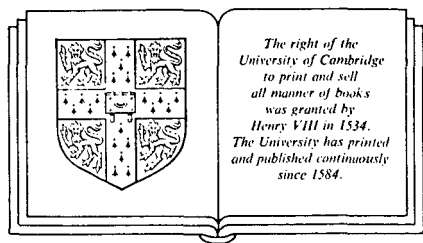# Language Development from Two to Three

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with

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Introduction

"I'm a teacher . . .
I was teaching you all the time."
                    Kathryn, 3 years old

Most children begin the year between their second and third birthdays with a fairly sizable vocabulary of words, at least 50 words by most counts. Many have even begun to combine words to form their first phrases and simple sentences. But the age of 2 marks the beginning of a year of great linguistic effort. By the end of this year, most children will have acquired much of what they need to know for forming sentences and making conversation. They will go on from there to acquire the linguistic complexities and subtleties that make a mature language user, and these later acquisitions will continue well into the school years. But they learn the basics in the year from 2 to 3. The papers brought together in this volume have to do with that period before 3 years of age when children acquire their basic knowledge of semantics, syntax, morphology, and discourse.

These studies, originally published between 1970 and 1989, are the result of the longitudinal research program begun in *Language Development: Form and Function in Emerging Grammars.*[1] The chapters are organized into three sections. The first consists of the studies of simple sentences and includes the acquisition of constituent structure and meaning relations (Chapters 2 and 3) and three kinds of complexity in simple sentences: negation (Chapter 4), verb inflection (Chapter 5), and *wh*-questions (Chapter 6). The second section consists of the studies of complex sentences; these are studies of the acquisition of syntactic connectives and clausal meaning relations (Chapter 7), complementation (Chapters 8 and 9), and complex sentences that express causality (Chapters 10 and 11). The two papers in the third section pertain to process and interaction in language development. One is a study of the role of imitation in learning words and constituent structure (Chapter 12); the other is a study of contingency in discourse (Chap-

ter 13). Together, the chapters in this book tell a developmental story of language acquisition from 2 to 3 years. At the beginning of this period, the children we studied were learning to say simple sentences; by the end of the period they had begun to acquire the structures of complex sentences. It was a noteworthy time in their lives. They learned to talk, to express what they had in mind, and to use language to influence the beliefs and actions of themselves and other persons.

Four children – Eric, Gia, Kathryn, and Peter – appear in all the studies, and six others appear in one or two studies. Although the information in this book is largely about child language and its acquisition between 2 and 3 years, we actually began the research when the children first started to combine words, before they were 2 years old. In the studies of early simple sentences (Chapter 2), negation (Chapter 4) and imitation (Chapter 12), for example, the children were observed from about 18 to 25 months of age.

They were born in the 1960s and are the firstborn children of white, college-educated parents who lived in university communities in New York City. Their parents were native speakers of American English, and their mothers were their primary caregivers. They were, then, children from a fairly well defined cultural context. They were chosen as subjects with these qualifications in what turned out to be, in retrospect, a naive effort to come up with a 'homogeneous' population. Since parent education, birth order, ethnicity, and economic differences among children had been found to be sources of individual differences in speech and language, these were the minimal 'controls' that seemed feasible to ensure that the children would be similar in their language learning. However, as we will see, one result of these studies was that despite the similarities among them, the children were nonetheless different from one another, in rate as well as in other aspects of their language learning.

The children were each visited in their homes, and the data were collected in the context of daily activities and informal play with a familiar adult (one or two of the investigators) and, less often, with their mothers. The same toys were brought to all the sessions, for the different children and for each child throughout the study, in an effort to establish consistency in the home contexts among the children and over time. The observations were audio recorded, and the transcriptions included all speech by the child and adults, along with descriptions of nonlinguistic context and behavior.[2]

The papers that make up these chapters have been changed from their original published form only for purposes of clarification and to reduce their length somewhat. Each chapter begins with an introductory section that expands and replaces the abstract in the original publication. A Postscript has been added at the end of each chapter to point the reader to subsequent research in the literature that was influenced by or is otherwise relevant to the results and conclusions reported here.[3]

The purpose of this introductory chapter is to place these studies in the context of contemporary child language research. I begin with a brief description of three dominant perspectives that influence current research and theory in language acquisition. These are the *developmental* perspective, the *learnability* perspective, and the *cross-cultural* perspective. Then I discuss the contributions from this research program to several conceptual themes in current acquisition research and theory. A central theme is the importance of *verbs* for learning syntactic structures: How these children acquired syntax was influenced by the verbs they learned. The other themes are the role of meaning in syntax acquisition, the importance of context for the child learning language and for the researcher studying the child learning language, the relationship of language learning to other aspects of the cognitive development of the young child, and individual differences among children learning the same language.

PERSPECTIVES ON LANGUAGE ACQUISITION RESEARCH

The Developmental Perspective

The studies in this book originated in what has come to be called the 'developmental point of view.' The broad outline of this developmental point of view comes from the theoretical work of Heinz Werner, but we owe the details of its formulation to the monumental work of Jean Piaget.[4] The human infant begins life in an essentially global and undifferentiated state. The bounds between self and other, subject and object – if they exist at all in the first few days of life – are blurred and indistinct. Development is a process of change that leads to increasing differentiation of self and other and, as a result, successive changes in the forms and content of action and thought. On the one hand, developmental change is additive and cumulative. The mental

capacities of infants increase as they acquire more and more information about different domains of world knowledge. On the other hand, developmental change is also qualitative as infants think about these content domains in substantively different ways.

The key to qualitative developmental change is the capacity for representation and, ultimately, the development of the symbolic capacity. Actions and feelings in the first year are very much tied to internal conditions and immediately perceivable objects, persons, and events in the environment. In the second year, the infant comes to think about objects that are removed in time and space when events in the situation cue their recall. And in the third year, infants develop the ability to mentally act on the representations they have in mind, instead of acting on the objects directly. The bounds between self and other are defined in this process as infants become able to think about objects and persons in relation to each other and in relation to the self, apart from their perceptions and actions. This development marks the transition from infancy to childhood. The ability to recall prior experiences in relation to present events and to anticipate new events increasingly informs the child's beliefs, desires, and feelings.

Language enables the child to make these thoughts known to other persons through expression and to attribute such thoughts to others through interpretation.[5] Language is acquired in the service of acts of expression and interpretation; it is not an end in itself. This means that how language is acquired depends very much on how children think and what they know. The effort to understand language acquisition, then, depends on understanding the importance to the child of such things as perceivability and repeated encounters that render things familiar and allow for the detection and appraisal of novelty. Most importantly, explaining acquisition depends on understanding that the symbolic capacity develops to make absent objects and events present in the child's thought for expression and interpretation.

The mental notation system for this representation in adult thinking is the subject of speculation and debate. For example, theorists differ on whether the required notation systems are componential (consisting of symbols and procedures for assembling them) or holistic (propositional or imagistic formats).[6] But regardless of the form of these mental contents, what the child has 'in mind' determines *what* the child says (and interprets of what others say).[7] *How* the child expresses these mental objects depends on learning words and syntax. It follows, then, that what children can hold in mind helps determine what they take

from the input language and events in the context for learning the language.

The study of language development, in this view, is essentially a bottom-up approach that begins with the child and assumptions about the cognitive capacities children bring to the language learning task. In particular, explaining language development depends on understanding what the child has learned of the language at a particular time and how this knowledge changes from one time to another in progress toward the adult language. Each of the studies in this book addresses a different aspect of language as it develops in the period from 2 to 3. Although each study examines a different question about a basic aspect of language, all started with the same central goal: to discover what children learning language *do* and how what they do can tell us what they *know*.

The aim of each of these studies, then, was to discover something about the children's grammar. Because a grammar is not itself accessible, we looked at the children's language – their use of the grammar – and how that changed over time. In several instances, we began with a rather neutral, pretheoretical question such as 'How did the children acquire syntactic connectives?' (in Chapter 7). Other questions were theoretically motivated. For example, in the study of imitation (Chapter 12) the questions we asked came from competing theoretical views in the literature regarding the part played by imitation for language learning. In the study of *to* complements (Chapter 8), we juxtaposed Otto Jespersen's theory of the origin of the *to* complementizer with Joan Bresnan's theory that *to* is a meaningless semantic marker.[8] In studies of the development of constituent structure (Chapters 2 and 3), we pursued the theory that semantic categories of verbs are central to acquiring grammar.

We inferred what the children knew about language from evidence of the regularities in their language behaviors, since we could not tap their intuitions about language by asking them to tell us directly what was possible or acceptable to them linguistically. Accordingly, a systematic distribution among large numbers of linguistic events was taken as evidence for a principled organization underlying language behavior. A sizable and coherent shift in the regularity of behavior across time, from one observation to a later observation, was seen as developmental change. We approached the data by first reading through an annotated transcription of child speech to form an initial hypothesis about what that child did with a particular aspect of the language. We

then tested this first hypothesis by going through the transcript again and judging whether and how each utterance was relevant. Relevance was judged initially on the basis of form, for example, the use of *no* and *not* in the study of negation and the use of *because* and *so* in the studies of causality. The criteria for relevance were expanded to include interpretive evidence regarding content, and our interpretation revealed, for example, the use of anaphoric reference in negation, and sentences with *and* that expressed temporal and causal connections. The initial passes through the data usually caused us to revise our original hypothesis and repeat the process again, and often again, until all relevant instances were identified and accounted for. The result was a pattern of the regularities and consistencies in the child language data, that is, categories that described the form, content, and use of language. Examples are the semantic categories of verbs in early sentences (Chapter 2), the semantic–syntactic configurations in sentences with subcategories of verbs (Chapter 3), categories of discourse contingency (Chapter 13), and so forth. Using the pattern obtained with one child as a heuristic, we repeated the process, first to establish generalizability with samples of speech from the other children at a comparable time (according to similarity in average length of utterance) and then to evaluate change over time in the subsequent observations.

The relative frequency of utterances in different categories, the change in relative frequency over time, and the advent of new categories provided the evidence we used for answering questions about development and proposing a theory of the child's language. The development of sentence negation (Chapter 4) is example. Interpretation of negative sentences in relation to the contexts in which they occurred revealed three semantic categories of negation with the meanings nonexistence, rejection, and denial. Early on, sentences expressing nonexistence were most frequent; expressions of rejection were less frequent; and expressions of denial were rare. As the children grew older, the frequency of sentences expressing rejection and then denial increased, in that order. Correspondingly, the syntactic form of negation changed, first for nonexistence – for example, from ''no wagon'' to ''a can't find a saucer'' – then for rejection – for example, from ''no go outside'' to ''I don't want to comb hairs'' – and, eventually, for denial, from ''no truck'' to ''that's not a apple.''[9] The relative frequency of the semantic categories of negation at different times and the pattern of change in both their frequency and syntactic form were the evidence used to infer the developmental sequence for sentence negation: nonexistence > rejection > denial.

Our approach is a dialectical one in which we use principles derived from relevant theories in developmental psychology and linguistics to help us understand what we cannot observe directly.[10] In *Form and Function in Emerging Grammars*, for example, I proposed early child grammars using principles from Chomsky's "standard theory" of transformational grammar[11] and the sorts of cognitive constraints that we know influence early development. In *Structure and Variation* (Chapter 2), differences among languages that are synthetic versus analytic helped us understand similar differences among the children in their early tendencies to combine verbs with either nouns (an analytic strategy) or pronouns (a synthetic strategy). In "Variation and Reduction as Aspects of Competence" (Chapter 3) we used a variable-rules model[12] to account for the probablistic nature of relative sentence length and completeness. In short, in order to develop theories of child language and language acquisition, we approach the child data with whatever resources we have in both linguistics and psychology.

In doing this research we observed and described what children did, using audiotaped records of their conversations. The children obliged us by saying well over 100,000 multiword utterances in our sessions with them. The procedural question was how to decide which of these were diagnostic of developmental change. Tapping one's intuitions about language is the mainstay in research with adults and older children, but it doesn't work with 1- and 2-year-olds, as everyone knows by now. Instead we rely on children's 'telling' us what they know by using the forms of language. Such procedures raise problems of sampling: How many utterances and how many children? One pertains to the size of a corpus of utterances for analysis and the other, to the number of children to study. These two decisions necessarily are trade-offs. If the research questions require large longitudinal samples of speech for detecting developmental trends, as was the case in this research, then the inevitable restrictions on time and money mean that fewer children can be studied.[13]

The longer we visited a child, the larger the corpus of speech we could collect, and the more likely we would hear more and different forms. But no one, to my knowledge, has satisfactorily solved the problem of how many data are enough. Everyone agrees that a scrupulous record of all a child's utterances, with contextual notes, is the ideal. It is also an impossibility. A devoted investigator might be able to catch what the child said, but also to record the discourse and other context at the same time would be a prodigious task. Accordingly, we have to sample children's speech. Sampling decisions include the length

of sessions and the intervals between sessions, and there are no rules. Both the requirements of evidence and the pragmatics of data collection enter into the decision. For example, in the days before videotape, we could afford to collect large samples of 6 to 8 hours of child speech because an audio record is a drastically reduced record of interaction, which meant that transcription was a relatively manageable task. In the research reported in these studies, we opted for roughly 8-hour samples every 6 weeks for Eric, Gia, and Kathryn. For the sake of comparing sample size and interval differences, we saw Peter for 5 hours every 3 weeks. This yielded a total of roughly 290 hours of observation over a 1-year period. A videotape preserves much more information, and so its transcription is proportionately more demanding and time-consuming. In a second longitudinal study, begun in 1981 with videotaped observations, we observed children for 1 hour every month but increased the size of our subject sample to 14 children. This yielded a total of 178 hours of observation for one year: fewer data from more children.[14] These decisions are not prescriptive, but they have served the purposes of the two different research projects.

Once we have what we believe is a sample of speech that 'represents' what a child does on any given day, what criteria do we use for our conclusions about developments in language? A very conservative criterion for productivity would be a relatively large number, say 10 or 15, tokens of a target behavior. Such a large number would cast a narrow net, and we would come up with those language forms and functions that the child knows well. But we would lose those that are infrequent, either because they are also relatively infrequent in the adult language or because they are forms and functions that the child knows less well or is in the process of learning. A very liberal criterion would be a single instance: For example, the first time a child asks one *why* question or says one negative sentence, we might attribute knowledge of *why* questions or negation. This would cast a very wide net but run the risk of overestimating what the child actually knows or is learning. A single instance could have been memorized, part of a routine, a phrase that the child associates with only a particular situation, or even an error in transcription (as could happen especially in the study of inflections and the small functor forms such as connectives and prepositions). The criteria for productivity in the studies presented here varied according to the aspect of language being studied but was not less than three or more than five instances of a target form, depending on our intuitions regarding expected relative frequency in the adult

language. In studies that used smaller samples of speech, these numbers could be too conservative.

In sum, the small number of children in these studies was dictated by the nature of the questions we asked and the methods we used in the research to answer the questions. Small numbers of children require that research results be tested by other researchers, with other children, in order to establish their generality. Such replication is necessary for extending the findings to larger populations. But in evaluating such attempts at replication, we need to keep in mind that different sampling methods and procedures raise problems for comparison. For example, results based on a single instance may differ from results based on a criterion reference for productivity. Issues such as these deserve more discussion in the acquisition literature.

Learnability-Theoretic Research

Whereas the focus in developmental research is on the child learning the language, an alternative approach in acquisition research begins with one or another linguistic theory of the adult grammar. Formal theories of acquisition, as in learnability research, are the result of a top-down approach that begins with a theory of the adult grammar and asks how that theory is learned. For example, how children learn the standard theory of generative transformational grammar was addressed by Wexler and Culicover.[15] Steven Pinker proposed a theory of how children learn the lexical functionalist grammar of Joan Bresnan.[16] More recently, Nina Hyams offered an acquisition theory based on parameter setting in the revision of standard theory known as *government and binding*.[17] Such formal theories of acquisition differ from one another in their presumptions of how much children use the speech they hear for data about the adult language and how much they depend on inborn principles and constraints. But these language acquisition theories share the basic assumption that an explanation of how the child learns language depends on an explicit theory of the end state: the adult grammar that is acquired.

The learnability enterprise was motivated initially by research and learnability proofs in machine learning.[18] Given sentences as input and a set of possible grammatical hypotheses, the learner's task is to determine the correct grammar for generating the input sentences. In the child's case, the input must be relatively simple because of limited processing capabilities, but the output will be the structures of the adult

language. This places a heavy burden on the set of hypotheses that the child uses for evaluating the input in order to arrive at the correct grammar. In addition, children are ordinarily not corrected for whatever grammatical mistakes they make, so when they do make a mistake they do not know that they are wrong or how they are wrong. This places yet another burden on the child's learning mechanism. And finally, children are supposedly in a hurry and have to learn the grammar fairly fast. These (and other) assumptions have led researchers to conclude that acquiring language could not be possible unless the child comes to the language-learning task with a strong biological endowment for overcoming these burdens. Usually a set of principles that constrain the possible grammatical hypotheses and a good part of the learning mechanism (what Chomsky originally called LAD, ''the language acquisition device'') must be innate.

Learnability proofs are elegant, and arguments for the innate aspects of language have been presented with a certain eloquence. Those who disagree have the task of demonstrating how the child might have learned whatever is claimed to be unlearnable without the proposed innate component. It is worth pointing out, however, that learnability proofs do not ordinarily operate with the data that children actually receive as input. Moreover, one of the biggest misconceptions in the literature might be that language acquisition is 'quick and easy.' In fact, children work hard at learning language. The studies in this book demonstrate that they have learned quite a lot by the time they are 3 years old, but 3 years is a long time and they still have much to learn.

Another argument for innatism is found in the 'child as linguist' analogy.[19] Children acquire a language by learning the grammar that generates sentences in the language and not by hearing and remembering the sentences themselves. Of course the young child does hear sentences and, supposedly, a lot of noise in the form of nonsentences as well. But the principles and procedures of the grammar to be acquired are nowhere accessible because they are hidden in the minds of those who use them. In short, children hear sentences, but they learn a grammar. The questions for the child are, what is the grammar and how do I learn it?

At the same time, the job of adult linguists is to discover what the grammar of a language consists of. The questions for the linguist are, what is the grammar and how do I figure out what it is? The assumption is that if linguists can answer these questions, they not only will

have learned what the grammar is but also will have discovered how children learn it. But linguists have great difficulty answering these questions. Speakers of a language know what is acceptable and unacceptable as a sentence, but linguists cannot agree on just how they know. In fact, they have not been able to agree on the form of the rules, procedures, or principles of grammar. Ray Jackendoff pointed out that several hundred very smart linguists have been working at what a generative transformational grammar might look like for the last 30 years. Because the task has proved to be so difficult for linguists and because the principles and procedures for language that the child needs to learn are not themselves accessible in the environment, learnability theorists assume that children must have a 'head start.' This head start takes the form of innate linguistic constraints that guide the child in discovering what the grammar might be.

But child and linguist are really very different. The most fundamental difference between them is, quite simply, that one already knows the language and the other does not. Given how they start out, the procedures of child and adult cannot be the same or even similar. Children start with one word at a time and work on the problem step by step. Because they don't yet know the language, they don't have to figure out the whole grammar for the language from the beginning. Little feet take small steps. Each step leads to another problem to work out which, once they have solved it, lets them take another step, and so on. Linguists not only have bigger feet, they also know quite a lot more about the world. They are smarter, in part, because they have lived longer. But also knowing the language is a big help in learning about the world. The linguist, then, starts out knowing the language already and knowing a great deal else besides. The child starts out knowing far less.[20]

In sum, the learnability-theoretic approach begins with the adult, a theory of the grammar that the adult knows, and a theory of how that grammar might be learned. If one begins by explaining how the child learns what the adult knows about grammar, then the task for the child is indeed formidable without a 'head start.' But in the developmental approach, one begins with the child, what the child knows, and how what the child knows changes over time. From the child's naive perspective, the task is a more tractable one.

These two traditions, inherited by contemporary research from the 1970s, were summarized by Norman Freeman as follows:

On the one hand, linguistics had generated vast sets of computationally-unspecified rules supposedly curbed by innate constraints which switched themselves in, by some unspecified means, inside the hypothetical child. . . . On the other hand, starting with real child's talk, psychology inherited a vast number of partial "child grammars and lexicons," which could be cobbled together to yield a recognizable shadow of the steady state only by a vast number of contingent assumptions. . . . From these two lines, the 'eighties have seen an encouraging degree of convergence.[21]

In moving toward convergence, learnability research has made increasing use of the data of children's talk for empirically testing theories of acquisition.[22] At the same time, the questions asked in developmental research have been increasingly informed by changes in linguistic theory and learnability research.[23]

The Cross-Cultural Perspective

We have yet a third perspective in child language research, one that is closer to the developmental tradition but has its origins in anthropology and the study of cultural and social differences. Children in other parts of the world not only learn different languages, they also learn different ways of living. From an anthropological perspective, linguistic inquiry is closely tied to the cultural and social contexts of the lives of language users. In this view, the nonlinguistic factors that make effective language users are as important as the language itself. Children need to learn, for example, when talk is acceptable or unacceptable in a situation, in addition to learning how to judge whether or not their sentences are grammatical. Thus, knowing language includes knowing what one can and cannot say to different people in different circumstances and even knowing when one can talk or not talk at all. Bambi Schieffelin and Elinor Ochs persistently remind us that learning language is closely tied to learning how to think and how to feel, as well as to learning what to say as a member of a larger social group.[24]

At the same time that learning language depends on learning about culture, learning the culture depends on learning language. Language is a means of transmitting knowledge about social and cultural practices. Thus, language both contributes to socialization and is the result of socialization.[25] This perspective can be found in the study in Chapter 11 of the meanings of early expressions of causality. Although not a cross-cultural study, we report how sociocultural practices, judgments, and feelings contributed to subjective meanings in the chil-

dren's expressions of causality. These meanings were an instance in which aspects of the culture were learned through language in the context of learning the language.

Because language and culture inform each other, explanations of language that are based on only a single cultural experience may be misleading. Children learning language in different societies can have different 'developmental stories.'[26]

Summary

The papers reproduced here originated in the developmental tradition. The children we studied came from a single cultural context in New York City and were few in number. The research is similar, in this respect, to cross-cultural ethnographies and cross-linguistic acquisition studies.[27] The focus on the child and the child's point of view in developmental research is a culturally relevant perspective and allows the inclusion of both process and interaction in the research. Our research differed from learnability-theoretic research because it was motivated by questions about aspects of the language the children were learning without assuming that those aspects are formalized by the grammar in a particular way. This means that one can evaluate the data from alternative theoretical perspectives rather than from only a single theory of adult grammar. Both traditional and contemporary theories of language influenced the questions we asked and our interpretation of the results in these studies.

A developmental perspective assumes that children play an active part in acquiring language. They are, in effect, 'the agents of their own development.'[28] Children learn from the language around them by attending to what they hear in contexts they can recognize and understand. They evaluate the input according to what they know about objects, events, and relations in the situation and according to what they have heard before in similar situations. They process language input and compare what they hear at one time with what they have heard at another time. They use frequently heard language forms in deciding what is more or less important to learn to begin with. Moreover, they pay particular attention to what they are currently learning: When children imitate the speech they hear, they imitate the words and/or the syntactic forms they are in the process of learning; they do not imitate what they already know well or forms they know nothing about (see Chapter 12). In contrast, in most learnability research the

child is essentially passive. The emphasis is on principles of universal grammar that are innately specified and on input sentences that 'trigger' the acquisition of instantiations of these principles in a particular language.

The three perspectives on research and theory in language acquisition differ in what Stephen Pepper described as fundamental hypotheses about the world, or "world view."[29] The world view of anthropologically motivated, cross-cultural research is contextualism, with its emphasis on history and the totality of changing events. Most learnability-theoretic research has an essentially mechanistic world view, in which language depends on inborn, specifically linguistic constraints triggered by relevant instances in the input. Developmental research and theory has an organismic world view, with an emphasis on change, integration, and process. Pepper tells us that these different world views are mutually exclusive, virtually by definition, because they originate in how we think about the world and we cannot think about the world in two different ways at the same time. Nevertheless, developmental theory has moved toward embracing both organicism and contextualism,[30] which brings the developmental perspective closer to the cross-cultural one. Finally, the three perspectives have the explanation of language acquisition as their common goal, and for this reason the learnability perspective is ultimately related to both. Research in the coming decades could make those connections explicit for informing the research that we do.

CONCEPTUAL THEMES

Several themes in these studies will be discussed in this chapter to provide a framework for the chapters that follow. These themes continue to influence research and theory today, in new and elaborated forms.

Meaning in Child Language

The studies in this volume have their roots in the renaissance of child language research of the early 1960s. The landmarks in the research of that period are the studies by Martin Braine, Roger Brown and his colleagues, and Wick Miller and Susan Ervin-Tripp.[31] These researchers were moved by the first rumblings of the profound shift in linguistic

theory that began in the preceding decade with the work of Zellig Harris and Noam Chomsky.[32] The generative transformational framework that resulted from this shift was to have a lasting influence on all subsequent theories of language. Linguistic inquiry was explicitly cast in terms of the knowledge people have for speaking and understanding sentences, and so the enterprise of specifying that knowledge became a psychological inquiry as much as a linguistic one. The boundaries between the disciplines of psychology and linguistics were thereby loosened irrevocably, and the new terms *psycholinguistics* and *developmental psycholinguistics* proclaimed their integration. The future direction of child language research took shape when Chomsky framed the central problem for linguistic theory as the explanation of how the child acquires knowledge of language structure.[33]

In standard generative transformational theory, grammar was "best formulated as a self-contained study independent of semantics," and meaning was not used to investigate linguistic forms.[34] Meaning in language comes from what we know about the world, which is limitless. For this reason, in addition to the problems of multiple interpretation, meaning could not be a suitable topic for linguistic inquiry.[35] Correspondingly, questions of meaning were ignored in the studies of syntax acquisition in the 1960s as well. However, in *Form and Function in Emerging Grammars* I suggested that semantics could not be ignored in the effort to understand syntax acquisition, because children use the meaning relations between words to discover the categories and rules of syntax. First, children learn the syntax of simple sentences for expressing a core of basic meanings, and subsequently, they learn the syntax of complex sentences to express the meaning relations between the propositions underlying their simple sentences (Chapter 7). The evidence I cited for the original proposal was the data I collected from Eric, Gia, and Kathryn at 19 to 27 months of age. At the same time, but independently, I. M. Schlesinger reported an analysis of semantic categories and relations in the data from the subjects in the earlier studies by Braine, Brown, and Miller and Ervin-Tripp.[36]

The idea that meaning is important to learning syntax soon took hold, helped in large measure by Roger Brown when he applied the meaning relations in *Form and Function in Emerging Grammars* and in Schlesinger's study to data from children in several different studies. The result was a description of the basic meanings of early sentences in what he called "Stage I speech."[37] The importance of se-

mantics for syntax acquisition has since been extended and formalized in contemporary acquisition theory as "semantic bootstrapping,"[38] and the idea is now virtually taken for granted.

The early meaning relations identified in *Form and Function in Emerging Grammars* were of two kinds. Certain meanings were expressed by particular words that the children used often in their early phrases. These included, for example, the relational meanings of recurrence (with *more*) and nonexistence, rejection, and denial (with *no*). Other meanings were described as "grammatical meaning," including the genitive ("Mommy sock") and the locative ("sweater chair"). Most important, however, were the grammatical meanings in sentences with the constituents subject–verb–object, utterances like "Mommy pigtail," "read book," and "Baby do it." Whether only two or all three of these constituents were actually realized in utterances, the majority of the children's sentences expressed action relations between animate nouns as actor or agent subjects and inanimate objects affected by the action.

The semantics of the grammatical meanings in early sentences were later described by Melissa Bowerman in terms of Fillmore's case grammar categories of agent, action, and patient.[39] She suggested (as had Schlesinger[40]) that the evidence from early sentences supported attributing semantic but not syntactic knowledge to the young child. In contrast, I had proposed originally (in *Form and Function in Emerging Grammars*) and argued subsequently (in the papers reproduced here as Chapters 2 and 3) that children learn syntax and semantics together. Once verbs are productive in word combinations, the constituent structure of children's sentences has a semantic–syntactic basis. The assumption that children's early sentences are syntactically motivated is now consistent with virtually all contemporary acquisition theories[41] and has since been embraced by Bowerman as well.[42]

The syntactic–semantic relations in early sentences were defined in the two 1975 papers according to categories of verb meaning. In the first, *Structure and Variation in Child Language* (Chapter 2), we distinguished between (1) verbs that did and did not name a movement: *action* and *state* verbs and (2) whether the goal of an action or state was a location of an object: *locative-action* and *locative-state* verbs. In the second, "Variation and Reduction as Aspects of Competence" (Chapter 3), we identified the different constituent relations that occurred with action verbs and subcategories of locative verbs. We proposed that the children learned grammar by learning semantic catego-

ries of verbs that determine the argument structure of sentences (as we shall discuss later in regard to the centrality of verbs). The children were learning different sentence configurations for these verb categories, and this led to the further claim that they were also learning the grammatical categories *subject* and *object*. The evidence for the category subject was the different arguments that occurred with different categories of verbs in the same syntactic (subject) position. The pre-verbal constituent of the children's sentences differed in semantic role according to the meaning of the verb in different categories of action and locative-action verbs. Sentence-subjects were agents or actors of transitive or intransitive action verbs respectively, and patients (the affected-object) or movers (both agent and affected-object) of intransitive locative verbs. In sum, these semantic roles licensed assigning the pre-verbal constituent of the children's sentences to the grammatical category sentence-subject.

The semantic roles of the constituents in these early sentences derive, for the child, from the two conceptual notions *movement* and *location*. The importance of these concepts has precedence in both developmental psychology and linguistics. In his several infant books, Piaget stressed again and again that children learn about objects in the world by acting on them and perceiving them in different places.[43] Young infants move objects from place to place and discover them anew in different places. Through these perceptions and actions (hence "sensory motor intelligence") in the first 2 years of life, children come to know that objects continue to exist in time and space even though they can no longer see them or act on them. The semantics of their early sentences builds on the conceptual knowledge acquired in infancy through appreciation of the effects of movement and location.[44] In linguistics, "the semantics of motion and location provide the key to a wide range of further semantic fields."[45] In particular, Jackendoff proposed a theory of semantics in which the meaning expressed through the lexical and grammatical systems of language is closely tied to conceptual structure. The ontological categories in this conceptual structure correspond to the categories of projected semantic entities in the constituents of adult sentences. These include, for example, action, thing, and place, which are consistent with the categories in children's early sentences.[46]

In sum, in the studies reproduced here, meaning is the thread that led the children to discover the forms of language. The meanings that were particularly important were action, state, and location (Chapters

2 and 3), negation (Chapter 4), and tense and aspect (Chapter 5) in simple sentences; and in complex sentences, additivity, time, and causality (Chapters 7, 10, and 11), and the psychological attitudes named by verbs of volition, directedness, perception, and knowing (Chapters 8 and 9). In addition, the notion of topic relatedness or shared meaning between sentences guided their discourse acquisition (Chapter 13).

The phrase "rich interpretation" was used by Roger Brown to characterize the practice of attributing meaning to children's speech.[47] Some have questioned its legitimacy,[48] but rich interpretation has remained a powerful instrument in the toolbox of acquisition research. The study of semantic relations in children's sentences in the 1970s[49] resurfaced in the 1980s in the emphasis in learnability-theoretic research on thematic roles and relations in adult grammar for the input children receive. Rich interpretation has been a relatively conservative enterprise so far, because attributions based on what children say are ordinarily restricted to attributions of linguistic meaning in words and combinations of words. More recently, we have begun to extend the practice of rich interpretation in making attributions of the representations in the states of mind that underlie children's expressions.[50] Language expresses what the child has in mind, and these representations are the contents of their beliefs, desires, and feelings. Meaning in language depends on these representations,[51] and so the developments that contribute to the child's having such mental representations also contribute to language acquisition.

The systematic appeal to meaning led to two other themes in *Form and Function in Emerging Grammars* that continue in contemporary child language research. One of these is the importance of the context for the child learning language and for the researcher studying how children learn language. The other is the relationship between language development and developments in other aspects of cognition.

Context and Child Language

Context is important for two reasons: We as researchers use the child's context to discover meaning in the child's language, but more important, the young child uses context to discover meaning in the language.

Rich interpretation required information from the context for interpreting the child's meaning. All this meant is that one can look to the child's focus of attention and use what the child is doing and seeing to infer something of what an utterance is about. The idea was not new.

The fact that children speak "very much in the here and now" was noted by Roger Brown and Ursula Bellugi.[52] Before that, Werner Leopold reported using the "aid of the situation" in inferring the meanings of his daughter's speech.[53] And well before that, Grace de Laguna observed that "even a member of the family often fails to grasp the significance of what the baby is saying if he does not see what the baby is doing."[54] Parents and other caregivers rely on the cues from context and situation to figure out the child's meanings in their everyday activities of daily living. This is because 1- and 2-year-old children talk about what they are doing, what they are about to do, and what they want someone else to do in a way that adults do not. For example, a young child who gets on a tricycle will announce the fact: "I ride bike!"[55] In contrast, when adult speakers know that their listeners can see what they can see, they do not ordinarily tell them about it.

Two things were new. The first was methodological. Studies of early syntax in the 1960s had looked only at the words children said and how those words were combined with one another (in distributional analyses). In *Form and Function in Emerging Grammars* I proposed that one could systematically exploit the child's 'here and now' talk to form hypotheses about meaning and that regularities in meaning could be used to discover the syntax of sentences. The "evaluation of an utterance in relation to the context in which it occurred provided more information for analyzing intrinsic structure than a distributional analysis of the recorded corpus."[56] The example that I used to make this point was the pair of utterances Kathryn used that sounded the same but differed in meaning: "Mommy sock." In one instance of "Mommy sock," Kathryn pointed to Mommy's socks in a pile of dirty laundry. In the other instance of "Mommy sock," Mommy was fashioning a sock on Kathryn's foot out of toilet paper to entertain her as she sat on the toilet seat. The two utterances were the same, but the interpretation of their meaning from the contexts in which they were said revealed different structural relations between the constituents "Mommy" and "sock" in the two instances.

The systematic use of context was an insight 'whose time had come.' Moreover, once the door to context was opened, researchers soon discovered not only that context was a resource for studying the semantics of child speech but also that one could study what the child was learning about the pragmatics of language use.[57] Thus, the first point made about context and child language was methodological: Context could be a systematic resource for linguistic analysis.

The second point made about context and child language in *Form and Function in Emerging Grammars* was conceptual. Not only is context useful to the adult who is studying the child, but it also is crucial to the child learning the language:

The importance of the child's awareness and cognizance of nonlinguistic experience in relation to language in [the] environment, in the course of development, should not be underestimated. . . . children learn to identify certain grammatical relationships and syntactic structures with the environmental and behavioral contexts in which they are perceived and then progress to reproducing approximations of heard structures in similar, recurring contexts. In order to use a structure in a new situation, the child must be able to perceive critical aspects of the context of the situation. Thus, the sequence in which syntactic structures are learned by the child may be influenced as much by [the] ability to differentiate aspects of situational context and recognize recurrent contexts as by such factors as frequency of exposure to structures or their relative complexity.[58]

This idea has since been made increasingly explicit in other research. For example, Dan Slobin proposed that certain scenes "regularly occur as part of [the child's] frequent and salient activities and perceptions, and thereby become the organizing points for later [acquisition of the forms of language]." He cited, in particular, what he called the "prototypical" "manipulative activity scene" that leads children to acquire transitive sentences.[59] However, children learn other sentence frames in addition to transitive action sentences in this period of time, especially for intransitive action verbs, transitive and intransitive verbs with locative arguments, and state verbs (Chapters 2 and 3). They learn these in the context of other kinds of 'scenes' so that action scenes for transitive sentences are not necessarily privileged or 'prototypical.' Richard Beckwith showed that the sentence types children heard their mothers use – indexed with the situational contexts in which they were said – predicted the sentence alternations the children subsequently learned.[60] In short, the speech the child hears is optimal for language learning when it relates to what else the child is attending to at the same time.[61] However, what the child attends to in the situation is determined by developments in perception and cognition.

Cognition and Child Language

It does little good to hear sentences spoken in relation to events if these events are not themselves recognized and understood. Linguistic and

nonlinguistic inputs are data for a child only when their appraisal is within the child's perceptual and cognitive abilities. The second fallout from introducing meaning into the study of syntax acquisition is this question of how developments in other aspects of cognition contribute to learning language. Young children express a small core of meanings, and some of these are expressed more frequently than others are. Moreover, certain meanings in the adult language occur infrequently or not at all in early child sentences, for example, comparative constructions, conditionals, identity (''Mommy *lady*''), and the instrumental role of an object in an action (''cut *knife*''). The fact that some relations are infrequent, others are frequent, and some do not occur at all means that the semantic relations expressed in early sentences are not simply a random sampling of the possible meanings the language can express. Rather, children select from the meanings available in the speech they hear only those that fall within their cognitive understanding.

Again, this idea is not new. The relationship between thought and language has been debated through the centuries. The linguist Edward Sapir proposed in 1921 that a ''speech element [such as the word *house*] is the symbol first and foremost . . . of a 'concept', in other words, of *a convenient capsule of thought that embraces thousands of distinct experiences and that is ready to take in thousands more.*''[62] But students of child language had rarely gone beyond words and sentences to ask how acquiring concepts relates to acquiring language.[63] Even Piaget's *The Language and Thought of the Child* is really a study of egocentric thought and has little to say about language or its development.[64]

The inquiry into cognitive developments and language in the last two decades of child language research has had, by and large, two aims. One is the focus on the child's knowledge base and one or another version of the traditional child language 'mapping problem': how children attach the forms of language to what they know about objects, events, and relations in the world.[65] The importance for language of object concepts and knowledge of events is, by now, virtually self-evident. Most simply, children learn to talk about what they know at least something about. The second cognitive focus in child language research is on development of the capacities and processes of thought that make possible the acquisition of concepts, event knowledge, and language itself.[66] These processes include the development of a symbolic capacity and such Piagetian constructs as object permanence,

means–end relations, and operational thought. They also include developments in memory, recall, computational capacity, and automaticity.[67]

We have, then, two cognitive perspectives in child language research. One focuses on acquiring knowledge in general and knowledge of the correspondence between language forms and meaning in particular. The other focuses on the development of the capacities and processes of thought needed to acquire this knowledge. The consequence is that we now have some idea of how cognitive developments contribute to the acquisition of words and the forms of language in the period from 1 to 3 years of age.

At issue, however, is how language originates in the brain. This issue was placed in sharp focus by the historic debate between Jean Piaget and his followers, and Noam Chomsky and his followers, at the Abbaye de Royaumont near Paris in 1975.[68] The question was whether language is a separate cognitive faculty apart from other aspects of cognition and innately specified, as Chomsky argued, or one part of general cognition and attributable to learning and cognitive principles, as Piaget argued. When the dust had settled, both parties of the debate claimed victory. At the least, each had presented the clearest statement so far of their separate views. Jerry Fodor, one of the participants in the Chomsky camp at the debate, subsequently extended the argument that language is represented separately in the brain, and 'modularity of mind' has been picked up and extended in both psychology and linguistics.[69] In contrast, since Piaget's death in 1980, his views have been represented with considerably less force in studies of language and acquisition.

These two positions on language and mind continue to influence research and theory today. The difference between them comes down to what determines cognitive development: how children learn to think, with an emphasis on process, or what their thinking is about, with an emphasis on content. The emphasis in the modularity position is on content. Cognition encompasses developments specific to separate content domains such as language, as in learnability-theoretic research, but also to such domains as object perception,[70] mathematics,[71] and biology.[72] These content domains are separate because each has its own domain-specific constraints and principles of learning.

Piaget's influence is more apparent in research in the developmental tradition, with its emphasis on general principles of learning and or-

ganismic change. In this view, developments in different domains can be related to one another because they depend on and derive from the same developments in underlying thought. This is true, for example, in the case of learning words and play with objects in the single-word period. Both depend on learning about objects in general and learning concepts for particular objects.[73] Further, what is learned in one domain can inform what is learned in another. Learning the semantic relations actor–action and action–affected-object and the constituents subject–verb–object in simple sentences depends on knowing the corresponding roles and relationships in action events.[74] In addition, in the domain of language, developments in subdomains inform one another for acquisition. How and what children learn of the structure of sentences depend on their lexical learning and participation in discourse exchanges with other persons. Semantics, syntax, and discourse are not separate for children learning language. Rather, they learn these aspects of language together, from the beginning. For these reasons, the studies in this book have an integrative perspective and address the contact among semantics, syntax, and discourse in the course of acquisition.

The difference between an integrative, cognitive perspective and a strictly linguistic perspective on explanation in acquisition research can be illustrated with the following example: Children's early sentences very often lack sentence-subjects, and they say such null subject sentences as "read book," "ride train," and "no fit." Even after they begin to say sentences with subjects, like "man making muffins" and "this no fits," null subject sentences continue to occur. Why? One linguistic explanation comes from the theory of parameter setting.[75] In Chomsky's government and binding theory, whether or not sentences have subjects is a "parameter" of universal grammar that is "set" differently in different languages. The parameters in universal grammar have a range of values; in this case, subjects are required or not, and these are the two values of the *pro-drop* parameter. Italian is a language that does not have to have sentence-subjects; they are optional. English, in contrast, is a language in which sentence-subjects are obligatory, which is why children's null subject sentences attract attention. The linguistic explanation, according to Nina Hyams and others, is that young children learning English have not yet gotten the information they need from the input language for setting or resetting the pro-drop parameter. They do not yet know that subjects are re-

quired, and so they act as children do who are learning Italian. This explanation is a strictly linguistic one, based as it is on an innate principle of universal grammar in government and binding theory.[76]

An alternative explanation of why null subject sentences occur in early child speech (in Chapter 3) draws on the cognitive processing requirements for language learning. What young children know about the structure of sentences can underdetermine what they actually say because of general constraints on cognitive functioning. In *Form and Function in Emerging Grammars,* I suggested that children have a fuller understanding of the constituent structure of sentences than is actually realized in the sentences they say. Others have since made the same observation.[77] When children show they have knowledge of constituent relations and argument structures by producing these in separate sentences – for example "Daddy read," "ride car," and "Mommy pigtail" – then one can attribute to the child the knowledge for fuller sentences – for example, "Mommy make pigtail" or "Daddy read book."[78]

However, the demands on the young child's cognitive resources include recalling words from the lexicon, responding to something someone else says in discourse, or adding syntactic complexity (like "Daddy read *airplane* book" and "Mommy *no* make pigtail." Complexity, lexical, and discourse requirements compete with one another for the child's limited resources. This means that recalling words that are newly learned and less automatic than known words, or adding negation or attribution to a sentence, 'cost' the child, and so something has to give. Thus, negative sentences are shorter than affirmative sentences and lack sentence subjects initially, because negation in a sentence 'costs' the child extra cognitive effort (see Chapters 3 and 4). These cognitive requirements are more systematic in their effects than are the performance factors that Chomsky described, such as fatigue, distractions, and shifts in attention and interest.[79]

The study reported in Chapter 3 reveals which factors competed for the young child's limited resources to reduce sentence length and also which factors facilitated and increased the probability that longer sentences would occur. For instance, the children were more likely to construct longer sentences with verbs that were relatively well known and when part of the sentence had already appeared in the discourse. Null subjects are also a function of semantic role and verb category, which we shall discuss in regard to the centrality of verbs in children's early grammars. In sum, some sort of probability model captures the

likelihood that child sentences will be complete. Children omit the subject (or some other sentence part) when their cognitive processing abilities are exceeded, for example, when they use new verbs, nouns, or pronouns or add negation or attribution to the sentence.

The two explanations of subjectless sentences – the cognitive-load hypothesis and the parameter-setting hypothesis – independently converge on a particular feature of language acquisition. Certain kinds of added complexity like negation and two-part verbs reduced sentence length, but one sort of complexity that did not reduce the children's sentences was verb inflection (Chapter 3). The children were not more nor less likely to lexicalize subjects when the verb was inflected. In the linguistic explanation motivated by principles of universal grammar and the pro-drop parameter, Hyams observed that children learn the adult setting for the pro-drop parameter (that subjects in English are obligatory) at about the time they begin to use verb inflection and auxiliaries.[80] Other evidence has since shown that children discover the obligatory subject requirement when they have learned the distinction between tensed and untensed verbs.[81] These findings underscore the close connection between sentence-subjects and verb inflection, a connection that is endogenous in the language and less vulnerable to the more general cognitive processing constraints.

Individual Differences

Children do not progress at the same rate, as is well known, but they also do not progress in their language learning in the same way. Such differences among children from the same social group, learning the same language, were first described in *Form and Function in Emerging Grammars*. The distinction among the children was in whether they initially lexicalized the arguments of verbs as nouns or pronouns. This difference in individual learning was likened to the basic analytic–synthetic distinction among languages in general (see Chapter 2). Synthetic languages like Russian and Finnish mark contrastive meanings or functions by adding affixes to noun and verb stems, much as Eric and Peter in these studies added pronouns like *it, there,* and *this* to their verbs. Analytic languages like English combine lexical items for contrastive meaning, much as Kathryn and Gia learned to combine categories of nouns with verbs. The nominal–pronominal difference has since been replicated in other studies and characterized in terms of analytic and holistic strategies for language learning.[82]

The nominal–pronominal difference is similar to other differences observed subsequently among the children in that it had to do with the form of their speech. Differences were not observed among them in aspects of language content. For example, the children also differed in the sequence in which they learned the different syntactic connectives after *and* (*because, so, when,* and the like), but not in the sequence in which they learned the meaning relations between clauses in complex sentences (Chapter 7). They also differed in the order of clauses that express causality: effect–cause or cause–effect (Chapter 10), but not in the meanings of causality (Chapters 10 and 11). Furthermore, the differences among them in acquisition of form are also differences in the target language. Adult speech shows shifting pronominal–nominal reference, and both effect–cause and cause–effect orders are used in expressions of causality with different connectives (*because* and *so,* respectively).

This raises the question of variation in the input that different children receive. We have come to recognize that the input to children learning language provides a number of options and that these can lead to more or less important differences among them. We do not know the extent to which differences among children may really be differences in the way their caregivers talked to them. We also do not know whether they are differences that make a difference, that is, differences that are important to understanding language learning. These are questions for further research, but such research presents a variety of problems, as discussed by Elizabeth Bates and her colleagues.[83]

The Centrality of Verbs

A theme repeated throughout these studies is that verbs are central to learning grammar and discourse. In *Form and Function in Emerging Grammars,* I pointed out that nouns predominate in presyntactic speech and that children begin to acquire syntax by selecting the verbs, prepositions, and adjectives that combine with the nouns they already know. Because there are no inflections, they cannot be used formally to mark grammatical categories. I suggested that early grammatical categories are marked instead by the selection of verbs, prepositions, and adjectives in ordered relationships with nouns. "The grammatical categories in early child language are selectional rather than inflected. They can only be marked by patterns of order and selection so that membership in categories cannot be reliably determined until lexical items oc-

cur in syntactic constructions.''[84] This use of ''patterns of order and selection'' was consistent with standard theory in which grammatical relations are determined by context-sensitive subcategorization rules that define ''a *selectional relation* between two positions in a sentence – for example . . . the position of the Verb and that of the immediately preceding and immediately following Noun.''[85]

In the later studies, much of what these children learned about grammar and how they learned to participate in discourse were determined by the verbs they learned. In standard theory, the syntactic component of a grammar articulated with actual words in the lexicon through lexical rules that operated only after the syntax of the base structure of a sentence was derived. However, the developmental data repeatedly pointed to the conclusion that children discover the syntax of sentences by learning the verbs in the language. Since that time, and independently of the acquisition data, the contribution from verbs in the lexicon to the syntax of sentences has become increasingly prominent in linguistic theory.[86]

The two 1975 papers (Chapters 2 and 3) were studies of the acquisition of argument structure and underscored the importance of verbs for acquisition. The terminology we used then is different from terms used now, and I will make the connections to current research and theory here. We proposed that the children learned semantic categories of verbs that determined the argument structures and configurations in their sentences. A major distinction in those studies was between verbs that do and do not take locative arguments, the difference between what we called *action* and *locative-action* verbs. In the first study (Chapter 2) we pointed out that when the goal of movement was a change in place of the affected-object, the verb was a locative one. Verbs like *go* and *put* are locative-action verbs that license place as an argument, for example, ''go *home*'' and ''put it *there*.'' In contrast, when objects were affected by a movement that did not have change of place as a goal, the verb was a simple action, nonlocative verb. When place occurred with action verbs like *eat* and *read,* it was a sentence adjunct (what we called action and place) and not an argument of the verb, for example, ''eat *in the kitchen*.'' Although some of the children's early sentences with action verbs included locative adjuncts (for example, ''orange chair read a book''), they were rare. The occurrence of place as an argument of locative verbs was far more frequent.

The acquisition of subcategories of locative verbs that determined different argument structures and sentence configurations was de-

scribed in subsequent research (Chapter 3). Constituent meaning relations were different with action and locative verbs and with different locative verbs. The semantic role of the sentence-subject was as agent with transitive-action verbs and locative verbs such as *put;* patient with locative verbs such as *go* and *fit* that did not license an agent argument (for example, *"car"* goes here" as the child puts the car on the train); and mover with verbs that named an action in which the object that changed location was also the cause of the action (for example, *"Mommy* go store"). Thus, sentences differed according to the syntactic placement of the noun or pronoun that lexicalized the object affected by the movement toward a goal. The affected-object followed locative verbs that took an agent (*put*) but occurred before verbs that did not take an agent (*go* and *fit*). Moreover, verb alternations occurred when the same verb appeared in two different categories with different argument structures. For example, the locative verb *fit* occurred in both transitive ("fit the piece in the puzzle") and unaccusative intransitive ("the piece fits here") alternations.

The semantic roles and relations we identified in the children's sentences are consistent with thematic relations in interpretive semantics[87] and more recent linguistic theories.[88] The notion of thematic relations, introduced originally by Gruber and developed by Jackendoff, has led most recently to work in linguistics having to do with lexical semantics. An integrative survey of this work with a focus on semantic categories of verbs in lexical knowledge has been provided by Beth Levin.[89] In her account, lexical knowledge includes semantic categories defined according to the argument structures they share and the realization of those arguments in the syntactic structure of sentences. Argument structure is determined by the semantics of the verb and its 'affectedness' on entities. For example, an object that changes position is the 'theme' with verbs like *slide;* an object that changes state is the patient with verbs like *cut.* Our description of children's early verb categories and the role of those verb categories in their syntax acquisition anticipated the structural outline of adult lexical knowledge that Levin described, as well as recent learnability-theoretic research on argument structure.[90]

In addition to the configuration data, the evidence for early verb categories included the relative frequency of constituents in the children's speech (Chapter 3). These data were the result of analyses to determine which factors contributed to the lexicalization of constitu-

ents and the relative length and completeness of sentences. The most frequently lexicalized constituent was the verb. The second most frequently lexicalized constituent in the children's sentence was the object affected by the movement named by the verb ('affected-object,' or 'theme'). Further evidence of the reality of the children's verb categories was the finding that null subjects were not independent of thematic role and verb category (in addition to the effects of cognitive load already discussed). The probability that a subject would be lexicalized was greatest when it was the affected-object that changed place (with a locative verb). Thus, the sentence-subject was most likely to occur when it was the theme of a locative verb: either the patient with verbs that did not license an agent – for example, *"car* go here," *"this* fits here" – or mover that was both agent and affected-object – for example, *"Mommy* go store."

An alternative explanation is that locative sentences with patient and mover subjects have shorter predicates and, therefore, less cognitive weight than do locative sentences with *put,* which include both object and place in the predicate.[91] However, predicate length with simple (nonlocative) action verbs was the same as predicate length with patient and mover locative verbs, but agent subjects of action verbs were more likely to be null than were patient and mover subjects of locative verbs.

In addition to predicting argument structures and lexicalized subjects, these categories of verbs in the children's sentences also predicted verb inflection (Chapter 5). Verb inflection was not independent of the semantics of verbs: whether (1) relevant movement occurred (the action/state distinction), (2) the goal of movement was a change in place (the action/locative-action distinction, and/or (3) the object that changed place was also the agent of the movement (the distinction among mover, patient, and agent with locative verbs). For example, more inflections occurred with action verbs than with verbs in the other categories, but given how often sentences with action verbs occurred, the proportion of inflections with action verbs was less than predicted. In contrast, the proportion of inflections with patient–locative verbs was greater than was predicted by the relative frequency of sentences in that category. At the level of the particular inflections, *-s* was learned originally with patient–locative verbs, whereas *-ing* and irregular past were learned originally with action verbs.

These semantic categories of verbs also predicted the complex sen-

tences that the children learned. The three complex sentence structures learned with syntactic connectives in this developmental period were conjunction > complementation > relativization, in that sequence. Each of these developed with essentially different populations of verbs. Conjunction occurred overwhelmingly with action and locative verbs; relativization was acquired with the copula; and complementation occurred overwhelmingly with state verbs, with semantic subcategories of state verbs acquired sequentially (Chapters 8 and 9).

Finally, the children learned to participate in discourse by building on the verb in a prior utterance (Chapter 13). The major development in discourse was the increase in contingent messages that shared the topic of a prior utterance with added information. This increase in contingency was characterized primarily by expansions, in which the verb of the prior utterance was repeated and something was added to it: Either major sentence constituents (SVO) were added or modified, or a *wh*-form was replaced by a word or a phrase.

Thus, the verbs in the language were central to how these children acquired grammar and learned to participate in discourse. Different categories of verbs determined differences in argument structure, sentence configurations, and verb inflection in simple sentences and the different structures and connectives in complex sentences. The results of these studies, taken together, led to the following conclusions:

Lexical verb development and grammatical development appear to be mutually dependent, with the result that the child's verb lexicon is not simply part of a mental dictionary with all the words that a child knows, including nouns. Rather, the results of the studies described here suggest that the verb system in child language may consist of a categorization of verbs on several levels of rules of grammar, with a network of attachments to a noun lexicon. . . . and children's knowledge of language structure [is] probably never independent from the different verbs that they know.

The categorization of verbs that has emerged from our studies includes large, molar categories – action/state; locative/nonlocative; durative/nondurative; completive/noncompletive; volitional/epistemic/notice/communication states, etc. The claim for the psychological and linguistic reality of these semantic categories rests on their being coextensive with major grammatical developments in the children's language or on their sequential development. There has been no evidence that more molecular semantic categories – such as verbs of locomotion (*run, walk, skip, fly,* etc.) or verbs of ingestion (*eat, drink, swallow, slurp, chew,* etc.) – have the same psycholinguistic status in these children's early language learning. Such potential molecular categories

appear to be represented in the early speech data by only one or a few instances (e.g., *eat* for the larger category of ingestion; *ride* and *run* for the larger category of locomotion; and *say* and *tell* for the larger category of communication, etc.). Thus, . . . the children had learned the relevant linguistic form or structure with a few verb exemplars and the high-frequency pro-verbs, such as *do* and *go,* which they used generally, as they learned a wider range of more semantically specific verbs. Knowing the structure, the children then would be able to fill in and expand the verb categories to form more molecular categories.[92]

The children's early verb categories included a variety of verbs, but in fact, only a few verbs occurred frequently, the all-purpose verbs that we called *pro-verbs*[93] because of their functional similarity to pronouns. They were primarily the action verb *do* and the locative verb *go,* and they occurred in place of a great many other, more descriptive verbs like *chew* and *drive* that the children had presumably not learned as yet. In sum, the children whom we studied acquired syntax by learning a small number of semantic verb categories. These categories consisted of the highly frequent, all-purpose pro-verbs and a few exemplars of more semantically specific, descriptive verbs. Having learned the verb categories and the structures they determine, the children could learn new descriptive verbs that meet the semantic and syntactic conditions in each category.

This account is consistent, in part, with the theory of "syntactic bootstrapping" proposed by Barbara Landau and Lila Gleitman, whereby children use their syntactic parsing of input sentences for learning the meaning of individual verbs.[94] Once children know how to parse sentences into constituents, they can use this syntactic knowledge to learn the argument structures for other verbs that have the same thematic roles and constituent relations. But do they learn how to parse sentences, or do they already have this ability to begin with? According to Landau and Gleitman, a syntactic parser is part of the linguistic endowment that the child brings to acquiring a language. Our view is that children use their knowledge of the syntax of simple sentences to learn more and different verbs but that knowledge of the constituent structure of simple sentences is learned. Constituent structure is learned originally in the context of acquiring verb categories with a small number of general, all-purpose pro-verbs like *do* and *go* and a few descriptive verbs. Having learned something of the argument structures, verb inflections, *wh-*questions, and complex sentences that the verb categories determine, a child can learn other verbs that are more descrip-

tive in their meanings (verbs like *chew, jump,* and *drive*) with the same syntactic privileges in these categories.

SUMMARY

The purpose of this introductory chapter was to provide a context for the studies described in the volume. We have seen, in particular, how this research project originated in the developmental perspective in child language, with its explicit focus on the child. Several conceptual themes emerged: meaning in child language, the relevance of other developments in cognition, the importance of context, and the existence of individual differences in acquiring aspects of form, if not content. Most important, however, is that the results of these studies have repeatedly pointed to the centrality of verbs in language learning. Each of these themes will surface again in the chapters that follow.

NOTES

1 Bloom, L. (1970). *Language development: Form and function in emerging grammars.* Cambridge, MA: MIT Press. This was originally my Ph.D. dissertation, 1968, Columbia University.
2 These procedures are described in greater detail in Chapter 2 and in Bloom, *Form and function in emerging grammars* (pp. 234–9). See also, Conventions for transcription of child language recordings, app. A, in Bloom & Lahey (1978). In order to avoid redundancy, descriptions of the procedures used to collect and transcribe the data have been omitted or abbreviated after Chapter 2. The speech samples from Eric, Gia, and Kathryn (and a fourth child, Jane) were collected and transcribed by Lois Bloom. The speech samples from Peter were collected and transcribed by Lois Hood and Patsy Lightbown, who took turns interacting with Peter and taking notes on the situational context and behavior. The data from David, Mariana, Paul, and Steven were collected and transcribed primarily by Lois Hood. The transcriptions from Eric, Gia, Kathryn, and Peter are stored in two places and can be made available to other researchers. One is the Special Collections at the Milbank Memorial Library, Teachers College, Columbia University, and the other is the Child Language Data Exchange System at Carnegie-Mellon University (thus far, only the transcripts from Peter are part of the computerized corpora in the CHILDES database.)
3 The citations included in these postscripts are not meant to be exhaustive, and I regret that important studies were undoubtedly missed.
4 Werner (1948) and Piaget's 'infant books,' for example, Piaget (1937/1954), and (1947/1960).

5 Danto (1983); Taylor (1979).

6 See, for example, the papers in Pylshyn & Demopoulos (1986).

7 See, for example, Fauconnier (1985).

8 Jespersen (1964); Bresnan (1970).

9 Examples from Kathryn in Bloom (1970).

10 This characterization was suggested to me by Richard Beckwith.

11 Chomsky (1965).

12 Labov (1969); Sankoff (1974).

13 I have addressed procedural issues in language acquisition research in several places, for example, Bloom (1974a), Bloom, (in press b) and Bloom & Lahey (1978).

14 The research from this longitudinal study is reported elsewhere, for example, in Beckwith (1988); Bloom & Beckwith (1989); Bloom, Beckwith, Capatides, & Hafitz (1988); and Lifter & Bloom (1989).

15 Wexler & Culicover (1980).

16 Bresnan (1978); Bresnan & Kaplan (1982); and Pinker (1984).

17 Chomsky (1982); Hyams (1986).

18 The canonical citation for the origins of learnability research is Gold (1967). An excellent history can be found in Morgan (1986).

19 As offered originally by Chomsky (1965) and echoed more recently by, for example, Jackendoff (1987).

20 Arguments against the 'little linguist' analogy have been made by others, for example, Braine (1971b); Hyams (1986); and White (1981).

21 Freeman (1989).

22 Examples of how the data and results of the developmental studies in this book have been used to 'test' learnability theories can be found in Hyams' (1986) use of the simple sentences data in Chapter 2 to argue for her theory of pro-drop in early sentences, and Pinker's (1984) use of the results of the study of *to* complements in Chapter 8 to argue how children might learn lexical functionalist grammar.

23 See, for example, Beckwith (1988); Leonard (1989); and papers in MacWhinney (1987).

24 Schieffelin (1979, 1990); Ochs (1988); Ochs & Schieffelin (1983).

25 Schieffelin & Ochs (1986).

26 Schieffelin & Ochs (1983).

27 The validity and generalizability of such studies depend on the extent to which the results are replicated by other researchers studying other children, from the same and different cultural contexts. Subsequent studies that addressed similar questions with other populations of children are reported in the Postscript to each of the chapters.

28 MacMurray (1957); Piaget (1937/1954). For discussion of this fundamental point in developmental theory, see, for example, Lerner (1986).

29 Pepper (1942).

30 Reese & Overton (1970).

31 Braine (1963); Brown & Fraser (1963, 1964); Miller & Ervin (1964).
32 Harris (1957); Chomsky (1957).
33 Chomsky (1965, 1968).
34 Chomsky (1957, p. 106).
35 See, for example, Bloomfield (1933).
36 Schlesinger (1971b).
37 Brown (1973).
38 Grimshaw (1981); Pinker (1984).
39 Fillmore (1968); Bowerman (1973a).
40 Schlesinger (1971a).
41 See, for example, Gleitman, Gleitman, Landau, & Wanner (1988); Hyams (1986); Landau & Gleitman (1985); Pinker (1984); and Valian (1986).
42 Bowerman (1987).
43 Piaget (1936/1952); Piaget (1951/1962).
44 Bloom (1973).
45 Jackendoff (1983, p. 188), citing Gruber (1965).
46 In fact, Beckwith (1988) successfully used Jackendoff's categories in a simulation study that showed how children learn argument structure from the linguistic input provided by their mothers.
47 Brown (1973).
48 Howe (1976). For a rebuttal, see Bloom, Capatides, & Tackeff (1981) and Golinkoff (1981).
49 For example, Bloom (1970); Bowerman (1973a); Brown (1973); Leonard (1976); and Schlesinger (1971a).
50 Bloom, Beckwith, Capatides, & Hafitz (1988). The theoretical rationale for this practice is discussed in Bloom (in press a).
51 Fauconnier (1985).
52 Brown & Bellugi (1964).
53 Leopold (1939–1949, vol. 3, p. 31).
54 de Laguna (1927/1963, p. 267).
55 Example from Gia, in Bloom (1970).
56 Bloom (1970, p. 10).
57 In particular, see Bates (1976), Dore (1975), and Ervin-Tripp (1970).
58 Bloom (1970, p. 233).
59 Slobin (1985, p. 1175). Slobin cited Fillmore's (1977) use of scenes in regard to meaning in adult language.
60 In Beckwith (1988).
61 For demonstrations of this on the level of word learning, see, for example, Masur (1982) and Tomasello & Farrar (1986).
62 Sapir (1921, p. 13, emphasis added).
63 Exceptions include earlier work by Roger Brown, for example, (1956) and (1958).
64 Piaget (1923/1926).

65 See for example, Bloom (1970, 1973); Gopnik & Meltzoff (1987); Mervis (1984); Nelson (1974, 1985); and many others.

66 See, for example, Bates (1976); Bloom (1973); Bloom, Lifter, & Broughton (1985); Brown (1973); Gopnik & Meltzoff (1984); Kelly & Dale (1989); Lifter & Bloom (1989); McCuhn-Nicolich (1981); Tomasello & Farrar (1984); and others.

67 Case (1978, 1985); Pascual-Leone (1987).

68 Piattelli-Palmarini (1980).

69 Fodor (1983); Gardner (1983).

70 For example, Spelke (1987).

71 For example, Gelman & Meck (1987).

72 Carey (1985).

73 Bates, Benigni, Bretherton, Camaioni, & Volterra (1979); Lifter & Bloom (1989).

74 A related assumption is captured by "semantic bootstrapping" in learnability research.

75 Hyams (1986).

76 I cannot do justice here to the full logic of the theory, and I refer the reader to Hyams (1986) for a thorough and readable account.

77 For example, Pinker (1984).

78 We are talking here about sentences that are neither imperative (in which subject omission is the rule) nor reduced by elision to avoid redundancy in discourse contexts.

79 Chomksy (1965, p. 3).

80 The two studies are not independent, as Hyams (1986) used the data in Bloom (1970) and Bloom, Lightbown, & Hood (1975; Chapter 2) for testing her acquisition theory. However, she also cited consistent data from other research projects.

81 O'Grady, Peters, & Masterson (1989).

82 Bates, Bretherton, & Snyder (1988); Nelson (1975b); Peters (1977); Ramer (1976).

83 Bates, Bretherton, & Snyder (1988).

84 Bloom (1970, p. 29).

85 Chomsky (1965, p. 113).

86 See especially J. Bresnan (1978); Bresnan & Kaplan (1982); and Chomsky (1982).

87 Jackendoff (1972). For the source of "the fundamental semantic notion . . . [of] *Theme* of a sentence" (p. 29), Jackendoff cites Gruber (1965).

88 Especially our identification of affected-object and (1) the notion of grammatical theme as "that argument which undergoes the motion or change in state denoted in the predicate," Bresnan (1982, p. 24); and (2) the macrorole *undergoer* in Foley & Van Valin (1984).

89 Levin (1985).

90 Bowerman (1987); Pinker (1984, 1989).
91 This is essentially the explanation put forth by P. Bloom (1990) to account for 'subjectless' sentences.
92 Bloom (1981 p. 169).
93 Called "general purpose verbs" by Clark (1978). Clark pointed out the communicative function such verbs share with the heavily used deictic terms *this* and *that* to talk about actions and objects for which children have not yet learned more different words.
94 Gleitman, Gleitman, Landau, & Wanner (1988); Landau and Gleitman (1985).

POSTSCRIPT

The Postscripts at the end of each chapter refer to later works that cited the research in the chapter or were otherwise relevant to it.

The following references cited a few or more of the studies in this book in a survey of the field.

Anisfeld, M. (1984). *Language development from birth to three.* Hillsdale, NJ: Erlbaum.

de Villiers, J., & de Villiers, P. (1985). The acquisition of English. In D. Slobin (Ed.), *The crosslinguistic study of language acquisition* (vol. 1, pp. 27–140). Hillsdale, NJ: Erlbaum.

Gleason, J. (Ed.) (1985). *Language development.* Westerville, OH: Merrill.

Ingram, D. (1989). *Language development.* Cambridge: Cambridge University Press.

Kuczaj, S. (1982). On the nature of syntactic development. In S. Kuczaj (Ed.), *Language development: Vol. 1. Syntax and semantics* (pp. 37–72). Hillsdale, NJ: Erlbaum.

Maratsos, M. (1983). Some current issues in the study of the acquisition of grammar. In J. Flavell & E. Markman (Eds.), P. Mussen (Series Ed.), *Handbook of child psychology: Vol. 3. Cognitive development* (pp. 707–86). New York: Wiley.

In addition, the results of this research have been used in assessment and intervention programs for children with delayed language development and language disorders.

Bloom, L., & Lahey, M. (1978). *Language development and language disorders.* New York: Wiley.

Lahey, M. (1988). *Language disorders and development.* New York: Macmillan.