the aforementioned Kyros'.

This does not seem, however, to be the case generally, cf. example (3):[4]

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[2] We believe this to be basically right, although languages may grammaticalize focus variants in various ways, cf. e.g. É Kiss (1998).

[3] In contrast to the usage in Modern Greek, where the determiner is obligatory with proper names (Lyons 1999:121, Holton *et al.* 2002:278), such names often occur without a determiner in Classical Greek texts. Cf. also the paper by Janne Bondi Johannessen in this volume.

[4] In the Greek examples the following abbreviations are used: The cases are nominative (N), accusative (A), genitive (G) and dative (D); the numbers are singular (SG) and plural (PL); the tenses are present (PR), imperfect (IM), aorist (AO) and future (FUT). Relative pronouns are glossed as REL, infinitives as INF and, finally, particles as PART. I have glossed participles with English participle forms, although they do not match in every detail. For proper names, I only note the case, not the number, which is in all cases singular.

(3) ***Dareiou*** *kai Parusatidos gignontai paides duo, presbuteros men*
Dar-G and Par-G become-PR3PL children-NPL two, older-NSG PART

***Artaxerxes****, neôteres de Kuros. … epei de eteleutêse* ***Dareios*** *kai*
Art-N younger-NSG PART Kur-N…when PART die-AO3SG Dar-N and

*katestê eis tên basileian* ***Artaxerxes****…*
establish-AO3SG to the kingdom Art-N

'Darius and Parysatis had two sons born to them, of whom the elder was Artaxerxes and the younger Cyrus. … When Darius had died and Artaxerxes had become established as a king...' (Xenophon, *Anabasis* I.1.1-3, trans. Brownson/Dillery)

The first sentence introduces the king of Persia, Darius, his queen and their two sons. In the temporal clause which follows shortly after the names of the king and his eldest son are not provided with a definite determiner even though the first sentence clearly establishes them as discourse referents. Now compare the following example, from the same context:

(4) *Tissaphernes diaballei* ***ton Kuron*** *pros ton adelphon hôs*
Tis-N attack-PR3SG the Kur-N to the brother-ASG that

*epibouleuei autôi*
plot-PR3SG him-DSG

'Tissaphernes falsely accused Kyros to his brother of plotting against him.' (Xenophon, *Anabasis* I.1.3, trans. Brownson/Dillery)

Here the name Cyrus occurs with the definite determiner, while Tissaphernes, who was introduced as the end of the preceding paragraph, does not. Does the determiner then indicate some kind of contrast, e.g. between Cyrus and his brother? The following example contains a pair of contrastive topics which show this not to be the case:

(5) *ho men oun presbuteros parôn etugkhane.* ***Kuron***
the PART PART elder-NSG being-present-NSG happen-IM3SG. Kur-ASG

*de metapempetai apo tês arkhês hês auton satrapên*
PART summon-PR3SG from the province REL-G him satrap

*epoiêse*.
make-AO3SG

'The elder, as it chanced, was with him already; but Cyrus he summoned from the province over which he had made him satrap.' (Xenophon, *Anabasis* I.1.2, trans. Brownson/Dillery)

Here there is an explicit contrast between Artaxerxes, the elder brother, and Cyrus. As we have seen, Cyrus has already been established as a discourse referent, but neither this fact nor the contrast is apparently enough to make the determiner obligatory.

The determiner frequently, though not universally, occurs with proper names when there is a shift of grammatical subject:

(6) *en Milêtôi de Tissaphernes proaisthomenos ta auta tauta*
in Mil-DSG PART Tis-NSG finding-out-before-NSG the same those

*bouleuomenous apostênai pros Kuron, tous men autôn apekteine,*
plan-APL desert-INF to Kur-N, some PART of-them kill-AO3SG,

*tous d' exebalen.*
some PART expel-AO3SG

***Ho** de **Kuros** hupolabôn tous pheugontas sullexas strateuma*
the PART Kur-N protecting-NSG the fleeing-APL collecting-NSG army

*epoliorkei Milêton…*
besiege-IM3SG Mil-ASG

'The people of Miletus also were planning to do the very same thing, namely, to go over to Cyrus, but Tissaphernes, finding out about it in time, put some of them to death and banished others. Cyrus thereupon took the exiles under his protection, collected an army, and laid siege to Miletus…' (Xenophon, *Anabasis* I.1.7, trans. Brownson/Dillery)

In this example, the transition from Tissaphernes to Cyrus as grammatical subject/sentence topic is accompanied by the occurrence of the determiner on the new subject. This is, however, not always the case, and the name which receives the determiner is frequently not the grammatical subject. In example (4) given above, Cyrus is the direct object of the verb *diaballein* 'falsely accuse', and the object stays in postverbal position. Accordingly, it is difficult to construe it as the theme, which usually comes first in the sentence. The same goes for the following example:

(7) *Parusatis men dê hê meter hupêrkhe tôi Kurôi…*
Par-N PART PART the mother-NSG support-IM3SG the Kur-D

'Parysatis, his mother, supported Cyrus' (Xenophon, *Anabasis* I.1.4, my translation)

Here Cyrus's mother, Parysatis, is the subject, while Cyrus again occurs postverbally. Interestingly, Brownson/Dillery in their translation make Cyrus the topic as well as the subject: 'He had …the support of Parysatis, his mother…' Hence we may perhaps take the function of the determiner here to be to indicate the discourse topic: Cyrus' plans to revolt against his brother are the subject of the paragraph which example (7) is taken from, and Cyrus is the subject of the sentences which precede and follow the example sentence. The main participants in this story are the brothers Artaxerxes and Cyrus. Perhaps the determiner is used with his name to indicate that while Parysatis is the grammatical subject of the sentence, Cyrus is the underlying theme. Consequently, the main point of example (7) is not that *Parysatis* supported her son Cyrus, but that *he* received the support of his mother.

As we have seen, it is difficult to draw general conclusions about the function of the definite determiner with proper names. We might follow Dyvik's (1979) lead and assume that for proper names in Classical Greek, non-use of the determiner is the unmarked option, in contrast to Modern Greek. It may also be that the determiner indicates the discourse topic. Is it possible to identify a comparable effect with complex DPs? More specifically, does the difference between the two patterns DNDA and NDA boil down to a difference with regard to informational status in the discourse? I will return to this problem in section 7 below.

## 4 The scope of the definite determiner

In complex DPs in English, the determiner has scope over the entire NP. This is clearly seen in examples like 'the black cat', 'the tiny, old woman', etc. From a semantic point of view, the noun and the adjective are put together first, and then the determiner is applied to the NP 'black cat' as a whole. Alternative orders of composition produce ungrammatical results as 'a cat the black', 'the cat black', etc.

As shown above, there exist several possible orders for complex DPs in Greek. The one resembling the English pattern most closely is the order Determiner-Adjective-Noun (DAN). Because of the superficial similarity of these patterns in the two languages, we tend to interpret the Greek DP as equivalent to the English one in its semantics as well as in linearity. That is, we quietly assume that the determiner in Greek projects definiteness over the entire NP.

This assumption is problematic for two reasons. The first concerns the possibility of marking definiteness explicitly for the whole NP. As we have seen in example (1), postnominal attributive adjectives must be marked for definiteness separately from their nouns: *ho anêr ho agathos* 'the good man'. This fact seems to indicate that the scope of the determiner goes no further than

to the noun and has to be extended by the introduction of another determiner. This is in fact the case for every additional postnominal adjective: the determiner must be repeated for each one. Secondly, if the pattern NDA *anêr ho agathos* is interpreted as equivalent to its English translation 'the good man', then the determiner must project its definiteness upwards from the adjective to scope over the noun as well.[5]

## 5 Semantics of the definite determiner with complex NPs

The following discussion of the various patterns of complex DPs consisting of a noun and a modifying adjective will concern the configurations (1a-c) as exemplified above. My explanation is couched in terms of a compositional semantics for the complex DPs and on general considerations of economy in the marking of dependencies within the DP.

In an intensional semantics, adjectives are taken to denote functions which map properties onto referents which have the relevant properties. Thus 'red' denotes a function which, when applied to an argument, gives as its value a referent which has the property 'red', as e.g. 'red car'. (With an intersective adjective like 'red', we could use an extensional semantics without running into trouble. The above formulation would then be equivalent to saying that 'red car' denotes the intersection of the sets denoted by 'red' and 'car'.)

The definite determiner, on the other hand, denotes a function which maps its argument onto the singleton set containing the only referent which has the relevant property. In the case of a complex property like 'red car', 'the red car' denotes the intersection of 'red' and 'car' only if it contains exactly one member.

Let us try on the basis of these definitions of the semantics of the parts to analyse the composition of the various orders of the complex DP in Greek. We will begin with the configuration which resembles English most closely, viz. DAN *ho agathos anêr* 'the good man'. We start by applying the function *agathos* to its argument *anêr*. This gives us the common NP 'good man' which as mentioned above denotes a function. We let this function be the argument of the definite determiner *ho* (formally nominative masculine singular). As in our English example 'the red car', we end up with the DP 'the good man'. For a proposition containing this phrase to be true, it is at least necessary that there is only one referent which is both a man and good in the relevant model.

If we move on to the configuration DNDA, we first apply the adjective to the determiner. For 'the good man' this means that we apply 'good' to 'the'. An expression such as 'the good' is ambiguous in Greek. On the one hand, it may

[5] I will not attempt a syntactic explanation for this here, but cf. the discussion of this pattern in section 7 below.

mean that the property denoted by the adjective picks out a set which has only one member. On the other, the adjective may be taken as a null head modifier as noted by Devine and Stephens (2000: 228ff.). In this sense, the adjective picks out a contextually given referent which has the property in question. The adjective introduces a variable which is bound by any referent which satisfies the conditions inherent in the semantics of the adjective. In our case, the binding takes place at the next stage of composition, namely, when the function 'the good (one)' is applied to the argument 'man'. We now have 'man the good (one)'. The function picks out the intersection between the set denoted by 'good', a contextually given referent and the set denoted by 'man' on the condition that this set is a singleton set. At this point, we have actually derived the semantics of the configuration NDA as well. The meaning of NDA *anêr ho agathos* is thus shown to be identical to the meaning of DAN *ho agathos anêr*. They both denote the single referent which is both a man and good. In this situation it seems superfluous to apply the determiner to 'the good man' once more.

We have derived the attested orders for the combination of an attributive adjective and a noun. We will not pursue the discussion of why the historical development of a definite determiner led to exactly these configurations. This is a complicated question, which deserves a more detailed account than we are able to give at this point.

## 6 Syntax or pragmatics

We have determined that the semantics of the various attested orders within the DP does not allow us to distinguish between them in a principled way. The question remains whether the reason for the variety is to be found in syntax or pragmatics. We will discuss pragmatics first and then evaluate the consequences for the syntax.

Dik (1997) discusses the placement of modifying adjectives in relation to their nouns. She explains the various attested patterns in terms of focus. Dik concludes that an adjective appears after the noun when the adjective is not 'contrastive or otherwise the most salient element in a noun phrase' (1997: 76). When it *is* contrastive, it will appear before the noun. While she does not provide a formal analysis of the Greek noun phrase, her conclusion is compatible with a movement analysis along the lines of Devine and Stephens (2000). Her concluding statement may be reformulated as a claim that adjectives are base-generated in postnominal position. When focused, the adjective must move to a phrase internal focus position. The same applies to nouns: focused nouns move to the same phrase internal focus position. This last movement operation would, however, be string vacuous since the noun precedes the adjective in the first place and doesn't move beyond the DP.

Examples from Greek show that the complex DP configuration NDA frequently must be given a definite reading. If we combine this fact with the semantic analysis above which showed that the first determiner in the configuration is superfluous from a semantic point of view, it is tempting to hypothesize that it plays a pragmatic role. This role may be identical to the role which the definite determiner plays with proper names; in other words, the first determiner in the DNDA complex indicates the role of the DP as a whole in discourse structure.

If this is the case, then why isn't an extra determiner inserted in front of the noun in the DAN configuration? One reason may be that the 'pragmatic' determiner is always placed at the left edge of the DP as a whole. Since the DP does already have a determiner at its left edge, there is no need for a second one. Alternatively, we might appeal to a morpho-phonological rule which deletes one of two identical determiners.[6]

## 7 The pragmatic function of (D)NDA

So far our examination of complex DPs has shown that the first determiner in the DNDA configuration does not contribute to the semantics of its phrase. Rather its role is to indicate the status of the DP in discourse structure. It is not possible to give explicit expression to this distinction with DPs of type DAN. In this section we will discuss the discourse structural role of (D)NDA and give some examples of its use.[7]

Devine and Stephens cite the following example from Herodotus in order to illustrate his use of split constituents, but it is interesting as an example of NDA order as well:

(8) *epiphaneos de toutou genomenou autika hoi Aigyptioi*
visible-GSG PART he-GSG becoming-GSG at-once the Egyptian-NPL

***heimata*** *te ephoreon* ***ta kallista*** *kai êsan*
clothes-APL and put-on-IM3PL the most-beautiful-APL and be-IM3PL

*en thaliêisi*
in celebration-DPL

'When he appeared to them, the Egyptians immediately put on the

[6] Searches in the *Thesaurus Linguae Graecae* (TLG) database confirm that the writers of the classical period actively avoided sequences consisting of two identical determiners within the same phrase. The reasons for this avoidance are surely complex, but euphony and syntactical transparency probably played a part.

[7] The examples in this section are taken from Devine and Stephens (2000:238) and Brunel (1964:81).

most beautiful clothes and celebrated.' (Herodotus, *Histories* III.27, my translation)

(9) *hêdion gar an* ***kômôdias tês phaulotatês*** *ê tôn houtô tekhnikôs*
rather PART PART comedy-GSG the lowest-GSG than the so skilfully

*pepoiêmenôn akousaien*
made-GPL listen-AO3PL

'For they would rather listen to the lowest comedy than to these things which have been skilfully made.' (Isocrates, *Against Nicocles*, section 44, my translation)

The NDA phrases in these examples both belong to the rheme part of the sentence. In (7) the interesting phrase is *heimata…ta kallista* 'the most beautiful clothes'. The theme is the Egyptians, while the (first part of the) rheme consists of the information that they put on their finest clothes after the god Apis had shown himself to them. Neither part of the DP seems to be contrastively focused: the point is neither that the Egyptians put on clothes to the exclusion of other things, nor that they put on their finest clothes as opposed to their everyday clothes. In example (8) the speaker contrasts low comedy not with other varieties of comedy, but with the most elegant poetry.

The following example is instructive as well:

(10) *pôs pote hê akratos dikaiosunê pros adikian tên*
how ever the pure-NSG justice-NSG against injustice-ASG the

*akraton ekhei*
pure-ASG have-PR3SG

'…how the pure justice might be related to pure injustice…' (Plato, *Republic* VIII 545a, my translation)

Again we see that the NDA phrase belongs to the rheme. The intersective adjective *akrastos* is not contrastive, being repeated with both nouns.

Examples (11) and (12) do in fact illustrate a textual pattern in which D(A)N and NDA alternate. In these examples, the D(A)N phrase comes first, followed by the NDA phrase:

(11) *Kurou apotemnetai hê kephalê kai kheir hê dexia*
Kur-GSG cut-off-PR3SG the head-NSG and hand-NSG the right-NSG

'The head of Cyrus and his right hand were cut off.' (Xenophon, *Anabasis* I.10.1, transl. Brownson/Dillery)

(12) *Oikêsete de tas autas oikias kai khôran tên*
inhabit-FUT2PL PART the same-APL houses-APL and land-ASG the

*autên ergasesthe kai gunaiksi tais autais*
same-ASG work-FUT2PL and woman-DPL the same-DPL

*sunoikêsete*
live-together-FUT2PL

'You will inhabit the same houses and work the same fields and live together with the same women.' (Xenophon, *Cyropaedia* IV.4.10, my translation)

Example (11) is parallel to (9) in that the modifying adjectives are repeated with the following phrases. In example (10), on the other hand, the adjective *dexia* 'right' is genuinely new information, though perhaps not focused: the important point is not that it was Cyrus's right hand that was cut off, but rather that there was a cutting off of head and hand.

These examples, then, seem on the one hand to confirm Dik's hypothesis that the placement of modifying adjectives is related to their informational status. On the other hand, the parallelism between the DAN and NDA configurations strengthens the suspicion that they both are equally definite.

## 8 Conclusions

In this short survey of the various configurations of determiner phrases containing modifying adjectives in Greek, we have established that there is no semantic difference between the patterns. Their distribution in discourse does, however, show that they are sensitive to information structure. The patterns DAN and NDA are used together to distinguish focused adjectives from presupposed ones in the rheme of sentences. While DAN phrases may function both as theme and rheme, NDA phrases must be expanded to DNDA to occur as theme.

We have adduced evidence from the use of the definite determiner with proper names to show that the definite determiner may indicate the discourse topic, whether this occurs as a presupposed part of the rheme or as the theme. Detailed investigations are needed to illuminate more clearly the relation between pragmatics and syntax in the Classical Greek determiner phrase, but we hope this contribution may point the way to interesting subjects for investigations.

## References

Brunel, J. (1964): *La construction de l'adjectif dans les groupes nominaux du grec*, Paris: Presses Universitaires de France.

Büring, D. (2003): 'On D-trees, Beans and B-accents', *Linguistics and Philosophy* **26**, pp. 511-545.

Devine, A. M. and L. D. Stephens (2000): *Discontinuous Syntax. Hyperbaton in Greek*, New York-Oxford: Oxford University Press.

Dik, H. (1997): 'Interpreting Adjective Position in Herodotus', in E. J. Bakker (ed.): *Grammar as Interpretation. Greek Literature in its Linguistic Contexts*, pp. 55-76, Leiden-New York-Köln: Brill.

Dyvik, H. J. J. (1979): 'Omkring fremveksten av artiklene i norsk', *Mål og minne*, pp. 40-78.

É Kiss, K. (1998): 'Identificational focus versus information focus', *Language* **74**, pp. 245-273.

É Kiss, K. (2002): *The Syntax of Hungarian*, Cambridge: Cambridge University Press.

Holton, D., P. Mackridge and I. Philippaki-Warburton (2002): *Greek. A Comprehensive Grammar of the Modern Language*, London and New York: Routledge.

*Isocrate. Discours*, vol. 2, ed. É. Brémond and G. Mathieu, Paris: Les Belles Lettres, 1938.

Karttunen, L. (1976): 'Discourse referents', in James D. McCawley (ed.): *Syntax and Semantics 7: Notes from the Linguistic Underground*, pp. 363-385, New York: Academic Press.

Kruijff-Korbayová, I. and M. Steedman (2003): 'Discourse and Information Structure', *Journal of Language, Logic and Information* **12**, pp. 249-259.

Lyons, C. (1999): *Definiteness*, Cambridge: Cambridge University Press.

*Platonis opera*, recognovit brevique adnotatione critica instruxit Ioannes Burnet, vol. 4, Oxford: Clarendon Press, 1902.

Rooth, M. (1992): 'A Theory of Focus Interpretation', *Natural Language Semantics* **1**(1), pp. 75-116.

*Xenophon. Anabasis*, translated by Carleton L. Brownson, revised with a new introduction by John Dillery, Cambridge, Mass.-London: Harvard University Press, 1998.

*Xenophontis opera omnia*, recognovit brevique adnotatione critica instruxit E.C. Marchant, vol. 4, Oxford: Clarendon Press, 1910.

# STRATEGIES FOR SPECIFYING RELATIONS*

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**Abstract**

The generation perspective taken by optimality theoretic syntax has a lot in common with the insights gained in natural language generation. This paper explores how insights about NP generation (e.g. Reiter & Dale (2000), van Deemter (2004)) can be made fruitful for explaining the semantics and pragmatics of sentences with more than one plural NP by exploiting optimality theoretic pragmatics, as well as the list construction in discourse grammar. Though this is an exploration only (anaphora is completely neglected and no attempt is made at covering the lexicon), I would claim to show here: 1. the naturalness of the cumulative readings, 2. how the different quantificational schemata arise, 3. how exhaustivity implicatures arise, 4. how differential implicatures arise, 5. how to disambiguate double plural sentences.

## 1 How to specify relations

A normal natural language generation task is to specify a relation, given as a set of sequences of objects, as computed e.g. by a relational database.[1] One of the subtasks here is to construct singular referential expressions. It is customary in NL generation to have preferences for the kind of NP employed. This is an example statement of the preferences, meant to be correct for Dutch and extended from Reiter & Dale (2000).

(1) first and second person pronouns > reflexives > 3rd person pronoun > deictic pronouns > anaphoric definites and short names > full demonstrative NPs > full descriptions and full names > indefinites > generics

*In partial fulfillment of a promise I made to Kjell-Johan to specify all my prejudices about topics.

[1]It is certainly no accident that the pioneering PHLIQA project in the 1970's, an NL interface with a relational database, was the context for the work reported in Scha (1981) and Scha (1983).

The interpretation of the hierarchy is that if the triggering condition for one kind of NP is met, it should be employed in preference over the NPs in the lower parts of the hierarchy. The triggering conditions are the conditions under which the NP can be used and the whole scheme can be captured by saying that a certain type of NP must be used if it can be used unless there is a more preferred type that can also be used. First and second person pronouns can be used if the intended referent is the speaker or the hearer, reflexives can be used if they have a c-commanding antecedent in the same clause, 3rd person pronouns if the referent is given and highly activated. Deictical NPs are made possible by being present in the visual field, short definites and short names by the referent being activated (or for short definites employing a relational noun, if a relation to a highly activated referent is expressed). Long definites are allowed by the possibility of a definition using common ground knowledge, and indefinites are the last resort if everything else fails.

Singular quantifiers are missing from the scheme (and do not belong there since they are not referring even in the extended sense given to that concept in discourse semantics). But they will be discussed later on in this paper.

The scheme can be explained in optimality theory (a fuller treatment is given in Zeevat (2000)) by assuming a set of expressive constraints that force the expression of certain features, like reflexive, person, identifiable etc. The constraints can be left unordered since it seems that apart from 1st/2nd person not implying reflexive, the higher triggering conditions all entail the lower ones.[2] Such constraints also give rise to implicatures associated with the choice of elements from the lower part of the hierarchy: the hearer is given to understand that e.g. the choice of "a woman" implies that various features are missing like reflexive, first person, identifiability by a property or by a function, contextual salience or visibility in the perceptual field of the conversation partners. Notice that these features are definable in terms of the common ground between the speaker and the hearer.

Grice notes that A in saying (2)

(2) I saw Smith in town with a woman.

implicates that the woman is not Smith's wife, but there is a far larger class of women she is implicated not to belong to (basically no woman in the common ground of speaker and hearer or functionally related to those) and the explanation for these implicatures – including Grice's implicature – are the expressive constraints the speaker is supposed to follow.

The hierarchy does not substantially change for plural reference:

[2]This suggests that Panini's elsewhere principle also explains what is going on here. The most specific rule for referring needs to be followed and this is e.g. using the third person pronoun if the object is activated as well as discourse old and identifiable.

(3) first and second person pronouns > reflexives > reciprocals > 3rd person pronouns > deictic pronouns > anaphoric definites and short names > full demonstrative NPs > full descriptions and full names > cardinal and estimating indefinites > bare plurals and covering plural definites

These hierarchies can be used for specifying a relation $R$. For simplicity, I am here assuming that the relation is given by its extension, i.e. as a set of n-ary sequences of objects, with the objects coming from domains $A_i$ with $i \leq n$. The projections $\pi_i(R)$ are defined as $\pi_i(R) = \{a_i :< a_1, \ldots, a_i, \ldots, a_n > \in R\}$. I also assume that there is a given Natural Language sentential scheme $\zeta\alpha_1, \ldots \alpha_n$ that expresses that $x_1, \ldots, x_n$ stand in the relation $R$ iff $\alpha_1 \ldots \alpha_n$ are replaced by names for $x_1, \ldots, x_n$ respectively.

Under these assumptions, one can define a simple and natural strategy for specifying the given relation. Using the hierarchy, a referring expression is selected for each projection $\pi_i$ and filled in for $\alpha_i$ in $\zeta\alpha_1, \ldots \alpha_n$. This will be the *default strategy* in the rest of the paper. It applies both to the singular and to the plural.

For singular relations (where all projections have cardinality 1) and quite a substantial class of plural relations, this is a successful strategy. E.g. for a single plural projection in an otherwise singular relation, this gives an optimal specification, i.e. one where the hearer is maximally informed given the possibilities provided by the common ground between speaker and hearer. In case definites can be used everywhere and can in fact be used by the hearer to determine the referent, the hearer can reconstruct the input relation.

A single plural projection does no harm to this property and the cases where the projection is a single collection (rather than the set of the elements collected in it) also do not lead to specifications that are less informative than is possible.

But if there are two properly plural projections, information may be lost under the simple strategy: the information about how the members of the projections are related. This does not mean that the strategy is not used. It still is and then gives rise to intended so-called cumulative readings, but their use seems to be either a final resort: the common ground does not allow full specification or a full specification is not the goal of the conversation. For the other cases, there are alternative strategies: the *distributive strategy* and the *list strategy*.

The simple strategy operates properly for homogeneous relations:

A relation $R \subseteq A_1 \times \ldots \times A_n$ is *homogeneous* iff $R = B_1 \times \ldots \times B_n$ with $B_i \subseteq A_i$ for $i < n$.

Purely singular sentences specify homogeneous relations and all monadic relations are homogeneous. Any polyadic relation with a single plural projection is still homogeneous. It is clear that homogeneous relations can be effectively specified by generating the singular or plural NP appropriate for each of their projections.

For non-homogeneous relations there is the distributive and the list strategy. In the distributive strategy, the relation is split into a set of relations

$$R_a = \{< a, a2, \ldots, a_n >: a \in \pi_1(R)\}$$

and it works only if all the other projections of these relations are uniform in one of the senses described below. If this condition is not met, the list strategy is the only one that will lead to a proper specification.

The best case is *identity uniformity*.

(4) $\forall a, b \in \pi_1\ \pi_i(R_a) = \pi_i(R_b)$
ex. Every boy kissed the two girls.

The next best case is (definable) functional uniformity.

(5) there is a functional relation $F$ with a name $\alpha$ such that $\forall a \in \pi_1 \pi_i(R_a) = F(a)$
ex. Every boy kissed his nieces.

The next best uniformity is kind and number/estimation uniformity.

(6) there is a kind $K$ and a number/estimate $N$ with names $\alpha$ and $\theta$ such that $\forall a \in \pi_1\ \forall i \leq n\ \pi_i(R_a)$ has $N$ members of kind $K$.
ex. Every boy kissed three aunts.
Every boy kissed many girls.

The weakest form of uniformity is kind uniformity:

(7) there is a kind or set $K$ with name $\alpha$ such that $\forall a \in \pi_1\ \forall i \leq n$ all members of $\pi_i(R_a)$ are of kind $K$.
ex. Every boy kissed girls.

In essence, in finding the NP for the non-distributing projections $\pi_i(R)$, the hierarchy of NPs still applies. One is looking for the highest NP in the hierarchy such that the NP meets the triggering condition for each object $\pi_i(R_a)$ for all $a$ in the distributing projection. The nature of the uniformity determines how far this can go: identity uniformity gives no restriction, functional uniformity can be marked by 3rd person pronouns bound by $a$, definite and possessive markers, kind and

number uniformity leads to NPs like "many chicken", "some books" and "three cakes", while kind uniformity is exclusively expressed by bare plurals and covering definites.

The distributing projection itself may follow the default strategy, though explicit quantifiers ("every boy") are also possible.

The distributive strategy presupposes uniformities in the relation: each projection needs to be uniform at the very least for kind. The hierarchy of NPs gives also here the correct implicatures: if a bare plural is used, one can infer that the uniformity in that projection does not go up to identity, functional relation or count/estimate.

The list strategy finally cuts up the first projection into a partition and divides the relation over that partition. The cells of the partition determine subrelations which should be presented in turn. All strategies are in principle possible for presenting the subrelations, but it is sensible to go for efficiency here, by selecting the partition in such a way that the default strategy or the distributional strategy applies. The following list illustrates the list strategy for a given relation $LIKE \subseteq GIRLS \times DANCES$ on which the first projection is split into two singletons and the partition results into two homogeneous relations which are specified by the names of the girls and the dances.

(8) Clara likes waltzing.
Maaike likes belly dancing.

The list strategy gives rise to the discourse relation "list" which allows recursive uses. It comes with a special implicature: that the partition is a partition, i.e. that the different cells are exclusive (the kind of differential implicatures that also arise with the discourse relation "contrast") and that their union gives the whole projection (a special exhaustivity implicature going with the list discourse relation). Unlike the default and the distributive strategies, the list strategy always leads to the most informative specification and – where definites can be used all around – allows the full reconstruction of the relation by the hearer.

## 2 A Theory of Interpretation: OT Pragmatics

In other work (Zeevat 2001) I defended the following theory of interpretation given by four OT constraints. It is called a pragmatics and not a semantics because while it is a theory of how to determine the change that a given utterance makes to the common ground (conversational implicature, context change potential or update semantics – in this case also allowing "downdates" –) and thereby also a natural account of the truth conditions of sentences, it is not determined by the syntactic structure of the utterances alone, but also by contextual factors and pragmatic principles.

The theory consists of a system of four defeasible constraints given here:

(9) **FAITH** > **CONSISTENT** > ***NEW** > **RELEVANCE**

**FAITH** is the principle that an interpretation is good if one could have expressed that interpretation in the same way oneself, if one were the speaker. Utterances that are imperfect do not remain uninterpreted: one goes for the interpretation for which there are fewest violations of this principle. If one would have a full OT syntax and phonology, the principle would be finding an interpretation for which the utterance is as optimal as possible, i.e. the interpretation should be such that there is no alternative interpretation for which the utterance is more optimal given the OT syntax and phonology. Requiring full optimality is too strong: **FAITH** should not give up with pronounciation or syntactic mistakes. It should also not give up for utterances that make use of non-conventional means.

**CONSISTENT** discards interpretations which are inconsistent with the context or are implausible given the context, provided of course there are others available that are more plausible and consistent. If the language can mark inconsistency with the context (e.g. by adversative marking) or implausibility given the context (e.g. by mirative marking), **FAITH** as the stronger constraint would switch this process off, by instead preferring inconsistent or implausible interpretations.

***NEW** is the general preference for the old, expected, familiar and activated and the prohibition to add anything to the interpretation without good cause. Good cause is exclusively given by the needs of **FAITH**, **CONSISTENT** or ***NEW** itself. It prefers presupposition resolution over presupposition accommodation, partial presupposition resolution over full accommodation, highly activated antecedents for pronouns over less activated ones, old referents over new referents if both are possible.

**RELEVANCE** is the principle that any question that is activated in the context and that seems to be addressed by the utterance is in fact answered by the utterance. It prefers interpretations where the questions are answered over those where they are not. There is an interaction here with the strategic considerations of section 1. Wherever decisions are conditioned on relevance, the **RELEVANCE** principle guarantees that the hearer will faithfully reconstruct those decisions.

## 3 The meaning of plurals

The following two examples of double plurals as well as the readings attributed to them are taken from Scha (1981). I will show how these readings follow from the possible strategies and pragmatics.

(10) a. The lines cross the circles.
b. 200 firms bought 300 computers.

They give rise to many readings. The first example identifies contextually given sets LINE of lines and CIRCLE of circles. Assuming those, the readings are as in (11).

(11) a. $cross(LINE, CIRCLE)$
b. $\forall x \in LINE\ \forall y \in CIRCLE\ cross(x,y)$
c. $\forall x \in LINE\ \exists y \in CIRCLE\ cross(x,y)$
d. $\forall x \in LINE\ \exists y \in CIRCLE\ cross(x,y) \wedge$
$\forall y \in CIRCLE\ \exists x \in LINE\ cross(x,y)$
e. $\exists x \in LINE\ \exists y \in CIRCLE\ cross(x,y)$
f. $\forall y \in CIRCLE\ \exists x \in LINE\ cross(x,y)$

Here (11a) is the (implausible) collective reading (compare: The boys lifted the pianos).

The second example has 18 readings based on the following ambiguities:

(12) collective or not per coordinate
precise/at least per cardinal
scope
cumulative or not

The point of the pragmatic system is that it gives combinations of a reading with a pragmatic profile which can be matched to the discourse situation as perceived by the interpreter.

If the speaker is taken to specify the crossing relation (restricted to the lines and the circles) or the buying relation (restricted to firms and computers) by means of the default strategy, in addition to the cumulative reading (= the double existential reading if we assume both definites in (11a) are covering definites) one gets an implicature that the relation is homogeneous (the condition under which the default strategy is a strategy for specification). This then gives the double universal reading based on covering definites (14 ) to (11a) (and in principle also to (11b)).

(13) $\exists X \subseteq LINE\ \exists Y \subseteq CIRCLE\ \forall x \in X\ \forall y \in Y\ cross(x,y)$

If the business of the speaker is specification, this also gives exhaustivity implicatures: no more firms bought computers, no more computers were bought by firms. This gives precisely 200 and precisely 300 as a meaning of the cardinals. The double universal reading does not make sense for the relation of buying restricted to firms and computers (firms buy their own computers), so the assumption of the default strategy for specifying the relation in (11b) leads to the cumulative

reading with the exhaustivity implicatures, where the question which firm bought what computer is left open. For (11a) specification also brings the implicature that all and not only some of the lines and circles are involved. Otherwise, the hearer would not be able to reconstruct the relation. So (11b) is the result. The existential readings (11c) , (11d) and (11e) result from not assuming full specification.

The full result for (10b) is (14).

(14) $\exists X \subseteq FIRM\ \exists Y \subseteq COMPUTER\ (\#X = 200 \wedge$
$\#Y = 300 \wedge\ \forall x \in X\ \exists y \in Y\ buy(x,y) \wedge\ \forall y \in Y\ \exists x \in$
$X\ buy(x,y) \wedge$
$\forall z \in FIRM\ \forall v \in COMPUTER\ (buy(z,v) \rightarrow z \in X \wedge$
$v \in Y))$

But with a different predicate homogeneity is quite plausible, as in (15).

(15) 3 boys saw 5 girls.
$\exists X \subseteq BOY\ \exists Y\ \subseteq GIRL\ (\#X = 3 \wedge \#Y = 5 \wedge$
$\forall x \in X\ \forall y \in Y\ see(x,y) \wedge$
$\forall z \in BOY\ \forall v \in GIRL\ (see(z,v) \rightarrow z \in X\ \wedge v \in Y))$

The other plausible reading is the distributive one with exhaustivity implicatures.

(16) $\exists X\ \subseteq\ FIRM\ \ (\#X\ =\ 200\ \wedge\ \forall x\ \in\ X\ \ \exists Y\ \subseteq$
$COMPUTER$
$(\#Y = 300 \wedge\ \forall y \in Y\ buy(x,y) \wedge\ \forall z \in COMPUTER$
$(buy(x,z) \rightarrow z \in Y) \wedge$
$\forall v \in FIRM\ \exists w \in COMPUTER\ (buy(v,w) \rightarrow v \in$
$X)))$

The other readings can arise by assuming that full specification is not sought by the speaker. E.g. in the last case one may be interested in how many firms bought a substantial number of computers with substantial being pragmatically defined as minimally 300. This removes both exhaustivity implicatures. Or (11b) can be part of a list where groups of firms are listed according to the number of computers they bought. The exhaustivity of 300 is then maintained but the exhaustivity of 200 is now with respect to *buying 300 computers* and not with respect to *buying computers*.[3]

Notice that there is a considerable distance here from compositional semantics. The "logical forms" that were given describe the input relation under the

[3]The exactly 200 reading would still be what one gets. In the case described by (16) one gets an even stricter reading for the "quantifier" 200.

assumption that the speaker is trying to do something specific with it (specify it, count it, etc.), given her knowledge of the input relation and the common ground with the hearer. The semantic/pragmatic contraints on the relations derive from the strategy that the speaker is apparently following in order to achieve her aim. It is in principle an accident, if there exists a compositional recipee for deriving the logical form, though it may be argued that the existence of such a recipee could be a factor in making communication easier.

The strongest argument for the picture of interpretation sketched in this and the previous section is the optionality of the grammatical marking involved. Distributivity can be forced by determiners like "every", "each" and "no" or by floating markers like "each", but it is not necessary to do so. Likewise collective interpretations can be marked by "together" and "all" rules out covering interpretations of definites and bare plurals (even of cardinal NPs). But often it is not necessary to use a marker. This points to a system of defaults that one can mark against. The optionality of the markers does not make proper sense under a compositional approach[4] since it seems counterproductive to leave the interpreter in the dark with respect to which of the many readings applies and it is equally hard to see why the markers would be recruited from other material if the interpreter is anyway free to insert covert operators as she sees fit during interpretation.

The system of defaults is given to some extent by the pragmatic system. **RELEVANCE** forces the construction of goals and questions the current sentence must contribute to, given the goals and questions already in the common ground and so is responsible for mostly assuming that the speaker is trying to specify a fully known relation in an effective way, thus giving homogeneous interpretations when the default strategy is already assumed. The constraints ***DISTRIBUTIVE** and ***SPLIT** make the default strategy in effect the default strategy, but also weaker interpretations when the relation is not fully known or when full specification is not the best way to contribute to the conversation. **CONSISTENT** is important to rule out implausible homogeneous readings (as in our second example) or implausible collective interpretations (as in our first example). ***NEW** does not seem to play any role.

How did a system of this kind get in place? The fossils seem to be still around, in the form of bare nouns and floating quantifiers. Starting from the assumption that it all starts with nouns and verbs, initially noun+verb and noun+verb+noun were highly ambiguous, with the nouns being everything: kind names, pronouns, existential and universal quantifiers, definites and indefinites. Recruitment of demonstratives in an adnominal position makes it possible to disambiguate definites. Adverbs can take on the role of distribution/collection/existential markers. Finally these can coalesce with nouns into NP determiners. A separate develop-

[4]Discourse Representation Theory (Kamp & Reyle 1993) seems to have no advantages in this respect.

ment of cardinals and estimators from adjectives makes it possible to disambiguate towards indefiniteness.

The new recruitments have pushed some of the original uses of bare nouns away towards the more unclear uses: where there is no identification of the referent or group of referents, no counting is possible and there is no distribution.

## 4 Exhaustivity Implicatures

The strategies I discuss in the first section also give a theory of scalar and other implicatures. Anybody who has been thinking about problems in natural language generation knows the effect: choices need to be made in generation, the fact that a certain choice is made indicates that the speaker assumes something.

Our strategy counts where counting is possible and classifies only where that is impossible or irrelevant. If counting takes place, it indicates that (functional) identification is impossible. Splitting the most prominent projection indicates that the most prominent elements of the split form a partition of the most prominent projection and that the remaining relations are uniform. These are exhaustivity implicatures. Counting gives the special exhaustivity implicatures that used to be called scalar implicatures.

They are computed as a side effect of the hearer checking **FAITH** in her joint context with the speaker. For this she needs to put herself in the hearer's shoes. As a good Gricean she needs to discover the speaker's intentions on the basis of the utterance.

Many other Gricean implicatures can be reduced to similar strategies. E.g. the (natural) strategy of telling a story in the order of the events is responsible for moving up reference times. The strategic obligation in complex assertions of marking whether a subordinate clause holds or does not hold according to the speaker (an obligation that cannot always be carried out as in: My husband believes I am cheating on him but he does not know it) forces the choice of "when" or "because" instead of "if" when the complement is true and a choice of the irrealis when it is false and forms the basis of clausal implicatures.

## 5 Relations are Topics are Questions

Many (van Kuppevelt 1995, Umbach 2001, Krifka 1992, Zeevat 1994) have assumed that topics are questions. If topics are *wh*-questions $?x_1,\ldots,x_n\varphi$ then they are relations or at least closely related to relations. The view that they are relations is Scha's (1983), but the views of Hamblin (1973) or Karttunen (1977) or Groenendijk & Stokhof (1984) are not far removed. The point here is that for a satisfactory treatment of the relation between questions and reduced answers, one

needs to get hold of the relation somehow and all accounts should allow for that.

If one takes a conversational turn in order to settle a topic, one needs to specify a relation. This is what is done all the time, but often the specification problems are rather trivial. Sometimes the relation is on a high level, e.g. in giving the arguments against a theory or in listing the possible causes of John not being there. Good Griceans standing in the speaker's shoes see the task the speaker is trying to carry out: telling them what happened last night at the party, explaining why so little progress has been made with the paper, giving the list of the shopping, explaining where one should go to when visiting Düsseldorf. If they grasp the speaker's intention, they grasp which relation she is trying to specify and how she is trying to do it. I am here playing out Grice (1957) against the later Grice who believed in literal meaning as a basis for computing the conversational contribution. **FAITH** is all but it produces all possible conversational contributions and not a core from which the contribution has to be computed.

## References

van Deemter, K. (2004), 'Towards a probabilistic version of bidirectional ot syntax and semantics', *Journal of Semantics* **21**(3), 407–421.

Grice, H. (1957), 'Meaning', *The Philosophical Review* **66**(3), 377–388.

Groenendijk, J. & Stokhof, M. (1984), Studies on the Semantics of Questions and the Pragmatics of Answers, PhD thesis, University of Amsterdam.

Hamblin, C. (1973), 'Questions in montague english', *Studies in Language* pp. 41–53.

Kamp, H. & Reyle, U. (1993), *From Discourse to Logic*, Kluwer, Dordrecht.

Karttunen, L. (1977), 'Syntax and semantics of questions', *Linguistics and Philosophy* **1**, 3–44.

Krifka, M. (1992), 'Presupposition and focus in dynamic interpretation', *Journal of Semantics* **10**.

van Kuppevelt, J. (1995), 'Discourse structure, topicality and questioning', *Journal of linguistics* **31**, 109–147.

Reiter, E. & Dale, R. (2000), *Building Natural-Language Generation Systems*, Cambridge University Press, Cambridge.

Scha, R. (1981), Distributive, collective and cumulative quantification, *in* J. Groenendijk, T. Janssen & M. Stokhof, eds, 'Formal Methods in the Study of Language', AMC, Amsterdam, pp. 483–512.

Scha, R. (1983), Foundations for Question Answering, PhD thesis, University of Groningen.

Umbach, C. (2001), Contrast and contrastive topic, *in* I.-K. Korbayová & M. Steedman, eds, 'Proceedings of the ESSLLI 2001 Workshop on Information Structure, Discourse Structure and Discourse Semantics', Helsinki.

Zeevat, H. (1994), Applying an exhaustivity operator in update semantics, *in* H. Kamp, ed., 'Ellipsis, Tense and Questions', ILLC, Amsterdam.

Zeevat, H. (2000), Semantics in optimality theory, *in* H. de Hoop & P. Hendriks, eds, 'Optimality Theoretic Semantics', OTS, Utrecht.

Zeevat, H. (2001), 'The asymmetry of optimality theoretic syntax and semantics', *Journal of Semantics* **17**(3), 243–262.

# KNOWLEDGE AND DESIRE, FROM A GERMAN PERSPECTIVE

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**Abstract**

The German modal verb *wollen* (≈ *want*) easily embeds reports of interrogative knowledge (*know whether*), but is reluctant to take propositional knowledge reports (*know that*) as complements. The difference is accounted for in terms of presupposition projection and a bridge principle relating desire reports and knowledge. The overall setting is a presuppositional extension of Groenendijk & Stokhof's (1982; 1984) partition semantics, as proposed by Sæbø (2005).

## 1 A Puzzle

The first snow has fallen. The roads are icy. Gaby has left about an hour ago. Under normal circumstances she would have arrived at her office half an hour ago, but with the weather it is to be expected she is late. She promised to ring Heinz on her arrival. She hasn't so far and Heinz is beginning to get worried. He wants Gaby to have arrived safely and he also wants to know that she has. Heinz's state of mind can be summed up by two German sentences:

(1) Heinz will wissen, ob Gaby im Büro ist.
Heinz wants to-know whether Gaby in-the office is
'Heinz wants to know whether Gaby is in her office.'

(2) Heinz will, dass Gaby im Büro ist.
Heinz wants that Gaby in-the office is.
'Heinz wants Gaby to be in her office.'

What Heinz wants, then, is to be in a situation in which not only Gaby is safe but in which he also knows that she is safe. It would thus seem that his state of mind may be summed up by one German sentence:

(3) Heinz will wissen, dass Gaby im Büro ist.
Heinz wants to-know that Gaby in-the office is.
'Heinz wants to know that Gaby is in her office.'

However, (3) does not express a consequence of (1) and (2), and it is not an appropriate way to describe the situation either. To the extent that (3) is appropriate at all, it has an entirely different meaning, due to an *ersatz* interpretation of *will* as meaning something close to *claim*. In the present note, I will ignore the latter phenomenon altogether[1] and pretend that (3) is simply ill-formed, be it for syntactic, semantic, or pragmatic reasons. And I will seek a semantic explanation.

When it comes to marking an expression inappropriate, two kinds of semantic explanation spring to mind. First, the expression might fail to express any content. This happens if its (semantic) presuppositions are jointly unsatisfiable, e.g. because some selectional constraint is violated. Alternatively, the content of the expression might be useless in one way or other. This happens if it is obviously redundant or, in the case of a sentence, clearly contradictory.

Although the latter account of oddity in terms of information value may be a far cry from a full explanation – after all, we do speak redundantly once in a while, and we may use obvious contradictions, albeit not in a literal way – if the case can be made that an ill-formed expression would have had a neurotic content, this might give a clue for why it is ruled out on syntactic grounds.

## 2 A Failed Attempt

### 2.1 Semantic Analysis

In the case at hand, a rather straightforward account in terms of contradictoriness suggests itself. It rests on the observation that the truth of (4) may be concluded from a report like (2):

(4) Heinz weiß nicht, ob Gaby im Büro ist.
Heinz knows not whether Gaby in the office is
'Heinz does not know whether Gaby is in her office.'

If the inference from (2) to (4) follows a general pattern, one would expect it to also apply to (3), leading to:

[1] The *ersatz* reading appears to occur whenever the literal reading would be inappropriate. In particular, it takes over with complements in the present perfect, as in *Er will sie getroffen haben*, which translates as *He claims to have met her*.

(5) Heinz weiß nicht, ob er weiß, dass Gaby im Büro ist.
Heinz knows not whether he knows that Gaby in-the office is
'Heinz does not know whether he knows that Gaby is in the office.'

This conclusion, however, may be construed as contradicting certain fundamental principles of knowledge, viz. what is known as *Strong Introspection* in epistemic logic. Hence if indeed (3) implies the contradictory report (5), this fact may be part of an explanation of why such a report is felt inappropriate.

In order to make the above reasoning precise – and then reject it – I will cast it in a surface-oriented (and thus somewhat superficial) semantic framework. To capture the interaction between knowledge as a propositional and as an interrogative attitude, i.e. between *wissen dass* [*know that*] and *wissen ob* [*know whether*], I will rely on a partition semantics of questions that treats an *ob*-complement as a bi-partition of Logical Space (*LS*).[2] In such a framework, the difference between *dass*- and *ob*-complements comes out as follows:

(6) $\|dass\ \mathrm{S}\|_a = \{i \in LS \mid \|\mathrm{S}\|_i = 1\}$

(7) $\|ob\ \mathrm{S}\|_a = \{i \in LS \mid \|\mathrm{S}\|_i = \|\mathrm{S}\|_a\}$

A quick word on notation in case it is not obvious. I am using '*a*', '*i*', and '*j*' as variables ranging over members of *LS* (whatever they may turn out to be). If E is an expression, '$\|\mathrm{E}\|$' denotes its intension, i.e. a function assigning to any point in *LS* E's extension at that point; sub-scripts are used for the arguments of intensions. In the case of sentences, which belong to category S and are denoted by the variable 'S' (this abuse of notation is of course customary), the extension is one of the truth values 0 (false) and 1 (true). Hence the intension of a sentence is a characteristic function of a subset of *LS*, the *proposition* it expresses. Thus according to (6), the extension of a clause of the form '*dass* S' is the proposition expressed by the sentence S. And according to (7), the extension of '*ob* S' is that proposition if it is true, and its complement otherwise. In particular, the extensions of both *dass*- and *ob*-clauses are propositions, and their intensions are *propositional concepts*,[3] i.e. functions from *LS* to its power set (of propositions). Under this semantic assumption they may be subsumed under one category $\mathrm{S}_{comp}$ and be given a uniform treatment as complements to verbs like *wissen*:

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[2] Cf. Groenendijk & Stokhof (1982, 1984); for the present purposes the restricted version of Lewis (1982) suffices. In the present setup the partitions come out as the *ranges* of the intensions of interrogative clauses.

[3] The concept and the term derive from Stalnaker (1978), where they are employed for entirely different (pragmatic) purposes, though.

(8) $\|wissen\|_a(Q)(x) = 1$ iff $Epi_x(a) \subseteq Q_a$

– where $a \in LS$, $Q$ is any propositional concept, and $x$ is an arbitrary subject. (8) rests on the assumption that the epistemic perspective of any subject $x$ at any given point $a$ in Logical Space can be modelled by a non-empty set $Epi_x(a)$ comprising the possibilities $i \in LS$ that are not excluded by $x$'s knowledge at $a$.[4] According to (8), the verb *wissen* expresses a relation holding between individuals $x$ and propositional concepts $Q$ just in case the proposition $Q_a$ determined by $Q$ at the actual point $a$ is true of all $i$ in $x$'s epistemic perspective, $Epi_x(a)$. In case $Q$ is derived by (6), $Q_a$ is the proposition expressed by the embedded sentence; if $Q$ is derived by (7), $Q_a$ is either the proposition expressed by the complement – or its complement, depending on which of the two is true of $a$.

In a similar vein, the extension of *will* can be specified in terms of bouletic perspectives $Bou_x(a)$ that contain all and only those $i \in LS$ at which everything is the case that $x$ wants at point $a$. I will skip the obvious treatment of *that*-clause embeddings as in (2) and only formulate the clause for *will* as a (subject) control verb of category $\mathrm{V}_{cont}$, where the proposition corresponding to $Q_a$ in (8) is obtained by saturating the open proposition expressed by its complement (of category $\mathrm{VP}_{inf}$) with the attitude subject:

(9) $\|will\|_a(P)(x) = 1$ iff $Bou_x(a) \subseteq \{i \in LS \mid P_i(x) = 1\}$

The internal compositionality of the most deeply embedded clause in (1)–(5) is of no concern here; we will refer to the proposition it expresses as '$g$', as shown in (10). (11) gives the straightforward interpretation of the name *Heinz* of category $\mathrm{NP}_{prop}$, where $D$ is the set of individuals.

(10) $\|Gaby\ \ im\ \ Büro\ \ ist\|_a = 1$ iff $a \in g$

(11) $\|Heinz\|_a = h\ (\in D)$

Apart from these assumptions about the contribution of the relevant lexical material, we also need some rules of construal taking care of meaning composition. These are quite straightforward, the relevant semantic combinations being varieties of functional application:

(12) $\|\mathrm{NP}_{prop}\ \ \mathrm{VP}\|_a = \|\mathrm{VP}\|_a(\|\mathrm{N}P_{prop}\|_a)$

(13) $\|\mathrm{V}_{fact}\ \ \mathrm{S}_{comp}\|_a = \|\mathrm{V}_{fact}\|_a(\|\mathrm{S}_{comp}\|)$

[4] Cf. Hintikka (1962, 1969). The usual disclaimers about *de se* complications apply.

(14) $\left\|\mathrm{V}_{cont}\ \ \mathrm{VP}_{inf}\right\|_a = \left\|\mathrm{V}_{cont}\right\|_a(\left\|\mathrm{VP}_{inf}\right\|)$

It is readily verified that the above assumptions lead to the following predictions concerning the interpretation of (3):

(15) $\left\|(3)\right\|_a = 1 \text{ iff } Bou_h(a) \subseteq \{i \in LS |\ Epi_h(i) \subseteq g\}$

## 2.2 Logical Analysis

Without further ado, (15) does not guarantee that (3) expresses a contradiction. What is still needed are (i) assumptions about the interaction between the intensions of *wissen* and *will*, as well as (ii) some basic principles of epistemic logic. Without (i), the inference from (3) to (5) would not be available; without (ii), (5) could not be shown to be contradictory. Both (i) and (ii) can be attacked more conveniently by introducing some notational conventions, thereby transposing the present discussion into 'Heinzentric' epistemic and bouletic logic. For any proposition $p \subseteq LS$, let '**K***p*' and '**W***p*' denote the following propositions, respectively:

(16) $\{i \in LS |\ Epi_h(i) \subseteq p\}$

(17) $\{i \in LS |\ Bou_h(i) \subseteq p\}$

Moreover, following established practice of modal logic, we may construe Boolean connectives as operations on propositions: $\neg p \coloneqq LS \setminus p$; $p \wedge q \coloneqq p \cap q$; etc. With this notation the truth condition given in (15) may be expressed by a term denoting the proposition expressed by (3):

(18) **WK***g*

The notation can also be used to formulate the general principles of epistemic logic. As a case in point consider the principle that what is known is true. In terms of the present framework this means that any point *i* in Logical Space and any individual *x* would have to satisfy:

(19) $i \in Epi_x(i)$

Given our notation, (the Heinzentric version of) principle (19) can be reformulated as the *Reflexivity* axiom of epistemic logic:[5]

[5] The term alludes the fact that (19) expresses that the *epistemic accessibility* relation $\{(i,j) \in LS^2 |\ j \in Epi_h(i)\}$ is reflexive. The (well-known) equivalence, or *correspondence*, between (19) and (A0) holds if the latter is understood as a second-order condition to the effect that the proposition it denotes coincides with *LS*, *for any* $p \subseteq LS$. See van Benthem

(A0) $\mathbf{K}p \rightarrow p$

Two further axioms expressible in this modal language are valid solely due to our coarse-grained account (8) of epistemic perspectives:

(A1) $(\mathbf{K}p \wedge \mathbf{K}q) \rightarrow \mathbf{K}(p \wedge q)$

(A2) $\mathbf{K}p \rightarrow \mathbf{K}(p \vee q)$

Clearly, these axioms do not suffice to derive the desired inference. We still need to make the connection between (2) and (4), and between (3) and (5) – which can naturally be achieved by way of a Bridge axiom spanning the gap between epistemic and bouletic modality:

(B) $\mathbf{W}p \rightarrow (\neg\mathbf{K}p \wedge \neg\mathbf{K}\neg p)$

Given the above semantic analysis, (B) expresses that a lack of knowledge whether $p$ follows from the desire of wanting $p$ to hold. As a case in point, assuming that *nicht* reverses truth values, it is easy to verify that (3) and (5) express the propositions (20) [= (18)] and (21), respectively:

(20) $\mathbf{WK}g$

(21) $\neg\mathbf{KK}g \wedge \neg\mathbf{K}\neg\mathbf{K}g$

Hence (B) adequately captures the pattern behind the inference aimed at. It remains to be shown that the proposition (21) expressed by (5) is indeed contradictory, i.e. the empty set. To this end one needs to introduce principles concerning the iteration of epistemic operators. The most obvious – and widely accepted – ones turn out to do the trick:

(A3) $\mathbf{K}p \rightarrow \mathbf{KK}p$

(A4) $\neg\mathbf{K}p \rightarrow \mathbf{K}\neg\mathbf{K}p$

(A3) says that whatever is known (by Heinz) is known to be known; according to (A4), whatever is not known is known to be not known. Together, (A3) and (A4) guarantee that the relational structure of Heinz's epistemic perspective is

(1984) for the general setup. (19) and (A0) cover only one direction of the *factivity* of *wissen*, to which I will come in Section 3.2.

particularly simple and transparent;[6] and they also guarantee the desired contradiction. To see this, one should first note that, by (contraposing) Positive Introspection (A3), (21) implies (22), which in turn implies the contradiction (23), by (contraposed) Negative Introspection (A4):

(22) $\neg \mathbf{K}g \wedge \neg \mathbf{K} \neg \mathbf{K}g$

(23) $\neg \mathbf{K}g \wedge \mathbf{K}g$

Since (3) expresses (20), which – given (B) – implies (21), which has just turned out to be contradictory, (3) itself is contradictory. As remarked earlier, this deficiency may be argued to be part of an explanation of why (3) is infelicitous.

However, this cannot be right. For the principles we have used to rule out (3) by deriving a contradiction from (20), may also be employed to rule out (1) by deriving a contradiction from one of its consequences, viz.:

(24) $\neg \mathbf{K}(\mathbf{K}g \vee \mathbf{K} \neg g) \wedge \neg \mathbf{K} \neg (\mathbf{K}g \vee \mathbf{K} \neg g)$

Given (B), (24) follows from (25), which is the proposition expressed by (1), as the reader may care to verify:

(25) $\mathbf{W}(\mathbf{K}g \vee \mathbf{K} \neg g)$

Now two applications of the Disjunctive Weakening axiom (A2) to the left conjunct of (24) yield (26), which again can be seen to imply (27), by two applications of the Positive Introspection axiom (A3):

(26) $\neg \mathbf{K}\mathbf{K}g \wedge \neg \mathbf{K}\mathbf{K} \neg g \wedge \neg \mathbf{K} \neg (\mathbf{K}g \vee \mathbf{K} \neg g)$

(27) $\neg \mathbf{K}g \wedge \neg \mathbf{K} \neg g \wedge \neg \mathbf{K} \neg (\mathbf{K}g \vee \mathbf{K} \neg g)$

However, (27) is the same proposition as (28), from which the contradiction (29) follows, by the Conjunctive Distribution Axiom (A1):

(28) $\neg \mathbf{K}g \wedge \neg \mathbf{K} \neg g \wedge \neg \mathbf{K}(\neg \mathbf{K}g \wedge \neg \mathbf{K} \neg g)$

(29) $\neg \mathbf{K}g \wedge \neg \mathbf{K} \neg g \wedge (\mathbf{K}g \vee \mathbf{K} \neg g)$

[6] More precisely, (A3) and (A4) jointly correspond to the condition that the relation defined in the previous footnote is transitive and Euclidian and can thus be modelled by a 'split partition' of Logical Space; cf. Zimmermann (1999: 269).

It would thus seem that the reasoning used to rule out (3) as contradictory also rules out (1), which is not only consistent but a perfectly adequate report of the situation at hand. So either there is something wrong with the semantic background assumptions or one of the above principles is not correct. I will argue for the former.

## 3 Amendments

### 3.1 Time

Let us take a closer look at the above *reductiones* of the propositions (20) and (25) expressed by (3) and (1), respectively, and at the principles underlying that reasoning. In both cases the initial step was made by invoking the Bridge axiom (B), which ought to reflect the intuition that German *will* (or English *want* for that matter) cannot report a desire that the subject knows to be satisfied or unsatisfiable. Whatever the precise basis of this intuition, I think it is not entirely misguided. Nor, I contend, is there anything wrong with attributing full positive and negative introspective powers to Heinz. In fact, by introspection, Heinz is fully aware of his own ignorance as to Gaby's whereabouts. This, however, flatly contradicts what (20) and (25) seem to imply according to (B), viz. that Heinz is unaware of his own ignorance. However, the contradiction ought to be seen as revealing a certain sloppiness in our application of (B), and not a reason for rejecting the bridge principle altogether. For Heinz's introspection and his desire concern different objects: whereas he *knows* that he is *presently* unaware of Gaby's whereabouts, he *wants* his knowledge to increase *soon*. And while he is fully informed about his present state of knowledge, his clairvoyant powers are somewhat limited, even if restricted to matters of his own epistemic perspective. In particular, he does not know whether he will ever find out about Gaby's whereabouts, and so he does not know whether what he wants to be the case, will be: that, *at some future time*, he will know that *g* is true, or at least whether *g* is true. Once the future directedness of desire is taken into account, the conflict with introspection ought to vanish.

So let us add a temporal dimension to the framework introduced in the previous section by dissecting the points of Logical Space into coordinates: $LS = W \times T$, where $W$ is the set of possible worlds and $T$ consists of (absolute) times that are ordered by the relation $\leq$ of temporal precedence and its converse $\geq$, which we take to be weak (= reflexive) linear orderings. We can now capture the future orientation of *will* by replacing the meaning assignment (9) with:

(30) $\|will\|_a(P)(x) = 1$ iff $Bou_x(a) \subseteq \{(w,t) \in LS \mid P_i(x) = 1, \text{ for some } t' \geq t\}$

According to (30), a proposition to which the subject stands in the *will* relation need not be true in his or her bouletic alternatives; it suffices if it eventually becomes true at some point in the future. Of course, it may be true, because the proposition may hold unbeknownst to the subject. Given this correction, instead of (20) and (25), the tenseless propositions expressed by (3) and (1) must now be replaced by:

(31) $\mathbf{WFK}g$

(32) $\mathbf{WF}(\mathbf{K}g \vee \mathbf{K}\neg g)$

– where **F** is a weakened version of the Priorian future operator:

(33) $\mathbf{F}p = \{(w,t) \in LS \mid (w,t') \in p, \text{ for some } t' \geq t\}$

The weakening lies in the fact that the underlying relation of temporal precedence is reflexive. Hence one of the general principles **F** satisfies is Reflexivity: [7]

(A5) $p \rightarrow \mathbf{F}p$

I can see no reason why (31) or (32) should be contradictory. In particular, the Bridge axiom (B) no longer creates havoc: in relation with the above two propositions, it only leads to conclusions concerning Heinz's ignorance about his own future epistemic states, as the reader is invited to verify.[8] But then, once the conflict between the interpretation of (1) and the above principles of knowledge and desire has been resolved, (3) no longer comes out as contradictory either. Hence more ought to be done to arrive at a semantic explanation of what is wrong with (3).

### 3.2 Presupposition

According to (A0), which has not been brought into action so far (as the reader may have noticed), knowledge implies truth. Hence (A0) only partially accounts for the well-known factivity of *wissen*. This is in line with a lot of previous work in epistemic logic, but also in partition semantics, where the presuppositional

[7] Cf. Prior (1967), Chapter VII, for the irreflexive variant of **F**. The implicational directions of (A0) and (A5) are reversed, because **K** is universal and **F** existential; by duality, (A5) also corresponding to reflexivity.

[8] (31), or (32), may still be contradictory for independent reasons. To establish their consistency, the logical and metaphysical principles regarding time, knowledge, and desire would have to be made explicit – which is clearly too ambitious a task to be attacked in this short note.

nature of factivity is frequently treated as a *quantité négligeable*. However, Kjell Johan Sæbø (2005) recently argued that a full treatment of factivity within partition semantics could be employed to give a simple explanation of why *know*, but not *believe*, may embed interrogatives. I will now argue that it can also help explaining the oddness of (3).

In order to account for the factivity of *wissen* we must trade the above classical framework for one that allows for partial intensions. To keep notational changes and extravagances to a minimum, I will only add presuppositions as side-conditions to those meaning assignments from Section 2.1 that directly affect the problem under scrutiny, beginning with a replacement of (8) by:

(34) $\|wissen\|_a(Q)(x) = 1 \text{ iff } Epi_x(a) \subseteq Q_a \;//\; a \in Q_a$

In (34), the presupposition is given immediately to the right of the double-slash. Hence (34) abbreviates:

(35) $$\|wissen\|_a(Q)(x) = \begin{cases} 1 \text{ iff } Epi_x(a) \subseteq Q_a \text{ and } a \in Q_a; \\ 0 \text{ iff } Epi_x(a) \not\subseteq Q_a \text{ and } a \in Q_a; \\ \text{undefined otherwise.} \end{cases}$$

The presupposition in (34) makes sure that the extension of *wissen* only yields a truth value (given a subject) if the complement clause expresses a true proposition. In case this complement is a *dass*-clause, the proposition denoted is its intension; hence (34) does impose factivity. If, on the other hand, the complement is of the form *ob* S, the presupposition will only create a truth value gap if the intension of S is undefined for the index *a* under consideration; otherwise, according to (7),[9] the complement denotes a proposition that is true at *a*: the *ob*-clause denotes the true of two alternatives, and that the true of the two is true is a truism! In other words, the presupposition imposed by (34) is always satisfied if *Q* happens to be the denotation of an *ob*-clause (as long as the presuppositions of the latter are satisfied). There is thus an asymmetry in the presupposition behaviour of *dass*-clause embedding *wissen* and its *ob*-clause embedding use: the former, but not the latter, is a presupposition trigger. This asymmetry will help to settle the puzzle about (3); for it will carry over to embeddings of *wissen* under *will*.

What remains to be done is to adapt the interpretational clause (30) for *will* to the case where the embedded material carries a presupposition. I will assume

[9] Unless specified otherwise, the classical conditions from Section 2.1 are understood as only carrying the presupposition that all the terms occurring in them have a denotation. Hence (7) only presupposes that S has a truth value at point *a*.

that in such a case the presupposition must be part of the subject's knowledge.[10] However, we must take care of the implicit future shift observed in the previous sub-section: since the desired state of affairs need not already obtain, its presuppositions need not be known to hold at the time the report is about either. We thus arrive at the following presupposition scheme:

(36) $(30)\ //\ Epi_x(a) \subseteq \{(w,t) \in LS \mid P_{(w,t')}(x) \in \{0,1\}, \text{for some } t' \geq t\}$

For simplicity, let us continue to assume (10), whereby the clause *Gaby im Büro ist* is presupposition-less. Then, given (36), the proposition expressed by (3) – i.e. the set of indices at which its extension is (defined and) 1 – turns out to be:

(37) $\mathbf{WFK}g \wedge \mathbf{KF}g$

Since (37) derives from the (amended) classical analysis (31) by intersecting it with the presupposition triggered by *will*, this result is neither surprising nor exciting. But it is sufficient to obtain the desired contradiction. For (37) is at odds with (B), which we may directly apply to its left conjunct, leading us from (37) to:

(38) $\neg\mathbf{KFK}g \wedge \mathbf{KF}g$

By the temporal Reflexivity axiom (A5), (38) may be rewritten as (39), to which the contrapositive of Disjunctive Weakening (A2) can be applied, yielding (40):

(39) $\neg\mathbf{K}(\mathbf{K}g \vee \mathbf{FK}g) \wedge \mathbf{KF}g$

(40) $\neg\mathbf{KK}g \wedge \mathbf{KF}g$

By Positive Introspection (A3), again taken contrapositively, we can get rid of one of the **K**s in the left conjunct of (40); given (A5), we may thus conclude (41) from (40):

(41) $\neg\mathbf{K}(g \vee \mathbf{F}g) \wedge \mathbf{KF}g$

But (41) is clearly inconsistent, in view of the disjunction principle (A2). We thus conclude that (3) is incoherent in that the proposition it expresses is necessarily inconsistent. The reader is invited to verify this result in a direct way, without taking the detour via logical notation.

[10] In that respect (36) is stronger than the usual assumption (made about English *want*) that the presupposition need only be true *according to the subject*; cf. Karttunen (1974). I do not have anything to say about this matter, except that (36) is useful when it comes to explaining the oddness of (3) as a case of necessary presupposition failure.

The above reasoning started out with the factive presupposition triggered by *wissen* and filtered by *will*. It will thus not carry over to (1) where, as we have seen, the embedded infinitival is presupposition-less. Thus Sæbø's asymmetry between propositional and interrogative knowledge saves us from paradox.

## 4 The View from English

A superficial comparison between the samples obtained by googling *will wissen dass* and *wants to know that* indicates that English speakers appear to be a lot more comfortable than their German counterparts with directly reporting desires for propositional knowledge.[11] If the above analysis is correct, then this difference between German *will* and English *want* as regards the embeddability of epistemic reports must be explained in terms of presupposition management, i.e. triggering and/or projection. I will have to leave this to future research.

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## References

van Benthem, J. (1984): 'Correspondence Theory', in D. M. Gabbay & F. Guenthner (eds.): *Handbook of Philosophical Logic. Vol. II*, Dordrecht, pp. 167-248.

Groenendijk, J. and M. Stokhof (1982): 'Semantic Analysis of *Wh*-Complements', *Linguistics and Philosophy* **5**, pp. 175-233.

Groenendijk, J. and M. Stokhof (1984): *Studies on the Semantics of Questions and the Pragmatics of Answers*, Ph.D. Dissertation Universiteit van Amsterdam.

Hintikka, J. (1962): *Knowledge and Belief*, Ithaca, N.Y.

Hintikka, J. (1969): 'Semantics for Propositional Attitudes', in J. W. Davis et al. (eds.): *Philosophical Logic*, Dordrecht, pp. 21-45.

[11] To be sure, the string *will wissen dass* does occur frequently, but then (as far as I could check) usually on the *ersatz* reading mentioned earlier (*will* ≈ *claims*). There is one exception though, which awaits explanation in terms of the above analysis: if *wissen dass* occurs in a direct question the presupposition may be cancelled: *Wer will schon wissen, dass er unheilbar krank ist?* (≈ *Who wants to know that he is fatally ill?*).

Karttunen, L. (1974): 'Presupposition and Linguistic Context', *Theoretical Linguistics* **1**, pp. 181-194.
Lewis, D. K. (1982): '"Whether"-Report', in T. Pauli et al. (eds.): *320311. Philosophical Essays Dedicated to Lennart Åqvist on his Fiftieth Birthday*, pp. 194-206, Uppsala.
Prior, A. M. (1967): *Past, Present, and Future*. Oxford.
Sæbø, K. J. (2005): 'A Whether Forecast', paper presented at the *Sixth International Tbilisi Symposium on Language, Logic and Computation*, Batumi, Georgia.
Stalnaker, R. (1978): 'Assertion', in P. Cole (ed.): *Syntax and Semantics 9: Pragmatics*, New York, pp. 315-332.
Zimmermann, T. E. (1999): 'Scepticism de se', *Erkenntnis* **51**, pp. 267-275.