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COMPUTERS AND LANGUAGES: THEORY AND PRACTICE

Anton Nijholt
(Free University, Brussels, Belgium)

Amsterdam: North-Holland, 1988, xiii + 482 pp.
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ISBN 0-444-70463-9, $89.50, Dfl 170.00 (hb)

Reviewed by
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This book is the fourth in the series *Studies in Computer Science and Artificial Intelligence* and as such does depend somewhat on the reader having a background in computer science. However, there is so much stuff in this eclectic book that almost anyone lacking specialized knowledge but with interests in artificial intelligence, history, linguistics, computer science, or social issues will find something to savor.

Computers and Languages consists of 13 chapters divided into five parts, namely: "Introduction" (history of computers, introduction to computability and formal language theory, and an introduction to intelligent applications and AI); "Military Background" (impact of computers on military needs and space and military applications of AI); "Viewpoints on Language" (introduction to generative grammar and associated issues such as acquisition, competence, performance, psychological validity and parsing, BNF programming and computer languages, and formal languages and parsing methods); "From Language to Intelligence" (a survey of natural language understanding systems from BASEBALL on, including interfaces and expert system applications, a variety of approaches such as ATNs, case grammar, Schank's conceptual dependency, Winograd's SHRDLU, semantic networks and frames, and natural language applications: interfaces, machine translation, and military applications including speech processing); and "The Military-Industrial-Academic Complex (University Research and the Military)".

The author notes in the preface (p. *x*) that the book is not intended to be a textbook although he has used parts of it in courses on computational linguistics, computers and society, and formal approaches to languages. The weakest parts of the book are in linguistics-related areas. Although the book was published in 1988, transformational theory, as represented by Chomsky's standard theory circa 1970, is described but not much beyond. The extended standard theory is mentioned, two sentences cover government binding, and there is one sentence each for lexical-functional grammar and generalized phrase structure grammar. No mention is made of the very important recent work in logic grammars, especially unification grammars. When programming languages for natural language are discussed (pp. 314–316), Lisp is briefly introduced (a few sentences), followed by a description of Planner (two pages), a language only of interest to AI archaeologists. Nothing is said of Prolog and its growing importance.

Because so many diverse topics are covered, an accusation of superficiality cannot be entirely avoided. Nevertheless, there are redeeming features in this book. It does provide a useful introduction to the diverse aspects of natural language understanding, including both formal and applications-oriented perspectives. It is rich in history, in the people and places involved in the major contributions. However, what is unique and most admirable about this book is the author's concern about the role of government, especially the military, in academic research in AI, especially natural language understanding. One cautionary remark should be made, however, that the entire discussion, except for two paragraphs, is framed in the context of the U.S. military enterprise as if in no other countries do the military establishments influence the directions of research in computer science. It may be the case that this process is most accelerated in the U.S., but surely Western Europe, Japan, and the Soviet Union cannot be far behind.

Nijholt has performed a valuable service in reminding researchers how intimately they have become involved in military research. Witness the following quotation from *Jane's Defence Weekly*, 17 May 1986:

> The market has become so vast that there is plenty of room for competent companies now that AI is well on the way from academia to the battlefield. (p. 145)

The final chapter of the book, "University Research and the Military", presents a concise description of "collaboration" between academia and the military, including such areas as the cold war, the Vietnam War, and those currently favored ventures, Star Wars and the Strategic Computer Initiative. With respect to professional responsibility and war research, Nijholt quotes relevant sections of the ACM's Code of Professional Conduct, perhaps in hopes of reforming the recalcitrant mercenary researcher.

This book is a concrete example of the word "eclectic". Although generally well laid out, it does have a major drawback that seriously interferes with ease of use: There is no subject index, though there is a name index. In addition, references appear only at the end of each chapter, thus requiring the use of the name

index to locate a reference. It may not find a well-defined readership but it gathers so much useful and interesting information in one place that it is well worth having if the reader is prepared to deal with the deficiences mentioned above.

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Remnants of Meaning

Stephen Schiffer
(University of Arizona)

Cambridge, MA: The MIT Press / Bradford Books, 1987, xx + 303 pp.
ISBN 0-262-19258-6, $27.50 (hb)

Reviewed by
Morena Danieli
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Schiffer's book is a devastating critique of analytical philosophy of language. The author aims at undermining the philosopher's confidence in the facts about language and thought that are usually taken as uncontroversial starting points. Schiffer argues that the questions that now define philosophy of language have false presuppositions and that the most prominent philosophical theories related to those questions are hopeless endeavors.

In the past years Schiffer was much taken with Grice's program, i.e., with the idea of "reducing the semantic to the psychological by first defining speaker-meaning in terms of certain species of semantical behaviour whose specification did not itself involve anything semantical, and then defining expression-meaning in terms of the reduced notion of speaker-meaning" (p. *xiii*). Now Schiffer says that this program of **intention-based semantics** (IBS) is impossible to implement for it is impossible to account for the content of beliefs in a language-independent way and to state propositional-attitude facts in sentences devoid of mentalistic idioms. In trying to deal with such negative conclusions, Schiffer came to forsake a great amount of what most philosophers of language still accept, and was drawn to the conclusion that such hypotheses as the existence of semantic facts and compositionality of meaning are misleading. The book is therapeutic rather than constructive: it belongs to the trend beginning with Wittgenstein's *Philosophical Investigations* (1953), and continued, more recently, by Richard Rorty's *Philosophy and the Mirror of Nature* (1979). It doesn't propose a new theory of meaning, but it puts the analytical philosophers in a critical position by attacking their professional role and their conceptual schemes.

I think that this book will be interesting even for people approaching it from an AI or computational linguistics perspective, for many of the philosophical topics discussed here can't be ignored by computational linguists concerned with semantic interpretation: e.g., analysis of belief and modal sentences, recognition of speaker's intentions, and compositionality of natural languages. I can't discuss all of them here, so I'll concentrate on the last one, which according to me should be a central issue for any theory of natural language understanding (NLU). Schiffer's idea that the semantics of natural language is not compositional is hard to accept, for it seems too tied to his refusal of IBS. Nevertheless, I think that his view can offer us some positive insights. Until now, research in NLU has been notably successful mainly in the area of syntax. The analysis of the meanings of the words has no firm foundation in the works of the computational community: most of the computational semantic analysis is still close to the procedural paradigm of the late '60s. Recently Graeme Hirst (1987) stressed this situation and pointed out that compositionality should be an important desideratum for a theory claiming to provide such foundations.

Compositionality is the principle according to which the semantic value of a sentence depends on those of its parts. Within philosophy of language it is known as **Frege's Principle**, and is regarded as an adequacy criterion for semantic theories of natural languages. It is not surprising, therefore, that Schiffer's attempt to undermine the theoretical basis of the philosophy of language also involves the rejection of the compositionality principle. More precisely, Schiffer comes to deny "the reason for supposing that natural languages have compositional semantics"(p. *xvi*), after having argued that the relational theory of propositional attitude is false. In fact, Schiffer says:

> On the one hand, it would appear that if, as many suppose, natural languages have compositional, truth-theoretic semantics, then the relational theory of propositional attitudes must be correct; while, on the other hand, I have argued that the relational theory is false. I must therefore deny that the relational construal of "believes" is required by its accommodation within a compositional semantics, or else deny that natural languages have compositional semantics. I opt for the latter course. (p. *xviii*)

Schiffer's position seems to be close to the widely held opinion that compositionality is unmaintainable if one denies the relational thesis on propositional attitudes. But he also seems to argue for a more substantial thesis, i.e., for the idea that compositionality is not a feature of natural language semantics. Schiffer admits that compositionality might seem a good way to account for the ability of native speakers to understand utterances of novel sentences: