NAIVE SEMANTICS FOR NATURAL LANGUAGE UNDERSTANDING
THE KLUWER INTERNATIONAL SERIES IN
ENGINEERING AND COMPUTER SCIENCE

NATURAL LANGUAGE PROCESSING
AND MACHINE TRANSLATION

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Preface

This book introduces a theory, Naive Semantics (NS), a theory of the knowledge underlying natural language understanding. The basic assumption of NS is that knowing what a word means is not very different from knowing anything else, so that there is no difference in form of cognitive representation between lexical semantics and encyclopedic knowledge. NS represents word meanings as commonsense knowledge, and builds no special representation language (other than elements of first-order logic). The idea of teaching computers commonsense knowledge originated with McCarthy and Hayes (1969), and has been extended by a number of researchers (Hobbs and Moore, 1985, Lenat et al, 1986). Commonsense knowledge is a set of naive beliefs, at times vague and inaccurate, about the way the world is structured. Traditionally, word meanings have been viewed as criterial, as giving truth conditions for membership in the classes words name. The theory of NS, in identifying word meanings with commonsense knowledge, sees word meanings as typical descriptions of classes of objects, rather than as criterial descriptions. Therefore, reasoning with NS representations is probabilistic rather than monotonic.

This book is divided into two parts. Part I elaborates the theory of Naive Semantics. Chapter 1 illustrates and justifies the theory. Chapter 2 details the representation of nouns in the theory, and Chapter 4 the verbs, originally published as "Commonsense Reasoning with Verbs" (McDowell and Dahlgren, 1987). Chapter 3 describes kind types, which are naive constraints on noun representations. Part II describes the contributions of NS to computational text understanding. Chapter 5 describes the implementation of the theory in a computational text understanding system, Kind Types (KT), first described in Dahlgren and McDowell (1986a). The remaining chapters demonstrate the usefulness of NS representations in taking steps toward solving several outstanding problems in computational linguistics. Chapter 6 describes disambiguation of prepositional phrases using NS representations. This chapter was originally published as "Using Commonsense Knowledge to Disambiguate Prepositional Phrase Modifiers" by Dahlgren and McDowell, 1986b. Chapter 7 provides an algorithm for word sense disambiguation. The work was originally reported in "Using Common-
sense Knowledge to Disambiguate Word Senses” (Dahlgren, 1988a). Chapter 8 proposes a model of discourse interpretation in which all modules of grammar, including naive inference, have access to each other in the process of generating a coherent picture of the meaning of a text. The proposal integrates NS with Discourse Representation Theory (Kamp, 1981, Heim, 1982, Asher, 1987). We suggest a method for extracting coherence relations using naive inference along with syntactic and semantic information.

Joyce McDowell is a co-originator of much of the work described in this book. I would like to thank Nicholas Asher, William Banks, John Bateman, Ezra Black, Tyler Burge, Joseph Emonds, Arthur Graesser, James Hurford, Leah Light, Ronald Macaulay, Eric Wehrli, Michael McCord, James Moore, Edward Stabler, Jr., Barbara Partee and anonymous reviewers for their invaluable comments and discussions of this research. Susan Hirsh, Susan Mordechay, and Carol Lord have contributed to both the theory and the construction of the Kind Types system. The management of the IBM Los Angeles Scientific Center has been most supportive, particularly Juan Rivero, John Kepler and James Jordan. Finally, there could not have been a book without the unusual patience of my family during the course of its creation.