similarly permits appreciation of a temporal sequence in an instant.

Psychologists cannot hope to study life histories without adopting the scholarly safeguards of the historian. Thus, Runyan points out, a multiplicity of sources is crucial. Lacking the free associations of the subject, the psychobiographer may if fortunate have records of artistic productions and autobiography. The creative product then can take the place of dreams in revealing the unconscious. Indeed, through objective consensual validation achieved by multiple sources and the passage of time the psychobiographer can offer the scientific world what patient and psychoanalyst view only in a limited and distorted way.

Finally, Runyan reminds us that the ultimate task of life history is how to discern what is significant. "Academic scholars helped to get the facts straight, while poets and literary figures helped to reveal the spirit of men" (p. 33). Can modern psychology manage to maintain its intellectual rigor and resurrect Freud's poetic science? This reviewer hopes so.

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Tensions in Psycholinguistics

Language Acquisition. The State of the Art. ERIC WANNER and LILA R. GLEITMAN, Eds. Cambridge University Press, New York, 1982. x, 532 pp., illus. Cloth, $49.50; paper, $17.95.

The 1960's and 1970's produced a generation of unprecedented research activity in an effort to discover what and how children learn about language in the first few years of life. In 1978 Wanner and Gleitman brought together a group of scholars who had made major contributions to this research. Because their work had been seminal, it was reasonable to expect that, taken together, their views would represent the state of the art. This book is the result of that conference.

Different assumptions about what language is and how it might be acquired characterize the different contributions to the volume, and this lack of consensus in itself reflects the state of the art. For example, in one chapter, Martin Braine and Judith Hardy assume that children interpret events in the environment to acquire a case grammar based on categories of semantic relations (*1*); Michael Maratsos, in contrast, proposes that children use the regularities with which forms are distributed in the speech they hear to acquire a constituent structure grammar (*2*); and Kenneth Wexler and Thomas Roeper each present a version of the acquisition of transformational grammar (*3*).

The constraints on acquisition are a major theme, for example, in the chapters by Susan Carey with respect to the acquisition of words and Marilyn Shatz with respect to the acquisition of syntactic structure. Gleitman and Wanner, in their introductory chapter, advance the view that language is autonomous and that the constraints on its acquisition are task-specific. According to Elissa Newport, though the constraints involved in language are task-specific, they are determined by a general learning process that is not itself specific to language. And Thomas Bever, who was one of the original proponents of the idea that general constraints on learning and cognition determine the structure of language (*4*), here suggests that the formal characteristics of language may be "Platonic" in their origin and "uncaused" by the constraints of human learning.

The lack of consensus, here and elsewhere in the study of language acquisition, comes from an interplay between three major theoretical tensions that emerged in the last generation of research. The first concerns the representation of the form and function of language in the brain in relation to general cognition, that is, how specific is the process of language acquisition and whether and how the child's cognitive development influences language development. The second concerns the relative contributions of the child and the social context to the process of acquisition, that is, a contemporary version of the nature-nurture question. And the third derives from the contrast between descriptive approaches to research, concerned with understanding *what* children learn when they acquire language, and approaches that are only explanatory and concerned with theory and *how* languages can be acquired. These theoretical tensions, perhaps more than anything else, represent the state of the art.

In retrospect, these theoretical tensions were inevitable, given the succession of explanatory models that came to dominate at one time or another in the course of the last generation of research. We began in the early 1960's with an interest in children's underlying knowledge of rules of grammar and questions of early syntax. The question of how children learn to combine words to form phrases and simple sentences led to an inquiry into meaning and what their early sentences were about. Questions about meaning led to concern with context. And once we began to look at the context and consider more than just what children actually said, we became concerned with discourse, the pragmatics of speech events, and communication more generally. But we have come full circle. Much of the research activity today, as reflected in many of the chapters in this book, is concerned with questions of grammar and language structure.

The beginning of the generation was marked by the first of these explanatory models: Chomsky's theory of generative transformational grammar (*3*). The theory focused on language structure and on the rationalist explanation of language as a uniquely specified and innately determined human capacity. A speaker-hearer's theory of language is an intricate and highly abstract system of rules, which are themselves never directly accessible. Moreover, these rules apply to representations of sentences that are "quite remote" from what individuals actually say or hear when speech is used. They cannot be learned from the environment, and they bear no relation to the representation of everyday events.

When attention shifted to matters of meaning in child speech, attention also shifted to cognitive development, notably the cognitive theory of Piaget (*5*), to explain language. Sensorimotor development in infancy consists of development of the capacity for the mental representation of reality—objects, events, and relations between them. For Piaget and others influenced by him, the meaning of children's early language derives from the representations of reality developed in infancy, and the subsequent development of language continues to depend on the logical development of thought.

The tension between these two points of view has permeated efforts to conceptualize and explain language development, and culminated in the historic meeting between Chomsky and Piaget at

Royaumont in 1975 (*6*). Neither protagonist emerged as the unequivocal winner in that debate, and we now recognize that language development does not reduce to cognitive development in any simple way. But the relation of language to the representation of reality in the mind of the child is still at issue. Translated into linguistic terms, the question concerns whether the semantic or the formal aspects of language are primary in determining the contrasts that children learn. In more general terms, the question concerns whether and how the processes involved in language learning are particular to language or extend to other kinds of problem-solving as well. Wanner and Gleitman have been heavily influenced by Chomsky's view that language is both autonomous and strongly constrained by predisposing biological factors, and many contributions to the volume clearly reflect their bias. The other point of view—that language is an aspect of cognition more generally, and language development depends at least in part on cognitive development—is represented here only in the chapter by Dan Slobin.

The second theoretical tension, between the biological and social constraints on language, emerged with attention to the social and cultural contexts of acquisition and explanatory models with roots in the ethnographic study of human interaction or the theories of Vygotsky. Language is constructed between persons in their interactions in everyday events, and the social constraints on language are also deterministic. In this context, we may recall that an original attraction of Chomsky's nativist view of language in the beginning of this generation was the corrective it offered to the emphasis on the environment that followed from behaviorism in the previous generation. In the last decade, however, the balance tipped once again toward the social context, as efforts to explain the development of language focused on the interaction between the child and the context.

However, social interaction and communication are not explanatory for language, as Shatz points out in this volume. Even after we succeed in understanding the development of communication and the ways children learn to use language in context, we will still need to explain the acquisition of the linguistic forms that children learn to use. But does that mean that language is autonomous? Chomsky's metaphor for language is an "organ of the mind," and, as with any body organ, language can function only when exposed to the appropriate external content. The neurons of the visual cortex, for example, can function properly only if they are exposed to light and pattern at a given age (*7*). Whatever the biological endowment of the human organism, the child develops in a socially determined environment. Only two contributions to this book are concerned with functionalist explanations of acquisition, the one by Elizabeth Bates and Brian MacWhinney and the one by Eve Clark. Two of the largest research efforts in the last decade, one concerning the linguistic input that children receive in their interactions with care givers (*8*) and the other concerning the development of sociocultural beliefs that govern the pragmatics of language use (*9*), are either ignored or dismissed by Gleitman and Wanner in their introductory chapter.

Several contributors to this volume have defined language narrowly in terms of the syntax of sentences. For example, the suggestion is made that autonomy of syntax is evident on those occasions when children are deprived of normal input from the context—as a consequence of certain accidents of nature such as deafness, blindness, and retardation or tragic distortions of nurture such as extreme deprivation—and are, nonetheless, able to say words, phrases, and sentences. Such disruptions in the normal course of events provide the opportunity to test the resiliency of language and the plasticity of the human nervous system. But is producing sentences enough for us to infer that the child has acquired language or even that the child has acquired syntactic structures? The ability to produce the sounds, words, and phrases of speech is specific to the human organism, and, as Carey points out in this volume, the amount of exposure required is most probably minimal. This ability to speak, however, is not required for language and may even be independent of language (*10*). Moreover, speech that is disjunctive in its meaning and in the context of its use—as often happens when children are impaired—is disordered language. We cannot afford, then, to derogate the importance of world knowledge in attempting to understand the *child's* acquisition of language, however interesting the abstract problem of syntax might be.

Finally, the third theoretical tension, between description and explanation, can be seen as marking either the end of the last or the beginning of the next generation of research. We now know a great deal more about *what* develops in language development, but we do not yet have an explanation of *how* language develops. As a consequence, some researchers have turned away from the study of children's behaviors and begun to look, instead, at the adult language and theories of "universal grammar" for an explanation. The most influential movement in this direction of explanation instead of description has come from Wexler, whose contribution to this volume is an overview of his research in language "learnability." Rather than ask what or how children learn about language, he asks, instead, what is learnable in language and attempts to determine the constraints and the conditions under which a transformational grammar might be acquired. Wexler has identified several important conceptual issues. However, we may ask why the theoretical study of language learnability and the empirical study of children's behaviors are mutually exclusive. Why still another duality?

In sum, the state of the art in research in language acquisition can be characterized by the several dualities that have emerged from appeals to different explanatory models: the cognitive/linguistic, the biological/social, and the descriptive/explanatory. The task in the generation ahead is to cut through the tensions that created these dualities to arrive at a theory of language that integrates and subsumes them. Learning language is most probably biologically constrained, and the limits of those constraints may well be task-specific. Wanner and Gleitman are correct to insist that one goal of research in acquisition is to determine the linguistic limits of those constraints. However, learning language is clearly socially and conceptually constrained as well. The effort to identify these several constraints, and the relations between them, will advance the state of the art in the generation ahead.

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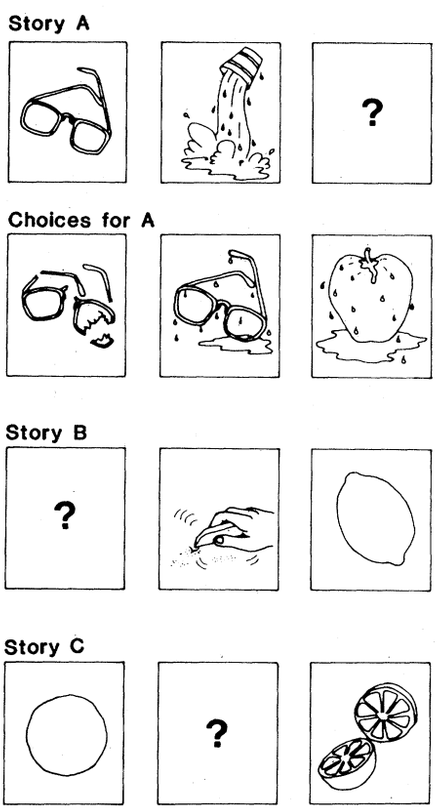
Understandings of Time

The Developmental Psychology of Time. WILLIAM J. FRIEDMAN, Ed. Academic Press, New York, 1982. xiv, 286 pp., illus. $29. Developmental Psychology Series.

Research on children's knowledge about time has a picturesque history. In 1928, Albert Einstein attended a lecture given by Jean Piaget. At the end of the lecture, Einstein posed a question: In what order do children acquire the concepts of time and speed? Almost 20 years later, Piaget published a two-volume, 500-page reply to Einstein's query. In essence, Piaget claimed that children acquire an understanding of time and speed at the same age, roughly 7 or 8 years, in technologically advanced societies. The two concepts were said to develop from a common ancestor, a rudimentary spatial concept in which both time and speed were equated with distance traveled.

The Developmental Psychology of Time, the first book published in English on this topic since Piaget's pioneering effort, reflects both the progress that has been made in the ensuing 35 years and the challenges that this progress has brought. When Piaget wrote his book, it was possible to view time as a single concept that had a single age of mastery. Piaget of course realized that the time concepts of 8-year-olds were not those of physicists. Nonetheless, he believed that the essential aspects of time, which for him were the combining of beginning and ending time to estimate duration and the relating of time to speed and distance, were mastered simultaneously. When children understood these notions, they fairly could be said to understand time.

Today, as the contributions in this book make eminently clear, the diversity of children's understandings is far more evident than the unities. As Friedman, the editor of the volume, states on the very first page, "It is not unusual in reading the older literature to come across developmental studies of 'the time concept.' The implied unity is appealing but illusory." Different aspects of time are understood at radically different ages, and there seems to be no principled way of deciding what constitutes true understanding. Fraisse reviews literature indicating that even infants possess some understanding of duration. If the feeding of 3-month-olds is delayed, they show unusually great agitation in the hour following the end of the usual interval. Two-month-olds respond to differences among musical sequences that vary only in the temporal spacing of notes. Harner notes that when 2-year-olds speak they distinguish between present and non-present and also between past and future. Bullock, Gelman, and Baillargeon describe how preschoolers segment time into episodes in making causal inferences. Stein and Glenn pursue a similar theme in discussing how elementary-school-age children comprehend stories. Three separate research efforts, one by Richards, one by Levin, and one by Wilkening, extend Piaget's initial efforts to study 4- to 11-year-olds' inferences of temporal duration. Friedman's own research extends the learning of aspects of time into adolescence and adulthood, focusing on understanding of cultural conventions such as calendars, daylight savings time, and time zones.



Examples of test sequences used by Gelman *et al.* to test children's understanding of causal relations. The correct answer for story B is a lemon with a drawing on it; the correct answer for story C is a knife. [Reproduced in *The Developmental Psychology of Time* from R. Gelman, M. Bullock, and E. Meck, *Child Development* **51**, 691–699 (1980)]

The contents of this book illustrate both why conceptual development is so fascinating and why it is so difficult to explain. Consider the following set of findings described in the volume. Richards demonstrates that when 5-year-olds are presented two moving objects traveling in the same direction on parallel paths they often confuse temporal duration with spatial end points. That is, they consistently choose the object that stops farther down the path as the one that traveled the longer time, even when it did not. Such findings are enticing and not particularly disturbing. If other factors are equal, the object that stops farther down the path *will* have traveled for the longer time. However, Levin finds that when 5-year-olds are presented two lamps with bulbs of differing wattages, they usually choose the more intense bulb as having been on for the longer time, regardless of the actual durations. Here, there is no obvious reason why children should make the choice that they do, except perhaps for a general rule "More of any dimension implies greater duration." We cannot conclude from these findings that 5-year-olds have no understanding of duration. Levin reports that when 5-year-olds are asked about the relative duration of the naps of two sleeping dolls, they typically judge correctly. Taken together, these data and others cited by Richards and Levin suggest that 5-year-olds' judgments conform to the formula "If it is possible to judge on some dimension related to time but not identical to it, do so. Otherwise, if it is possible to judge on a dimension unrelated to time, do so. If your back is really to the wall, and there is no apparent other dimension on which to judge, then judge on the basis of time, as you were told to." Explaining why children would adopt such an approach is no easy task.

All of this complexity involves one age group's knowledge of a single aspect of a single concept. The general issues that the book raises about conceptual development are even tougher and at least as interesting. Consider just two of these. First, how can we draw useful conceptual boundaries? Would we be best off thinking about understanding of time as a single entity, as an extremely large number of particular understandings, or as a limited set of domains in which temporal understandings are expressed? At present, researchers have little basis for as-