Preface

This volume grew out of a series of workshops and meetings that were organized at the Massachusetts Institute of Technology with a grant from the American Telephone and Telegraph Company as one of several activities leading up to the Convocation on Communication that was held in Cambridge, Massachusetts, on March 9–10, 1976, to mark the centennial of the invention of the telephone. It was appropriate to focus on questions of language on that occasion, for not only is the transmission of the spoken language the primary function of the telephone, but Alexander Graham Bell, the telephone's inventor, had throughout his life a deep scientific interest in problems of language. Although his contributions to our understanding of speech and language have been overshadowed by his technological contribution, Bell is certainly one of the intellectual ancestors of the modern student of language.

Each of the workshops on language and cognition that met at MIT at irregular intervals during 1975 and the beginning of 1976 brought together between twenty and thirty researchers affiliated with different groups in this country and abroad. Our thinking, like that of most students of language in this generation, had been influenced by the work of our MIT colleague, Noam Chomsky. Chomsky has sometimes startled students of language with the observation that linguistics is a branch of psychology, specifically, that branch of psychology devoted to understanding the particular organ we call human language, and there can be little doubt that any adequate psychology of man must provide some way to understand the human capacity for language. It was a belief shared by quite a few among us that developments in linguistics and psychology were leading to similar conclusions by separate routes and that this was an appropriate time to explore the implications of these apparently parallel developments for future, perhaps joint, work. This volume represents a few initial steps in the direction of that goal.

The most striking results of the last decade's work in linguistics, especially of the work carried out at MIT by Chomsky and others, was a fundamental reevaluation of the respective roles assigned to the transformational component and to the lexicon in accounting for the facts. During the past twenty years, since transformations were first introduced into the armamentarium of syntacticians, these computa-

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tional devices have been the subject of searching investigations because it was widely held that they played a particularly significant role in the functioning of language. More recently it has become evident that transformations are not altogether optimal for some of the tasks assigned to them. This discovery, as noted in Bresnan's chapter, elicited different responses from different researchers: some proposed to overcome the difficulties by increasing the power of transformations, whereas others—among them Bresnan in her contribution—have explored the consequences of limiting the power and role of transformations.

One consequence of the move to limit the power of transformations is the need to account in another way for the facts that previously were explained with the help of transformations. An obvious candidate for this role is the lexical component—that is, the repository of the information that speakers have about each of the many thousands of words that every normal person understands and uses. Since, as Bloomfield has remarked, the lexicon is "a list of basic irregularities," it was widely felt that little of interest was to be discovered by studying it closely. This estimate proved quite wrong—as should, no doubt, have been expected—once the lexicon was subjected to serious scrutiny. One part of Bresnan's chapter is a further contribution to this topic.

By a fortunate coincidence, interest in the lexicon developed at about the same time among psychologists. As our workshops were getting under way, George A. Miller and Philip Johnson-Laird had just completed their monumental *Language and Perception* (1976), a large portion of which is devoted to an inquiry into the form and function of lexical entries. Miller's chapter in this volume reflects a further development of the views represented in *Language and Perception* as modified by reflections subsequent to the book's publication. Much of what is new in his chapter stems from the discussions of this topic in our workshop.

A person who has command of a language possesses a certain kind of knowledge, which allows him to produce and understand an unlimited number of sentences. All of us know from direct experience that occasionally this knowledge becomes inaccessible to us, as when we fail to recall a particular word (that is just "on the tip of the tongue"), or when we are guilty of a solecism ("You must renew your subscription by the fifth of the month in which you expire") or when we misunderstand a perfectly well-formed sentence ("The

horse raced past the barn fell down"). There is thus a distinction to be made between the knowledge that makes it possible for us to speak and understand a language and the way in which we employ this knowledge in producing and comprehending actual utterances.

The production and understanding of sentences has been a topic of great interest to psychologists; much of their interest in developments in linguistics during the past twenty years has been directly related to their hope that these developments would help us to a deeper understanding of what it means to understand sentences in a given language. The results of many of these inquiries have not been altogether unambiguous; good evidence was found for the psychological reality of constituent structure, but early studies of transformational relations between sentences produced inconclusive and often inconsistent results. In reaction, attempts were made to explain syntactic processing in terms of concepts developed in automatic parsing systems rather than in terms of specific transformations postulated by linguists. Such a nontransformational model underlies the work by Wanner and Maratsos reported in Chapter 3. In discussions of this work in our workshops it was suggested that the parsers described by these workers are not incompatible with a transformational model of language, especially one in which the role of transformations is sharply limited (see Bresnan's remarks in Chapter 1).

It is a common experience for us to see objects in random arrangements of shapes, lines, and colors. We see a man in the moon, and landscapes, castles, and fantastic beasts in the cloudy sky. There is also a linguistic analogue of this effect that is no doubt well known to anyone who has experimented with concocting grammatically deviant utterances: utterances that appear clearly deviant to the experimenter will often be judged well-formed by his subject, who will point out certain—albeit highly implausible—contexts in which the concocted utterance might be normal, rather than deviant. Such reactions are evidence of a familiar fact: a sentence can express different meanings in different contexts—which is the central problem of pragmatics. In his chapter on anaphora Keith Stenning proposes to recognize explicitly the role that our ability to invent plausible contexts for utterances plays in our understanding of the relation between an anaphoric expression and its antecedent. He points out that in many instances an expression will be understood as the anaphor of an antecedent that receives no overt linguistic expression in the discourse. He concludes that a successful account of the

antecedent–anaphor relation will have to recognize explicitly the fact that it is a relation between a linguistic entity (the anaphoric phrase) and a feature of a—real or imagined—context, situation, or state of affairs. A sketch of such an account makes up the heart of Stenning's chapter.

Ray Jackendoff's contribution is an attempt to use the information about semantic structure that is provided by the interpretation of various syntactic configurations in order to gain insights into basic attributes of human cognition. It stands to reason that at some level of representation—which Jackendoff proposes to call conceptual structure—the information conveyed by language must be compatible with that conveyed by other perceptual systems, for example, vision. It has turned out that in dealing with the minimal predicates required by the semantic component, constant recourse must be had to nonlinguistic (conceptual) knowledge; moreover, the mechanisms independently needed to deal with nonlinguistic conceptual knowledge provide an almost trivial account of the required predicates. A semantic theory must, therefore, be a subpart of the general theory of conceptual structure. Under the further assumption that semantic projection rules are of a simple character, grammatical structure and grammatical parallelism can be used as direct evidence about semantic structure, from which conceptual structure may be inferred fairly directly. Jackendoff analyzes three different kinds of semantic entities to illustrate this approach.

The remaining chapters are concerned with the way the knowledge of a language is acquired and lost. The chapter by Edgar Zurif and Sheila Blumstein surveys some recent work on aphasia in the light of different theoretical models of language. Michael Maratsos inquires into the implications that a model of language with a restricted transformational component has for our understanding of the way children acquire the syntax of their mother tongue. The chapters by Susan Carey and by Morris Halle, which conclude this volume, deal with the learning of words and sounds, rather than with the learning of phrases and sentences. Carey observes that many six-year-olds have a vocabulary of 14,000 words or more. Since the average child has a vocabulary of only about fifty words by the time he is eighteen months old, the implication is that during the ensuing four and a half years children acquire words at a rate of more than eight per day, or close to one per hour for every waking hour of their lives. This rapid rate obviously does not allow for much trial-and-error, nor for

extensive reinforcement schedules. It therefore raises serious questions that learning theorists will have to come to grips with. Halle cites examples from the acquisition of the sound structure of English, which, like the word acquisition facts discussed by Carey, cannot be plausibly accounted for in terms of standard learning-theory concepts. In addition, Halle discusses certain other facts that normal speakers of English must be credited with having knowledge of, yet for which it is very difficult even to imagine a plausible sequence of steps that might lead to acquisition. In Halle's view, these facts are instances of innate knowledge, knowledge that is not learned but that is, rather, genetically programmed into each normal member of our species.

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Morris Halle