

Language, Text, and Knowledge



Text, Translation, Computational Processing

2

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Language, Text, and Knowledge

Mental Models of Expert Communication

Edited by

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Preface

When people use text to communicate, some special knowledge is usually at stake. *Language, Text, and Knowledge* is aimed at drawing together some new attempts to explain how knowledge and language interact when people create, use, and understand text. By the end of the 1990's, practically all of the cognitive sciences shared this aim to a greater or lesser degree, and had succeeded to a greater or lesser extent in realizing their ambitions. In view of their common interests, however, and to help consolidate their gains, workers in these fields should perhaps be encouraged in coming years to move more towards one another. The present volume, which draws together work by linguists, psychologists, and psycholinguists may illustrate both some reasons for and some advantages of doing this.

In a communication setting, special knowledge is often also the knowledge of specialists. The kind of knowledge this book focuses upon is largely that possessed by experts, and the kind of communication it focuses upon is largely communication about a domain which in some way involves experts. The overarching view of cognition it embraces is that of mental models: that the world, knowledge, and the world of text are represented cognitively in particular, understandable ways (and which are also understandable to most nonexperts).

For their generous and patient help in producing this volume, we are most grateful to the other contributors, and to Maja Seilund and Elisabeth Halskov Jensen of the Copenhagen Business School, who struggled with us to produce a presentable final product. Thanks are also due to C.B.S. itself for its support of the research project *Mental Models in LSP*, and to Katja Huder and Dr. Anke Beck of Mouton de Gruyter.

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Lita Lundquist and Robert J. Jarvella

Introduction

This book is an attempt to cast light on the interplay of language and knowledge in texts which are used in expert communication. It combines ideas and approaches from scientific disciplines which share an interest in explaining how language is used in real situations, and does so from the perspective of people actually using language.

The three domains included in the title - language, knowledge and text - have been studied with success in different disciplines: linguistics, the other cognitive sciences, and text linguistics. There have also been attempts to integrate these areas in work in experimental psycholinguistics. However, linking the three domains together to explore a fourth area - expert communication - adds a specific and relatively uncharted dimension: that of *specialised knowledge* and *differences in knowledge*, as reflected in the distinction between experts and laymen.

This new dimension at the same time is an earmark of the field of Language for Specific Purposes (LSP), or *Fachsprache*. With this volume, we aim to examine and explore various aspects of LSP in light of progress made in the areas of language, knowledge and text. To do this, we have chosen an overarching theoretical approach: that of *mental models*. A mental model, borrowing Philip Johnson-Laird's early formulation (1983: 397), is a theoretical construct which represents "objects, states of affairs, sequences, the way the world is...", and whose function is to "enable individuals to make inferences and predictions to understand phenomena..." such as texts and actions in general.

The authors who contributed to this book are working on the general problem of determining how linguistic and cognitive structures are related, and how these structures are reflected in texts which treat specialised domains of knowledge, both when texts are aimed at experts and at non-experts. They are interested in asking not only how readers draw upon background knowledge, but also exploit other kinds of knowledge when reading and interpreting expert texts. And this is where the concept of mental models comes in.

Two important notions above are *structure* and how structures are *related*. It has been shown in several areas of linguistics that language has structure which contributes to meaning. Work in semantics has shown that lexical meaning is structured and that lexical items enter into predictable relations with each other. Work in syntax has shown that phrases, clauses and sentences have internal structure which also mark regular meaning relations. And work in pragmatics has shown that utterances have structures which are related to and reveal intentions, illocutions and the like in a principled way.

But in much of theoretical linguistics, structure seems to stop at the sentence boundary. Only sentences and units within sentences there are often considered to

have structure and to bear structural relations. One consequence of deciding to accept this limitation is that for higher-order linguistic expressions, such as sentence pairs, larger text sequences and full texts, implicitly knowing what the structure is of words, phrases, clauses and sentences will not generally suffice for a person reading a text to correctly infer the relations between the parts, or to (re)construct much more than a propositional representation of the text.

Text linguists, however, have shown that texts also have structure, namely specific structures of their own. These may be thematic structures following the theme - rheme principle (Danes 1970; Halliday 1967), rhetorical structures organizing successive sentences in list or satellite relations (Matthiessen - Thompson 1988), rhetorical relations such as elaboration, motivation, etc. (Asher - Lascarides 1995), text-typical structures based on, e.g., narrative, such as represented in story grammars (Rumelhart 1975), or argumentative structures which program the text-interpreting process (Lundquist 1989, 1993). Recently, some text linguists have pointed out that there exists an iconicity between text structures and other linguistic structures (Dressler 1996), whereas others, mainly cognitive linguists, argue that linguistic structures, including ones transcending sentence boundaries, are iconic with general knowledge structures (Langacker 1991).

In fact, knowledge is structured as well, as shown by work in cognitive science. Knowledge about (parts of) the world is structured and represented in mental models (Johnson-Laird 1983), often according to very general principles, such as found in frames (Barsalou 1992, Fillmore 1985), canonical event models (Langacker 1991), scripts (Schank - Abelson 1977), and scenarios (Sanford - Garrod 1981), which all can be subsumed under the even more abstract concept of "idealized cognitive models" (Lakoff 1987). It is this kind of mental model which can help the receiver of a text to infer relations in it, including relations between higher-rank text sequences, and to (re)construct a coherent mental representation of text content.

The relation between the structure of knowledge and the structure of text has been investigated before, mainly by psycholinguistics (see Garrod - Sanford 1994 and Sanford - Garrod 1994 for an overview). But the texts used in such studies have until now generally been limited to ones about domains of common knowledge, and belonging more often than not to narrative, descriptive or expository text genres.

In this volume, we apply the approach of mental models to texts which are used in expert communication, from experts to (more or less) experts, about specific expert domains. The domains of specialized knowledge treated here come from law, medicine, sociology, economics, and the study of risk. We suppose that specialized knowledge is structured in a special way, according to an expert's concepts in his own domain, and contains specific relations and reasoning rules. Some of the articles presented here are concerned with structures, relations and reasoning rules which are specific for expert knowledge (Kjær; Madsen), others

with how expert knowledge differs from novice knowledge (Noordman—Vonk—Simons; Palsbro).

In this perspective, understanding specialized texts presupposes special(ized) background knowledge which is used during reading to construct a coherent mental representation of text content. It is also likely, however, that readers without such background knowledge can understand specialized text to a limited extent by drawing on other resources, such as linguistic and textual knowledge. This is one conclusion of a number of articles included here (Almlund; Engberg; Jarvella—Mathieu; Lundquist). Finally, there is a controversy as to under what circumstances, and for what audience, numerical information should be expressed using actual numbers such as probabilities rather than other natural language expressions (Sanford—Moxey).

What binds the twelve papers presented here together is their common focus on the interaction between cognitive aspects of language and text on the one hand, and the structure of specialized knowledge on the other. We set out to investigate to what extent structures and relations which are specific to specialized knowledge domains are in certain respects necessary for, and in other respects derivable from, reading and understanding of expert texts. The papers focus on different levels of analysis: from words (Racah; Engberg) and phrases (Høeg Müller), to (embedded) sentences (Almlund) and cross-sentential relations (Lundquist), to argumentation (Palsbro), texts (Rothkegel; Madsen; Jarvella—Mathieu) and knowledge domains (Kjær; Noordman—Vonk—Simons; Sanford—Moxey).

The papers use methodological approaches from theoretical linguistics (Racah; Høeg Müller), text linguistics (Almlund; Lundquist), translation theory (Rothkegel), LSP (Engberg; Kjær; Madsen) and experimental psychology and psycholinguistics (Jarvella—Mathieu; Noordman—Vonk—Simons; Palsbro; Sanford—Moxey). Several of the chapters (Almlund; Kjær; Lundquist; Madsen; Palsbro) further continue a tradition in discourse description started by Mann and Thompson (1992), and take up in part the same text studied from different theoretical perspectives. In this case, data are reported based on analysis of a legal judgment handed down by a supreme court. All the chapters combine their particular methodological focus and data-based approach with more cognitive aspects, and in this sense, the book represents a truly interdisciplinary and transdisciplinary enterprise.

We have chosen to present the papers in an order which combines the two perspectives outlined above, starting with smaller linguistic units (words, phrases, clauses etc.) and moving towards larger and more comprehensive cognitive and linguistic ones.

In “Lexical and dynamic topoi in semantic description: A theoretical and practical differentiation between words and terms”, *Pierre-Yves Racah* uses the linguistic paradigm of “Argumentation within Language” (Anscombe - Ducrot 1983) to demonstrate the difference between words in natural language, and terms in specialized language. Racah argues that, whereas words cannot help but reveal

the point-of-view of their utterer, which he explains via the concept of *topoi*, the use of terms strives to be void of point-of-view. This aim, however, is judged by Raccah, not only to be unnatural, but also an unfortunate consequence of the fact that traditional linguistics has been too heavily information- and truth-based.

In “Does routine formulation change meaning? - The impact of genre on word semantics in the legal domain”, Jan Engberg argues that the difference between lay meaning and expert meaning of legal terms is that the latter is a dynamic, historical extension of the former, and that expert meaning is to a large degree determined and conventionalised by the use of words in specific legal text genres. Taking the German word *Beweis* (‘proof’) as an example, he shows, first by consulting ordinary and specialist dictionaries, and then by analysing a corpus of legal texts (court judgments), that expert meaning includes additional cognitive aspects. Engberg explains his findings with the aid of the concepts of mental frames (Barsalou 1992) and their static relations, and of mental spaces (Fauconnier 1994) and their more dynamic relations.

In “Noun phrases in specialized communication. The cognitive processing of the Danish s-genitive construction”, Henrik Høeg Müller argues on the basis of a fine-grained analysis of the argument structure of s-genitive noun phrases (*the suspect’s friends, the judge’s colleagues, the labor market’s single mothers*) that the traditional contrast between relational and non-relational nouns is inadequate and should be nuanced by considering the concept “relational” as a variable that depends on our conceptualization of the world. He thus shows how “even very small linguistic units can be said to have strong influence on how language users cognitively process constructions by decoding word sequences into meanings.”

In her article “Semantic roles in expert texts - exemplified by the Patient role in judgments”, Åse Almlund uses Fillmore’s (1968) semantic case role model to show how the Patient role can supply the reader - also the non-expert reader - with important information about the structuring and content of legal texts. Almlund focuses on patient roles governed by declarative verbs and consisting of complement or interrogative clauses (*the defendant states that the contract’s acts should imply that...*). Adding the faculty of “hearing” to Langacker’s stage model (Langacker 1991), she shows how different types of declarative verbs introduce subordinate mental spaces (Fauconnier 1994) by zooming in on the different “voices” which are heard in a legal judgement. Almlund is able to point to new regularities between types of declarative verbs and the content of corresponding patient roles on the one hand, and the structuring of legal judgments on the other.

In “Knowledge, events, and anaphors in texts for specific purposes”, Lita Lundquist focuses on the phenomenon of transsentential NP anaphors, the interpretation of which poses special problems in specialised texts, because a non expert cannot know whether two NPs refer to the same entity (as in the case of *gold* and *the metal with the atomic number 79* (Frege 1892 [1952]; Putnam 1975). To explain how readers can use knowledge from one level to compensate for lack of knowledge on another, Lundquist proposes a model called the “generalised

event model” as a common denominator between cognitive structures in the lexicon (Pustejovsky 1995), sentences (Fillmore 1968), texts (Rumelhart 1975) and background knowledge (Johnson-Laird 1983).

Anne Lise Kjær, in “On the structure of legal knowledge: The importance of knowing legal rules for understanding legal texts”, works within a true perspective of *Rechtslinguistik* ‘linguistics of law’, integrating linguistic and legal theories. She studies a type of rule which is specific for legal reasoning, the so-called “connecting rule”. Kjær considers this legal rule as a mental model, and convincingly shows how such a specialised mental model is necessary for experts to draw upon in reading texts written in legal practise (e.g. legal judgments, contracts, and other sorts of legal documents) with the aim of identifying the legal rules implied by the text. She concludes by elegantly bringing into opposition the legal model of connecting rules, which holds legal concepts together in a dynamic horizontal if-then structure, with the static, vertical structure of super- and sub-concepts.

The static is also contrasted with the dynamic in *Dorte Madsen’s* “Communicative situations as reflected in text structure. On legal text production and background knowledge”, which analyzes how the highly complex text structure of legal judgments is determined by the numerous internal and external communicative situations from the corresponding law suit. Applying Rothkegel’s (1993) “object (knowledge) model”, Madsen also shows how illocution is objectified, i.e., made part of the model. This is elegantly linked to the experts’ dynamic knowledge of procedural law and legal practice, which interacts with the more static domain knowledge of “substantive” law. Accordingly, a dual model is proposed which contains both a *schema* to capture the static elements of a law suit and with slots for instantiating text roles, and a *scenario* to render the dynamic sequencing of communicative situations in the law suit.

Annely Rothkegel, in “Transfer of knowledge in cross-cultural discourse”, takes up the question of what enables a professional translator to first identify culturally-specific information in text, and then replace it with information which is appropriate for readers who will use the translation but come from another culture. Taking translation theories anchored in the communication process as a point of departure, and a concrete example from the way in which information for using pharmaceutical products is disseminated to German vs. American consumers, Rothkegel proposes a model of an implicit text plan which brings together speech-act-based frames and the dynamic communicative environment of text with more static aspects of a text’s global and local structure.

With *Lene Palsbro’s* article “Argumentation and knowledge - An empirical study on inference-making in expert and novice reasoning”, the book presents the first of a set of empirical studies of background knowledge and text understanding. Palsbro reports results from an exploratory study exploring the effects that background knowledge and point of view, i.e., argumentative aspects, have on subjects’ inference-making and hence on construction of a mental model of a text.

Opposing legal experts and non-experts, and assigning them different roles and pragmatic points of view (as the buyer or seller in a consumer context), Palsbro asked her subjects to give arguments supporting one of two opposing argumentative conclusions ('buy/do not buy at the price advertised', 'sell/do not sell at the price advertised'). Her data show that readers impose different reference frames according to their background knowledge and pragmatic point of view, i.e., argumentative interest. In her analysis of reference frames and argumentative inferences in the responses, Palsbro points to the problem of finding sound criteria for relating cognitive units from general and specialized frame knowledge to linguistic units in the surface of text.

In "Knowledge representation in the domain of economics", *Leo Noordman, Wietske Vonk, and Wim Simons* present a set of experiments which explore similarities and differences in the structure of economic knowledge of highly-educated individuals who are experts in economics vs. non-experts. Ninety concepts were studied drawn from four different domains (the stock market, public finance, monetary policy, and general economics). The rich set of data described in this chapter includes differences between these two groups in the sets of concepts they have, in how the concepts or measures are related to one another, in the depth of and familiarity with these kinds of information, and in the manner of access in mental representations from concepts from other concepts. The results of the work reported are summarized using network diagrams which show positive and negative causal interconnections among 20 basic concepts.

In "On judging quantities in text without expert knowledge", *Robert J. Jarvella and Suzie Mathieu* consider how domain-specific knowledge, general linguistic knowledge and knowledge derived from text may interact and combine during the process of reading. Readers in two studies were asked to judge whether bare and modified quantities reported in texts from 16 socio-economic and other demographic domains represented a little or a lot. Their decisions were analyzed with respect to linguistic features in the text, and for persons who were informed vs. not informed of the average value of a measure being discussed. Knowledge of the standard, information from the prior text, and specific expressions used to modify quantities in text were all found to influence people's judgments about quantity. Jarvella and Mathieu discuss a range of strategies which readers might adopt to guide their judgments which involve establishing a scale in a domain and using it for comparing numerical information.

In "Risk portrayal and risk appreciation as a problem in language use", *Anthony Sanford and Linda Moxey* take up the question of how known risks can be communicated in terms people will understand, and be able to appraise. Their chapter is concerned largely with how we understand information in text when it is conveyed in different forms (e.g., numerically vs. using ordinary language). Sanford and Moxey review and illustrate a range of important phenomena, showing that people are sensitive to factors including how information in text is framed (e.g., in inherently negative vs. positive terms), the perspective in which

information is presented (e.g., as the likelihood of an event occurring over the long vs. the short run), and our personal interests (e.g., concerning the effectiveness of contraceptive devices). Expressions with very similar meanings are seen to give rise to quite different inferences, and the same message to mean something different to different people. In the interest of objectivity, and to improve the chances of real understanding, Sanford and Moxey argue that, in communicating risks, there is a need for knowing more about the mental models used by the public in general.

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Pierre-Yves Raccah

**Lexical and dynamic topoi in semantic description:
A theoretical and practical differentiation
between words and terms¹**

Introduction

The leading trend in linguistic semantics identifies meaning with information. From Montague to Chomsky, from Situation Semantics to Discourse Representation “theory”, the models change but not the fundamental assumptions. According to those assumptions, the meaning of a natural language sentence is a state of the world. This point of view specifies the notion of information which is equated with meaning: it is not the Shannonian concept of noise reduction –since this concept could not be identified with the notion of state of the world–, but rather the logical-conceptual notion of truth-conditions. The different models in that classical trend mainly differ in their conception of how the meanings of parts of discourse assemble to form the sentence’s truth conditions (or, equivalently, the information conveyed by the sentence).

A rather new trend in the semantics of natural languages, which can be considered as a paradigm shift with respect to the information paradigm, can be defined as follows. The meanings of natural languages’ words, in their everyday life use, are not concepts, but rather instructions to build points of view. Special purpose languages use the form of natural languages (lexicon, syntax,...) with a particular semantics: some of the lexical items, instead of referring to instructions to build points of view, refer to technical concepts. These lexical items, used with this non natural semantics, are called *terms*.

After criticising the “old paradigm”, I will present a particular theory in the “new paradigm”: the Theory of Argumentation Within Language (AWL),² develop some of its conceptual tools, show their interest for the description of the lexicon (mentioning the problems they solve as well as the ones they pose...). I will apply that apparatus to the distinction between words and terms and finally conclude with a hypothesis intended to account for the success of the old paradigm.

-
1. Several parts of this text are directly inspired by Raccah (1990) and Bruxelles - Ducrot - Raccah. (1995).
 2. For a presentation of the essential issues, see Anscombre - Ducrot (1983); for short presentations of the theoretical framework, see Raccah (1987a, 1987b, 1990).

1. Language and conceptual organisation of knowledge

I will very briefly show that natural languages differ from logical reconstruction systems in (at least) three essential points.³

1.1. The rôle of the utterer

Natural language utterances have a single, individual utterer who takes the responsibility for them, while logical language utterances have a universally quantified utterer. Understanding a natural language utterance involves a characterisation of its utterer. Utterances of the French sentence:

- (1) *le chien est encore sur le tapis*
The dog is again/still on the carpet

can be understood only by someone who understands the relationship between the utterer and the dog (it is “still” vs. “another time” on the carpet).

1.2. The concept of truth

1. The concept of truth which is central in logical reconstruction languages, is only useful in natural languages; e.g. the meaning of

- (2) *The dog is on the carpet*

is certainly different from the meaning of

- (3) *The carpet is under the dog*

However, the two sentences have exactly the same truth conditions. Moreover,

2. When the concept of truth is used, it is not the same concept as the one central to logical languages.

Indeed, the concept of truth in logical languages is opposed to that of *falsity*, while, in natural languages, it is opposed to that of *lying*.

It is easy to find falsities that are not lies, as well as lies that are not falsities, e.g.

- (4) *“I live in Paris”, said at a conference in Sydney to a Japanese participant by someone who lives in Issy-lès-Moulineaux (a small town which touches Paris), would be false (since Issy-lès-Moulineaux is different from Paris*

3. These points of difference are, actually, connected and the distinction I make is only for purposes of exposition.

and is not included in it), but would not be a lie (it would probably be the best way to have the hearer understand where the speaker lives).

- (5) *"No, I don't have cigarettes" said by someone who only has cigarillos to a beggar who asked for a cigarette, would be logically true (since a cigarillo is not a cigarette), but would certainly be a kind of lie (since one can expect the beggar to be at least equally pleased with a cigarillo...).*

1.3. Variability vs. stability of meaning across occurrences

It is essential for logical reconstruction languages that each term of the language be associated with one and only one meaning.⁴ This is, among other reasons, to insure that, whenever the same term occurs several times in the same utterance, it refers to the same concept. In natural languages, the "rule" is exactly the opposite: whenever the same word occurs several times in the same utterance, it must be assigned different meanings.

Example (inspired from Oswald Ducrot's seminar)

In Racine's *Andromaque*, Pyrrhus protects Andromaque's child against the Greeks because he wants her to marry him. The Greeks badly threaten Pyrrhus for not wanting to kill the child (who is Hector's son); on the other hand, Andromaque doesn't seem to accept Pyrrhus' proposition. At that point, Pyrrhus says to Andromaque:

- (6) *Je meurs si je vous perds, mais je meurs si j'attends*
'I die if I lose you, but I die if I wait'

In that utterance, the two occurrences of *je meurs* 'I die' cannot be interpreted with the same meaning, because of the presence of *mais* 'but' which imposes both an opposition between some consequences of the two "types of death" and a sort of ranking of those two deaths.... Such a construction is impossible in formal languages (no connectives or operators allow such a differentiation in the interpretation) and would be ridiculous in a "semi-formal" technical sub-language. Consider, for instance, the following sentence:

- (7) *The positive square root of X is even if X is multiple of 4, but the positive square root of X is even if X is even.*

4. This is also true for the meaning of variables: their value assignation does vary according to the context of their occurrence, but not the way in which that assignation is computed.

2. Language and topical organisation of knowledge

From the “logicist” point of view, since meaning is information (more specifically, truth-conditions), all the effects of an utterance must be derived from the information it conveys and the situation of the utterance. Thus, if two utterances convey the same information in the same situation, the logicist position predicts that all the semantic effects of those two utterances would be identical; in particular, they should –necessarily– have the same argumentative orientation. This prediction is contrary to the observable data. Among the extremely numerous examples, let us consider the following pair of sentences:

(8) *John is clever, but he is clumsy*

(9) *John is clumsy, but he is clever*

uttered by two members of the same hiring commission, while considering John Smith’s application.

The argumentative orientations of the two utterances are clearly opposed, while in this single situation, the information they convey is the same (in the sense of truth-conditional, objective information).⁵

A careful examination shows that examples of this kind, far from being exceptions, are central in natural languages, and not only when connectives are used.⁶ If we consider these facts as relevant for language description, we have to provide, within the semantic description, an independent treatment of argumentation.

Once we have reached this point, three positions can be defended (the fourth one –the logicist position– has already been eliminated):

a) the minimalist position:

According to this position, not all utterances have argumentational effects and, thus, the necessity of directly accounting for argumentational phenomena within semantics only concerns a small number of words and constructions of natural languages. The informational effects are central, while the argumentational ones are peripheral.

b) the centralist position

According to this position, all words and constructions of all natural languages need an argumentational description, even when they occur in utterances that are

5. As evidence for that, note that none of the two commission members would hold that the other is mistaken about the state of the world, or lied, or simply uttered a false statement.

6. A host of examples such as “John is intelligent” vs. “John is cunning” can be found to illustrate this point.

not explicitly used in some argumentation. An informational description may also be needed, but it is never enough to exhaust the semantic description.

c) the maximalist position

According to this position, the necessity of directly accounting for informational phenomena within semantics only concerns a small number of words and constructions of natural languages. The argumentational effects are central, while the informational ones are peripheral.

I have argued elsewhere⁷ for the centralist position. It would be too optimistic to seek a general proof of the accurateness of that position; however, for each alleged counter-example provided by the tenants of the minimalist position, there has been –up to now– a way of proving either that it was not a natural utterance or that it needed an argumentational description. On the other hand, there are still examples that the tenants of the maximalist position consider as relevant facts though the description of their informational aspects cannot –for the time being– be derived from that of their argumentational aspects.⁸

In order to describe the argumentative inferences involved in the semantics of natural languages, one must have made a decision concerning the following problem.

Consider the following argumentations:

(10) *The weather was cold last night: the plants must be in a bad shape*

(11) *There has been frost last night: the plants must be dead*

(12) *The weather was mild last night: the plants must be in a good shape*

One can either take the standpoint that each of these utterances relies on a different argumentative warrant:

G10. When the weather is cold the plants generally suffer

G11. When the weather is chilly, the plants generally die

7. Cf., for instance, Racciah (1987a). I actually tend to believe, with Oswald Ducrot, that, in natural uses of natural languages, information is derivable from argumentation (and not the contrary, as it is usually believed). However, in the present state of the Theory of Argumentation within Language, I have no means to prove it.... For more about Ducrot's position, see, for instance, Ducrot (1988).

8. Consider, for instance, the opposition between "John has finished" and "John has almost finished". The informational difference between utterances of those two sentences cannot be accounted for in terms of argumentative orientation, since it remains even in the cases in which they have the same orientation.

G12. When the weather is mild, the plants generally go well

or else one can consider that all of these argumentations rely on one and the same rule relating the weather to the health of the plants.

From the latter point of view, which is the one I adopt, this rule must be gradual. In the case under study, it would be of the form:

The better the weather, the better the health of the plants

or

The worse the weather, the worse the health of the plants

Gradual rules of this kind, called *topoi* (singular: *topos*), have been studied within the framework of the theory of Argumentation within Language.⁹ The description of natural language operators and connectives is greatly facilitated by the use of *topoi*.¹⁰

It was shown recently¹¹ that the description of the lexicon also needed *topoi*. If, for instance, we want to describe the meaning of the word “rich” only using an informational (truth-conditional) description, we cannot account for the odd effect of

(13) *This baby is rich*

Again, one might think that the oddness of the utterances of that sentence is only a marginal phenomenon. In that case, one should not bother trying to describe the word “rich” in such a way that this oddness could be predicted. But if one considers, as I do, phenomena of this kind as central for natural languages, it becomes necessary to deal with that question.

Using *topoi*, the oddness of the utterances of the sentence above can be predicted. The descriptive apparatus needs to assign *intrinsic topoi* to words. In particular, the word “rich” is assigned the *topos*

// the more one possesses, the more one can //

9. See, for instance, Anscombe - Ducrot (1983), Raccah (1984), Ducrot (1988), Raccah (1990) or (1995).

10. See, for instance, Raccah (1987b) for a description of *but*; or Bruxelles - Raccah (1987) for a description of the French *si...alors* ‘if...then’.

11. See Raccah (1993) or Bruxelles - Ducrot - Raccah (1995) for a more detailed discussion.

That is, the word “rich” triggers an instruction such as: see possession as a source of power.¹² Independent evidence for that analysis comes from a diachronic look at the word “rich”, which comes from old English *Rice*, and belongs to a Germanic root related to the German *Reich* ‘power’, which, itself, seems to be an early adaptation of Celtic *Rix*, corresponding to Latin *Rex* ‘king’, of an Indo-European root which also gave the Hindustani *Rajah* ‘monarch’, from Sanscrit *Râjâ*.

Several words have been described in such a way, whose diachronic derivation refers to the consequent of the intrinsic topos proposed. Though a diachronic analysis cannot, obviously, explain synchronic facts, it is not uninteresting to have descriptions of the latter which are compatible with the former. A new direction of research which is being explored is the systematic topical description of the dictionary entries of different natural languages. This will allow us to better understand how (and what of) culture, beliefs, ideology are crystallised (or “encapsulated”) in the words of a language.

3. Intrinsic topoi

3.1. Topical fields and conceptual fields

It will be useful to remark that there is a semantic link between the antecedent and the consequent of a topos: in a topos such as

// the more one possesses, the more one can //

the kind of possession referred to is already constrained by the fact that it is seen as enhancing capacity to act and, the kind of capacity to act referred to is also constrained by the fact that it is seen as coming from possession.¹³ For that reason, antecedents or consequents of topoi cannot be considered as predicates in the usual sense of the term. We shall use the term *topical field* to denote each of the two entities linked by a topos. The general idea is that a topical field contains a gradation which depends on an implicit evaluation in the utterances. This gradation corresponds to a particular way of perceiving a certain domain of reality; we denote this domain by the term *conceptual field*. Thus, a topical field can be represented as a pair of terms, the first of which is a conceptual field and the second a principle of gradation in this field. This second term can be either an evaluation (of the type *good, bad*), in which case we may speak of an *elementary*

12. Note that such instructions are language dependent (and even community dependent –cf. the difference between the English “rich” and the Spanish “rico”).

13. See section 4.3 below for more about this semantic link.

topical field; but it can also be a topical field itself (which will thus serve as a principle of gradation for another topical field). This leads us to the following recursive definition:

The pair (X,Y) is a topical field if and only if X is a conceptual field and one of the following two conditions is satisfied:

- (i) Y is a value (*good* or *bad*); or
- (ii) Y is itself a topical field.

This definition permits us to construct increasing chains of nested topical fields, based on elementary topical fields containing an evaluation: the principle of gradation contained in the elementary topical field extends to the totality of the topical field in which it is included. It is this feature which enables us to consider a topical field as a principle of gradation for other topical fields.

An example will be useful in order to illustrate this definition. Consider an utterance of the sentence:

- (14) *He is rich, he will invite you*

The conclusion expressed here relies on the topos T, which we can formulate as follows:

T₁₂: // The more one possesses, the more one gives //

The antecedent of T is gradual, but this graduality is not based on a simple quantitative measure of wealth: what graduates wealth, here, is the capacity to act that it confers. In other words, wealth is perceived here according to the capacity to act that is associated with it. This is what we express by saying that the antecedent of T is the topical field A of *possession*, which associates the conceptual field X of POSSESSION¹⁴ with the topical field Y of *power of action*. It will be noted that A is not an elementary topical field, because Y is not directly a value. In contrast, we have described Y as an elementary topical field, constituted by the pair

<CAPACITY TO ACT, *good*>

14. We have used the same string, “possession”, to refer to both the topical field A and the conceptual field X; the two uses are differentiated typographically, italic type for A and small capitals for X. It would have been misleading to use two different words because all the words in a natural language are linked to topical fields. Thus, no lexical item in a natural language could properly correspond to a conceptual field such as X.

(where CAPACITY TO ACT is a conceptual field). This gives us, as a description of the antecedent A of T, the formula:

A_{12} : <POSSESS, <CAPACITY TO ACT, good>>

A similar analysis leads us to describe the topoi involved in the utterances of the sentences (15) and (15')

(15) *It's warm outside, let's go for a walk*

(15') *It's warm outside, let's stay in the hotel*

as follows:

T_{13} : //<TEMPERATURE, <PHYSICAL STATE, good>>, <ACTIVITY, good> //

T_{14} : //<TEMPERATURE, <PHYSICAL STATE, bad>>, <ACTIVITY, bad> //

Notice that this analysis commits us to admit that the adjective “warm” does not have the same meaning in (T_{13}) and in (T_{14}). And this is something desirable (the warmth referred to in (T_{13}) is perceived as invigorating, that of (T_{14}) as stifling), which would be difficult to obtain without the intrinsic topoi.

3.2. Topoi canonically associated with a topical field

Let us now consider a slightly modified version of example (14):

(14') *He is rich, he has the means to invite you*

in which the expressed conclusion is based on a topos T_0 , which can be formulated, to a first approximation,¹⁵ as follows:

T_0 // *the more one possesses, the more one can act* //

It seems reasonable to suppose that, in this case, the antecedent of T_0 is indeed the same as that of T (*wealth*, perceived according to the capacity to act). The consequent of T_0 is precisely the capacity to act; it thus turns out to be identical to the topical field which constitutes the principle of gradation of the antecedent of T_0

15. We use the old notation, which is less clumsy, as a first approximation in order to represent the topoi we intend to examine.

itself. Putting aside the question of the direction of variation (+ and -), the full description of T_0 thus has to be:

//<POSSESS, <CAPACITY TO ACT, good>>, <CAPACITY TO ACT, good> //

In this case, we say that T_0 is *canonically associated* with A (the existence and uniqueness of the topos canonically associated with a non-elementary topical field is evident).

It is the use of such topoi in utterances which produces the quasi-tautological arguments¹⁶ of the type illustrated by our last example. On the other hand, the topos T of example (14), which introduces other considerations, does not give this impression of redundancy: it is not canonically associated with its antecedent topical field.

3.3. Intrinsic topical fields

Let us now examine the usefulness of this approach for a semantic description of the lexicon.

Let us go back to the description of the adjective “rich”. When we say that the word “rich” triggers an instruction such as: *see possession as a source of power* we can recognise here the essential, characteristic feature of topical fields: i.e. it presents a concept according to a subjective point of view. In this case, the topical field in question is the field A_{12} :

$A_{12} : <POSSESS, <CAPACITY TO ACT, good>>).$

Thus, the adjective “rich” can usefully be described by means of the (non-elementary) topical field A_{12} . In terms of the formalism (as it stands in its present state of development), a topical field intrinsic to the word “rich” will thus be described by:

rich: <POSSESSION, power of action >,

from which we derive:

rich: <POSSESSION, <CAPACITY TO ACT, good>>

16. Utterances of this kind are called *doxal utterances* (see section 4.2 for more details).

We shall use the expression *intrinsic topos* to designate the canonical topos associated with one of the topical fields intrinsic to some word. The topoi which are used in an utterance need not be intrinsic topoi of some word in that utterance: when they are, the utterance produces an effect which is discussed in section 4.2. Otherwise, those topoi which are used in order to interpret the utterance are called *dynamic topoi*.

4. Words and terms

An interesting side-effect of the theory of topoi is that it allows for a productive theoretical distinction between words and terms. As we saw in the previous sections, natural language words evoke all sorts of inferences related to speakers, the cultural knowledge and beliefs of hearers, the situation of utterance and even the place of the word in an utterance. Terms, in contrast – and this the great difficulty which terminologists must overcome –, are not supposed to evoke non deductive inferences, though their forms are borrowed from some natural language lexicon: terms look like words, sound like words, syntactically behave like words..., but are not words. That ‘Canada Dry’ flavour of terms strikes anyone who happens to participate in a private conversation with a person who uses terms instead of words. Consider, for instance a situation in which you or I would say

(16) *“It is cold in here”*

and suppose you hear someone say

(17) *“Temperature is under six degrees Celsius in these premises.”*

You might wonder whether this fellow is a robot; or else, you might suppose that there is a technical reason why that threshold of six degrees Celsius is evoked. In that case, one must suppose, in addition, that there is a particular reason why that technical reason overtook the everyday life way of considering the speaker’s relationship to temperature.

In section 4.1 to 4.3, I will show in some detail how the use of intrinsic topical fields for word description allows one to account for the fact that utterances express the relationship their utterers have with the objective world about which they speak; during that discussion, I will keep the focus on the contrast between word and term description.

4.1. The lexical description tools

The general idea that the example above was meant to illustrate is that, in everyday life conversation, we do not claim objectivity: on the contrary, human beings are expected to express the relationship they have with the objective world about which they talk. Hence, the word “cold”, which expresses a subjective feeling about temperature, and the word “here”, which expresses a subjective (egocentric) manner for locating states and events. Terms, on the other hand, have been created precisely to avoid, as much as possible, the expression of subjective feelings. It is interesting to observe the funny impression that can, occasionally, be caused by mixing words and terms in the same utterance. For instance, both

(18) *“It is cold in these premises”*

and

(19) *“Temperature is under six degrees Celsius in here”*

can sound funny (which does not mean, by all means, incorrect), though not to the same degree.¹⁷

We account for that difference between words and terms by contrasting their descriptions in the following manner:

- The semantic description assigns logical concepts to terms, in such a way that, when a scientific or technical utterance¹⁸ is true, its meaning picks up the appropriated objective relation between the concepts which are denoted by its terms. This way of describing terms follows the classical semantic tradition except in the essential fact that it is restricted, precisely, to terms.

17. For the time being, I have no explanation for that difference of effects caused by the two mixed utterances (I don't even know whether this impression is constant enough to be considered a phenomenon to be explained). A lead could be to investigate the degree of subjective implication imposed by the different words.

18. It is assumed here that scientific or technical utterances are the only types of term-utterances (i.e. of utterances containing only relators and terms). This assumption may turn out to be erroneous (in that case, we would have to take potential other types of term-utterances into account in our description). However, on the grounds of what I have observed up to now, I do defend the hypothesis that the property of being (or, more accurately, being presented as) term-utterances characterises scientific and technical utterances.

- On the other hand, as stated in section 3, words are assigned topical fields, in such a way that the sense of an everyday life utterance picks up the appropriated relation between the points of view suggested by its words.

In order to show how this descriptive apparatus accounts for the difference between words and terms, I will have to trace the way in which the topoi evoked in utterances (the dynamic topoi) are partially determined by the topical constituents of the meaning of the words in a sentence (intrinsic topoi). I will thus propose a mechanism for describing the constitution of dynamic topoi on the basis of the topical constituents of lexical items. In most cases, this mechanism is based on an operation on topoi, called *relativisation*, which will be described in section 4.3. However, before dealing with the general case, it is interesting to see how the description mechanism functions in the trivial cases in which the dynamic topoi are precisely the intrinsic topoi.

4.2. Doxal, para-doxal and non-doxal utterances

An elementary case, that was already mentioned in connection with example (14'), is that of utterances that we call *doxal* (cf. Bruxelles - Raccah 1990), in which the dynamic topos evoked is exactly the same as that which appears in the description of the sentence. Thus, the dynamic topos used in the utterance of example (14') above ("He is rich, he has the means to invite you"), merely repeats and confirms the lexical topos T_0 (which is repeated below, for the reader's comfort):

T₀: // the more one possesses, the more one can act //

The cases on which we will focus are those where the dynamic topoi do not merely repeat the constituent topoi of the sentence, but combine them with other argumentative principles, which may be extra-linguistic. In such cases, it is said that there is non-doxal argumentation; such utterances are called "non-doxal utterances".

The technical hypothesis is that, given a dynamic topos $T = // \pm P, \pm Q //$, evoked in the utterance of a sentence S , the antecedent P of T is linked, by a chain of topoi, to at least one of the intrinsic topoi of the words of S ; similarly, if C expresses a conclusion that can be reached by means of T , the consequent Q of T is linked, by a chain of topoi, to at least one of the intrinsic topoi of the words of C . Thus, if an utterance of a sentence $[S, C]$ (where S is presented as an argument and C as a conclusion) uses a dynamic topos $// \pm P, \pm Q //$, P is linked to the words of S , and Q to the words of C .

Among non-doxal utterances, there are some which present themselves as aiming at a conclusion opposite to that which would follow from the intrinsic topoi of the words in the sentence which is uttered. In this case, they are difficult to accept, unless they are interpreted as ironic, or unless the paradoxical nature of the

conclusion is explicitly emphasised, for instance, by the use of an adverb such as “paradoxically”. This is the case in the following examples:¹⁹

(20) * *I have worked hard; I am no longer tired*

(compare this with:

(20') *I have worked hard; paradoxically, I am no longer tired*)

(21) * *This suitcase is light, John won't be able to carry it*

(22) * *He is rich, he won't be able to invite you*

We call such utterances “semantically paradoxical utterances”.

Other non-doxal utterances present themselves as aiming at a conclusion opposite to that which would follow not, this time, from the intrinsic topoi of the words alone, but from a combination²⁰ of these intrinsic topoi with argumentative principles which a given cultural community commonly takes for granted. We will illustrate this idea immediately with several examples.

(23) *I have worked hard; I feel much better*

(24) *This suitcase is light, John won't carry it*

(25) *He is rich, he won't invite you*

We qualify such utterances as “culturally paradoxical”.

Finally, a third category of non-doxal utterances contains those which present themselves as aiming at a conclusion different from (but not contradictory with) that which would follow from the intrinsic topoi of the words, possibly combined with culturally accepted argumentative principles. These are probably the most common occurrences in everyday conversation; we may illustrate them with

(26) *I have worked a lot; Mary must have got impatient*

(27) *This suitcase is light, you don't need to check it in*

19. In all these examples, the star (*) does not mean that the utterance is impossible, but that it sounds funny and requires a particular type of situation to be understood.

20. The notion of combination of topoi will be more fully examined in the following paragraph.

(28) *He is rich, he must have friends*

4.3. The composition of topoi²¹

In the preceding paragraph, I mentioned the combination of intrinsic topoi with argumentative principles. I shall only be concerned here with argumentative principles that can be expressed in the form of topoi.²² Our problem thus reduces to the combination of intrinsic topoi with other topoi. We shall address this question in its most general form of topoi composition: given two topoi T_1 and T_2 , is it possible to form a third topos by combining them? And if so, how is the third topos constructed on the basis of the two initial topoi?

If, in the formula

// the more X is P, the more Y is Q //

used to express the topoi, one were to consider that P and Q are “atomic” entities that cannot be decomposed, we would immediately have a rule for combining topoi which would carry the day in virtue of its great simplicity:

1. T_1 and T_2 are composable if and only if the consequent of T_1 is identical to the antecedent of T_2 and

2. the result of combining T_1 and T_2 is the topos which has as its antecedent that of T_1 , and as its consequent that of T_2 .

Schematically, we would have:

// the more X is P, the more Y is Q //

// the more X is Q, the more Y is R //

// the more X is P, the more Y is R //

However, this simple rule, which as we have said is virtually unavoidable if topical fields were considered as non-decomposable, is unacceptable on empirical grounds. The following example will help in understanding why.

Suppose a farmer uses two topoi according to which (i) rain is good for plants, (ii) the good health of his plants is to his advantage. If we were to represent these

21. This section reproduces the composition rule presented in Bruxelles - Ducrot - Raccah (1995).

22. Actually, there are reasons to believe that the only cultural principles that combine in argumentation have the form of topoi. However, I will not defend that stronger position here.

topoi by the simplistic formulae given above, they should combine to form a topos according to which rain is to the farmer's advantage:

// the more it rains, the more the plants prosper //
// the more the plants prosper, the more the farmer is happy //
 // the more it rains, the more the farmer is happy //

Consequently, after a violent storm, one should be able to say to the farmer, without irony, that he must be happy. This does not seem to be the case.

In order to "save" something of this rule of compositionality, it is necessary to restrict the applicability of the topos which is produced: but the restriction should bear on precisely the element that the simple rule of composition eliminated, i.e. the effect of rain on the health of the plants. It is not the rain in itself which is advantageous to the farmer; it is the rain in as far as it does the plants good. Since the topos produced by the simple rule makes no reference to the health of the plants, there is no way to restrict it appropriately.

In order to compensate for the fundamental insufficiency of that simple rule, Bruxelles, Ducrot and I (1995) proposed another rule for the composition of topoi, which takes into account the complex nature of topical fields. The necessary adjustment consists in allowing the topos which composition eliminates to nevertheless leave a trace in the antecedent of the resulting topos. This latter antecedent is no longer, strictly speaking, the exact antecedent of the first topos: it is this antecedent "perceived from the point of view" of the antecedent of the second topos. In order to capture the idea that a topical field can be "perceived from the point of view" of another topical field, an operation was introduced, by which one topical field is relativised by another, an operation designated by the symbol #. This is a binary operation which applies to two topical fields having the same terminal value (either *good* or *bad*), and which we define recursively as follows:

1. If CF is a conceptual field, *v* a value (*good* or *bad*), and TF a topical field of the form

$$\langle X_1, \langle X_2, \dots \langle X_i, \dots \langle X_n, v \rangle \dots \rangle \dots \rangle \rangle$$

where, for all *i*, X_i is a conceptual field, then

$$\langle CF, v \rangle \# TF = \langle CF, TF \rangle$$

2. $\langle CF, TF \rangle \# TF' = \langle CF, TF \# TF' \rangle$ for all TF' having the same terminal value as TF .

Armed with this operation of relativisation, we can now define the composition of two topoi:

Suppose we have two topoi