NATURAL LANGUAGE PARSING AND LINGUISTIC THEORIES

Uwe Reyle and Christian Rohrer (eds.)
(Universität Stuttgart)

Reviewed by
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This is a collection of papers on natural language parsing and the formal description of natural languages. Most of the papers were originally presented at an interdisciplinary workshop, Word-order and Parsing in Unification Grammars, that was held in Friedenweiler, West Germany, in April 1986. However, two studies have been especially written for this volume, and an extensive introduction by Reyle and Rohrer has been added to outline the contents of the book and to provide the readers who are less familiar with unification-based formalisms with the necessary background information that the authors of the papers assumed to be known.

At the workshop mentioned above, the issue of the possible contribution of linguistic theories to natural language processing and vice versa was discussed. It was also meant as a central topic of the book under review (cf. its title), but in fact only one of the papers (by Shieber, who opens the volume) is directly concerned with the interplay between theoretical and computational linguistics, while in others the subject is touched on in a more or less parenthetical way. Generally, the authors agree that linguistic theories and natural language parsing may benefit from drawing on the experience of each other; that an implementation of a declaratively described theory may encounter difficulties (cf. the paper by Boguraev, who demonstrates it with the example of GPSG); and that linguists should not be discouraged from inventing new grammar formalisms, and ease of implementation must not be the only criterion for a linguistic theory. However, we do not go far beyond remarks of this kind, and the contents of the book may seem rather disappointing in comparison with its promising title.

This does not lessen the value of particular contributions to the volume. Because German is, no wonder, the language referred to in many of the papers, and French as well as Japanese are represented too, the book does not show the usual, though irritating, tendency of computational linguistic literature to infer very general statements concerning language on the basis of English (as if there were no other languages in the world!). In some of the papers, problems of German word order are considered, as well as non-local dependencies and coordination; in some others, questions of semantic representation are addressed.

Most of the contributors to this volume work in the framework of unification grammars (LFG and GPSG) but there is also a paper on parsing with a Government and Binding grammar (Wehrli), and two attempts to combine unification with categorial grammars (Zeevat and Whitelock). In addition, the applicability of indexed grammars, which fall in between context-free and context-sensitive grammars, is discussed (Gazdar).

Because of the wide range of issues it covers, the book can serve as supplementary reading for advanced courses in computational linguistics. Thus, apart from scholars and programmers dealing with natural language grammars and parsers, the work under review will interest students and teachers.

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COMPUTER INTERPRETATION OF NATURAL LANGUAGE DESCRIPTIONS

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This book describes work in the areas of semantics and reference resolution for text understanding, exploring the idea of **early semantic analysis**. These ideas were implemented in a Prolog program for analyzing word problems in physics at the University of Edinburgh as part of the author's Ph.D. thesis.

Early semantic analysis is an attempt to "bring forward parts of the semantic processing before or during syntactic analysis" (p. 13). This means that semantic interpretation goes on incrementally throughout processing, rather than all at once at some predefined point, such as immediately after parsing. In the case of reference resolution, early semantic analysis means that the text must be seen as incrementally providing constraints on the types and identities of entities mentioned. This information is input to a constraint-satisfaction procedure that evaluates references. It seems that the system expects that eventually there will be enough constraining information to narrow the choice of candidates down to one, but it is not clear how long the system will wait for such information, or what it does if there isn't enough information available at the time when it has to make a choice. Mellish discusses

several potential mechanisms that might be used in these cases, such as focusing (Sidner 1979), or preference semantics (Wilks 1975), but none of them were implemented.

Unfortunately, although early semantic analysis is an intuitively plausible approach, and Mellish explores it thoroughly, there are basic questions about its generality and extensibility that are left unanswered. For example, the system is unable to handle some very central aspects of language, such as negation ("The ends of the string are not fixed") and generic reference ("A string has two ends"). These problems arise from a basic assumption in this system that noun phrases have specific referents, and the system falls short when this assumption is not met. If these problems are inevitable consequences of early semantic analysis, then it is hard to see how early semantic analysis could be used in a realistic system. Mellish owes the reader a discussion of these issues and not just a statement that handling them would require a major revision.

Another disappointment is that there is no attempt to integrate work done in the paradigm of focusing and centering (Grosz 1977, Sidner 1979, Grosz et al. 1983) with this approach. While this work may not have come to the attention of Mellish while he was doing the original work (1978–81), a detailed discussion of the relevance of the focusing work to his work would have been immensely valuable in the present volume. For example, the notion of focusing (or the related concept of centering (Grosz et al. 1983) can provide constraints on referents (as suggested by Rich and Luper-Foy 1987) and may be able to do some of the work that Mellish assigns to domain-specific reasoning. Typically, work in the focusing and centering paradigms has not been concerned to any great extent with the role of domain-specific reasoning. Because of this, an integration of these two approaches would have been very valuable.

It would also have been interesting to see a discussion of the pros and cons of using techniques like focusing versus domain-specific reasoning in cases where either could do the job. The exploration of early semantic analysis would also have been much more valuable if Mellish had spent more time discussing the implications of this work for future work in computational linguistics. Does he believe that the shortcomings in coverage that he points out mean that this work is just an interesting blind alley? Are there parts of the work that provide insights that should be used in future systems? Discussions of these questions would have been very helpful.

Mellish is refreshingly clear and explicit about the limitations of his work. There is also a very useful and detailed discussion of some relatively unexplored types of noun phrases. For example, the program described here has good coverage of some interesting types of plural noun phrases, such as specific plurals with indefinite cardinality. An example of this is "Small blocks, each of mass m, are clamped at the ends and at the

center of a light rod". I am not aware of any other work that addresses the problems of handling these kinds of noun phrases to this extent.

This book contains some detailed information about the program, including algorithms, actual code, and traces of execution, which are very useful for understanding what is going on.

REFERENCES

Grosz, Barbara 1977 *The Representation and Use of Focus in Dialogue Understanding.* (Technical note 151, SRI International, Menlo Park, CA.)

Grosz, Barbara; Joshi, Aravind; and Weinstein, Scott 1983 Providing a Unified Account of Definite Noun Phrases in Discourse. In *Proceedings of the 21st Annual Meeting of the Association for Computational Linguistics,* Cambridge, MA.

Rich, Elaine and Luper-Foy, Susann 1987 *An Architecture for Anaphora Resolution.* (Technical report number ACA-HI-393-87, MCC, Austin, TX.)

Sidner, Candace L. 1979 *A Computational Model for Co-reference Comprehension in English.* Ph.D. thesis, MIT, Cambridge, MA.

Wilks, Yorick 1975 A Preferential, Pattern-seeking Semantics for Natural Language Inference. *Artificial Intelligence,* 6:53–74.

Deborah Dahl received her Ph.D. in linguistics from the University of Minnesota in 1984 with a dissertation on the interpretation of *one*-anaphora in discourse. She is currently a senior staff scientist and manager of natural language processing at Unisys Paoli Research Center, where she has designed and implemented the components for reference resolution and noun phrase semantics in PUNDIT, a large text-processing system. Dahl's address is: Unisys Paoli Research Center, P.O. Box 517, Paoli, PA 19301. E-mail: dahl@prc.unisys.com.

BRIEFLY NOTED

INTENTION, PLANS, AND PRACTICAL REASON

Michael E. Bratman
(Department of Philosophy and CSLI, Stanford University)

Cambridge, MA: Harvard University Press, 1987, viii + 200 pp.
ISBN 0-674-45818-4 (hb)

> In this book, I take some steps toward providing a systematic framework within which to understand . . . ways of characterizing mind and action in terms of intention. . . . I am guided by a simple, but, I think, powerful idea. Our commonsense conception of intention is inextricably tied to the phenomena of plan and planning.
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> —*From the introduction*

Exploring Artificial Intelligence: Survey Talks from the National Conferences on Artificial Intelligence

Howard E. Shrobe, (ed.)
(Symbolics Inc)

Morgan Kaufmann Publishers, 1988, xii + 693 pp.
ISBN 0-934613-69-9, $39.95 (hb); ISBN 0-934613-67-2, $19.95 (sb)

Sixteen of the survey talks given at the 1986 and 1987 AAAI conferences, which were not included in the proceedings of