FROM DISCOURSE TO LOGIC

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FROM DISCOURSE TO LOGIC

Introduction to Modeltheoretic Semantics of Natural Language, Formal Logic and Discourse Representation Theory

by

HANS KAMP
and
UWE REYLE
Institute for Computational Linguistics, University of Stuttgart

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Contents

PART 1

Preface **1**

0 Preliminaries **7**
0.1 Theories of Meaning 7
0.2 Logic 13
0.3 Logic and Semantics 21
0.4 Syntax 24

1 DRT and Predicate Logic **59**
1.1 Simple Sentences 59
1.1.1 Pronouns 66
1.1.2 Truth Conditions (informally) 73
1.1.3 Indefinite Descriptions 74
1.1.4 The Construction Algorithm 85
1.2 Models 92
1.3 Negation 99
1.4 Verification, Truth and Accessibility 108
1.5 From DRT to Predicate Logic 126

2 Quantification and Connectives **141**
2.1 Conditionals 141
2.2 Universal Quantification 166
2.3 Disjunction 181
2.3.1 Accessibility 185
2.3.2 Verification 190
2.3.3 Non-Sentential Disjunctions 195
2.3.4 Disjunctive NPs 200
2.3.5 The Standard Version of Predicate Logic 208

2.4 Conjunction 214

3 Loose Ends **233**
3.1 Reflexives 233
3.2 Possessive Noun Phrases 240
3.3 Proper Names 246
3.4 Definite Descriptions 248
3.5 Stipulated Identity and Asserted Identity 257
3.6 Identity and Predication 260
3.7 Scope Ambiguity 279
3.7.1 Scope 279
3.7.2 'Every'-Phrases and Indefinites 282
3.7.3 Specific and other Wide Scope Indefinites 288
3.7.4 Generics 294
3.7.5 The Scope of Definite Descriptions 297
3.7.6 Scope Ambiguities involving Sentential Connectives 300

PART 2

4 The Plural **305**
4.1 Introduction 305
4.1.1 Summation 306
4.1.2 Abstraction 309
4.1.3 Generalized Quantifiers and Duplex Conditions 314
4.1.4 Collective Readings and Distribution 320
4.1.5 Distributive Readings of Non-quantifying NPs 326
4.1.6 Dependent Plurals 330
4.2 DRS-Construction for Plurals I 332
4.2.1 Syntax 332
4.2.2 NPs that Denote Collections 334
4.2.3 Set-denoting Anaphoric Plural Pronouns 339
4.2.4 'They' as Individual Variable 345
4.2.5 Dependent Plurals 356
4.2.6 Dependent Plural Pronouns 375
4.2.7 Generic Interpretations of Plural Pronouns 391
4.2.8 A Uniform Theory of Singular and Plural Pronouns? 394

4.3 Model Theory 397
4.3.1 Models 398
4.3.2 Verification of DRS-Conditions 419
4.4 DRS-Construction for Plurals II 429
4.4.1 Collective vs. Distributive Readings and Ambiguity of Scope 429
4.4.2 Conjunctive Noun Phrases 434
4.4.3 Floating Quantifiers 441
4.4.4 Cardinality Quantifiers 452
4.4.5 Reciprocals 463
4.4.6 Gather, The Same and Together 471

5 Tense and Aspect **483**
5.1 The Semantics and Logic of Temporal Reference 483
5.1.1 Tense Logics 486
5.1.2 Inadequacies of TPL and Similar Systems 491
5.1.3 Instants, Intervals, Events and States 500
5.2 DRS-Construction for Tensed Sentences 510
5.2.1 DRS-Construction for Single Sentences in the Past Tense . . 510
5.2.2 Temporal Anaphora. DRS-Construction for Sequences of Sentences 521
5.2.3 The Future Tense and the Present Tense 534
5.2.4 DRS-Construction Rules for Temporal Reference I 541
5.2.5 Negation 546
5.3 Aspect 556
5.3.1 Methodological Preliminaries 556
5.3.2 Aktionsarten 557
5.3.3 Aspectual Operators and Aspectual Shift 566
5.3.4 DRS-Construction for Perfects and Progressives 570
5.4 Temporal Perspective 593
5.4.1 Construction 601
5.5 Temporal Adverbials 611
5.5.1 Locating Adverbials 613
5.5.2 Adverbs of Temporal Quantification 635
5.5.3 Temporal Measure Adverbials 647
5.5.4 Subordinate Clauses 651

5.6 Model Theory 664
5.7 Syntactic Rules 679

Bibliography **691**

Table of Construction Rules **700**

Index of Symbols, Features and Feature Values **701**

Index of Names **702**

Index of Subjects **703**

Preface

This book is about semantics and logic. More specifically, it is about the semantics and logic of natural language; and, even more specifically than that, it is about a particular way of dealing with those subjects, known as Discourse Representation Theory, or DRT. DRT is an approach towards natural language semantics which, some thirteen years ago, arose out of attempts to deal with two distinct problems. The first of those was the semantic puzzle that had been brought to contemporary attention by Geach's notorious "donkey sentences" – sentences like **If Pedro owns some donkey, he beats it**, in which the anaphoric connection we perceive between the indefinite noun phrase **some donkey** and the pronoun **it** may seem to conflict with the existential meaning of the word **some**. The second problem had to do with tense and aspect. Some languages, for instance French and the other Romance languages, have two morphologically distinct past tenses, a simple past (the French Passé Simple) and a continuous past (the French Imparfait). To articulate precisely what the difference between these tenses is has turned out to be surprisingly difficult.

One feature the two problems seemed to have in common was that neither allowed for a natural solution within the framework of modeltheoretic semantics, the dominant formal approach towards semantics in the seventies; and the ultimate reason appeared to be the same in each case: the static perspective behind modeltheoretic semantics, which tries to give an exhaustive characterization of the meaning of a linguistic expression in terms of the referential relations that it bears to the subject matter that it is used to speak about, ignores a dimension of linguistic meaning that is crucial both to the analysis of aspectual matters and to questions of anaphora. This is the dimension of *interpretation*: the meanings of linguistic expressions are – or so we would want to claim – inextricably linked with the interpretive canons that must be brought into play by anyone who wants to grasp their sense. DRT tries to remedy the one-sidedness of the model-theoretic paradigm by combining its referential perspective with this second interpretation-oriented viewpoint. It is this more complex view of linguistic meaning – as subject-related on the one hand, and as bound up with the interpretation of language on the other – which is the central conception that informs the theory presented in this book.

The intention to write a book of this sort goes back to the early eighties, when the first work on DRT (see [Kamp 1981]) and the independent, but closely related investigations of Heim (most extensively reported in [Heim 1982]) had just become

available. In fact, writing such a book had got off to a false start more than once. In the fall of 1987, the authors jointly taught a seminar on DRT at the University of Stuttgart and it was this seminar which provided the two of us with the impetus to produce the text that has now at last appeared in print. The particular circumstances of the book's origin have been responsible for two salient properties. First, since the book started out in the form of teaching material, it was set up as a textbook from the outset. Having decided that this wasn't necessarily a bad thing, we carried on in the same vein. The result is a manuscript which we hope can serve as a textbook on DRT.

It would not be right, however, to simply describe the book as a textbook and say no more. Only the first part, consisting of Chapters 0, 1 and 2, clearly deserves this description. This part of the book has been tested repeatedly in seminars at Stuttgart University and elsewhere, and the feedback received from those who have used it has led to a certain consolidation of both content and form. The matter is different for the remaining chapters. These contain material that has for the most part not yet been published, even if it has figured in oral presentations or been circulated in unpublished manuscripts. It is possible that these chapters will need substantial modification in the light of criticisms that the publication of this book will provoke, and thus that they have not yet reached the degree of maturity that may be expected of classroom material.

The substance of the book is to be found in Chapters 1, 2, 4 and 5. Chapters 1 and 2 give a systematic presentation of the theory as it is outlined in [Kamp 1981]. In addition, Chapter 1 offers a treatment of negation and Chapter 2 treatments of both disjunction and conjunction; the analysis we propose for conjunctions is, to our knowledge, new. Chapters 4 and 5 extend the theory of the preceding chapters into new territory. Chapter 4 deals with plural constructions, Chapter 5 with questions of tense and aspect. The proposals discussed in Chapter 4 are largely based on unpublished work by Frey and Kamp from 1985/1986. (Some of the ideas that are central to the DR-theoretical aproach to questions of plurals have been used by others. See in particular the work of Roberts ([Roberts 1987b]) and of Kadmon ([Kadmon 1987a], [Kadmon 1987b], [Kadmon 1990]).) The material of Chapter 5 is in part quite old, going back to the origins of DRT hinted at in the opening paragraph. Those original ideas, buried almost beyond recognition in [Kamp 1979], have undergone many refinements in the course of the past 15 years. Perhaps their most explicit elaboration to date is to be found in a nearly finished book manuscript by Kamp and Rohrer on the system of tense and aspect of French. Preliminary sketches of that work can be found in [Kamp 1981b], [Kamp & Rohrer 1983] and [Rohrer 1986]. The method outlined in these papers has also been used in other studies of tense and aspect – see for instance [Partee 1984], [Abusch 1988], [Ogihara 1989], [Smith 1991].

Chapter 0 deals with preliminaries. The chapter consists of two quite different

parts. The first part gives an informal discussion of some of the fundamental issues – conceptual as well as methodological – relating to the book's principal concerns, semantics and logic. Introductions of this sort are notorious for being to the liking of nobody. The cognoscenti, if not actually infuriated by what they read, are inevitably bored, while the novice, for whom the introduction is primarily intended, finds himself unable to make sense of an exposé for which he lacks the necessary presuppositions. Although we are aware of these pitfalls, we have thought it nevertheless necessary to try and say something about semantics and logic as we understand these fields and their mutual relationship, as well as about the place of the particular approach we pursue within a wider linguistic, logical and philosophical perspective.

The second part of Chapter 0 serves an entirely different purpose. As we said, this is a book about logic and semantics. It is not a book about syntax. But even so, we cannot make do without syntax altogether for one of our central objectives is to describe how syntactic form determines linguistic meaning. So we must avail ourselves of some means for representing syntactic form, even if these means fall short of satisfying those who expect syntactic descriptions to reveal the deeper principles of grammar. We fully acknowledge the central importance of syntactic theory as the systematic study of those principles, and we should have much preferred to use a syntax that has a better claim to capturing them than the one we have chosen. But to present such a better motivated syntax would have involved us in syntactic discussions far more extensive than seems compatible with the true purpose of this book. So we have decided to stick with the policy followed in the first explicit description of DRT ([Kamp 1981]) which makes use of a simple phrase structure grammar. The second part of Chapter 0 defines a phrase structure grammar that is slightly more complicated in that it has been enriched with various syntactic features. Later on, this feature system is significantly expanded. However, the basic architecture of our syntax remains the same throughout.

The one chapter that we have not yet mentioned is Chapter 3. This chapter is a kind of interlude between Chapters 1 and 2 on the one hand, and Chapters 4 and 5 on the other. Some parts of it deal with issues, such as for instance reflexives or scope ambiguity, which pertain directly to the theory developed in Chapters 1 and 2, but which we have chosen ignore for reasons of presentation. The other parts of Chapter 3 contain fairly brief discussions of linguistic constructions that the book does not treat in depth, but which, we found, kept turning up in sentences that illustrate the phenomena focussed on in Chapters 4 and 5. To demonstrate the viability of the theoretical proposals we make in those chapters it is important that they can be applied to such sentences, i.e. that they can be used in the conversion of those sentences into DRSs which represent them. But in order to convert a sentence into a DRS we must have principles to deal with every linguistic construction that it contains, including those that may have no direct bearing on the issues at hand.

So it is important that we have some understanding – even if it be lacking in theoretical depth – of those other constructions as well. Some of the constructions touched upon in Chapter 3 will be discussed in greater detail in Volume 2.

The second feature which this book owes to the particular circumstances of its origin is connected with the students who took the seminar that made us write it. To our considerable consternation, almost none of those students had had any previous training in either semantics or logic. At first, teaching a course in DRT to students whose preparation was so truly minimal seemed an enterprise that was bound to end in disaster. However, things turned out a lot better than we expected. No doubt this was due in large part to the exceptional ability of those who attended the course (for the most part computer scientists taking linguistics as a secondary subject). But we'd like to think that the manuscript which we were producing as we went along did its bit too; and that it helped as much as it did, because of the conscientious effort we were making to explain everything that someone without previous exposure to either formal semantics or logic would need to be told. In this way we ended up writing a book without prerequisite. This is not to say that some antecedent knowledge of logic or semantics would not be useful. For instance, we think the reader should have an easier time if he has had at least some exposure to formal logic, so that he is familiar with the syntax, and preferably also with the basics of the model theory, of the predicate calculus. But while such knowledge will undoubtedly make it easier to assimilate many of the book's details, it is not a prerequisite in a strict sense. In fact, the book contains, as part of the general development, an account of the syntax and semantics of predicate logic that presupposes no antecedent knowledge whatsoever.

The table of contents we planned originally included much that is not to be found within the present volume. As time went on, we discovered that things always take longer, not only longer in the sense of time but also in terms of the number of pages that are needed to say anything properly. Thus it became inevitable, lest we produce a book that would be as impossible to carry as to read, that certain parts of the original project be shelved. These parts will be published in a second volume. The main topics of this second book are: 1. Implications of DRT for certain issues in the philosophy of language and logic (relating to reference, truth, propositions, presupposition, ambiguity and the relation between semantics and pragmatics). 2. The proof theory of so-called "DRS-languages" (DRSs, or Discourse Representation Structures are the formal representations postulated by the theory developed in this book; these structures can be treated as formulas of certain symbolic languages, called 'DRS-languages'). 3. The theory of propositional attitudes (like belief, desire etc) and the semantics of attitude reports, i.e. sentences which ascribe attitudes to those who have them, like 'John believes that Mary is drunk'.) 4. The theory of verbal communication, of common knowledge and of common reference.

To make the book more useful as a textbook we have included a smattering of exercises. Some of these are routine, and only serve to give the student a chance to test his understanding of the preceding section. But there are also some exercises which touch upon matters of independent theoretical interest, and by illustrating substantive points which we decided to keep out of the main body of the text for reasons of exposition. The exercises constitute perhaps the most obvious point on which the book is open to improvement. It would be an exaggeration to claim that no textbook could ever have too many exercises. But it is not much of an exaggeration, and in practice there are few textbooks that could not have done with more exercises than they in fact contain. Certainly the present book doesn't have enough of them, not at any rate by our own lights. However, producing good exercises is not easy, and it takes time. The stock of exercises that we have collected up to this point (and which for the most part has found its way into the book) has been the fruit of an ongoing effort, closely connected with the series of DRT seminars that we ourselves and others at Stuttgart University have been teaching, and which, each time, have yielded a few new additions. We hope that the stock will continue to grow, and that now that the book is out, its growth rate will even accelerate. If, a few years from now, we find ourselves with a substantially richer collection than the one contained in the book, we may decide to make that collection publicly available.

A considerable number of people have influenced the content and/or form of the text that has now appeared in print. We are much indebted to Bernd Langner, who has been almost singlehandedly responsible for the visual appearance of what lies before you. (The manuscript was delivered camera-ready to the publishers, so everything looks just the way Bernd made it look.) Also, he and Bianca Dorn displayed a growing and eventually uncanny virtuosity turning what most people would perceive as random distributions of ink into digitalized script. Those who have had an effect on content as well as form include not only the ones who have given us their comments on earlier versions of the present manuscript, but also the many others with whom we interacted in relevant ways before the manuscript was started, and specifically those who read and criticised its abortive precursors. Without serious hope that we will succeed in mentioning everyone who should be, we want to express our explicit thanks to: Dorit Abusch, Joseph Almog, Nicholas Asher, Rainer Bäuerle, Johan van Benthem, Steve Berman, Daniel Bonevac, Gennaro Chierchia, Robin Cooper, Jan van Eijck, Werner Frey, Franz Guenthner, Irene Heim, Nirit Kadmon, Ewan Klein, Fred Landman, Hubert Lehmann, Arthur Merin, Michael Morreau, Toshi Ogihara, Stanley Peters, Manfred Pinkal, Craige Roberts, Christian Rohrer, Mats Rooth, Antje Rossdeutscher, Hans Rott, Görel Sandstrom, Andy Schwartz, Peter Sells, Bonnie Webber, Jürgen Wedekind and Ede Zimmermann.

A special tribute is owed to Victoria Rosen, who proof-read the first part of the

book with exceptional care, and to whom we owe a large number of substantive as well as stylistic improvements. If the first three chapters read better and seem more coherent than those that follow, her scrutiny must surely be a major reason. Perhaps an even greater tribute must go to Barbara Partee. Among other things it was her penetrating criticisms of an unpublished manuscript by Frey & Kamp on plurals that led us to correct a good many mistakes that might otherwise have slipped into Chapter 4.

The list of those we mentioned in the last two paragraphs is long and diverse enough to suggest that the sentence you are reading right now may well be the only one in this book to which everyone on that list would happily agree. So, prudence would seem to command that we disclaim responsibility for all the remaining sentences. However, as we are the ones who wrote them all, the blame should be all ours too.

Hans Kamp
Uwe Reyle
Stuttgart, April 1993