

Book Reviews

LANGUAGE AND LEARNING: THE DEBATE BETWEEN JEAN PIAGET AND NOAM CHOMSKY
edited by Massimo Piattelli-Palmarini.

Cambridge, Mass.: Harvard University Press, 1980. 409 pp. \$20.00.

Most of us who have received training in psychology, linguistics, or education in the last twenty years would undoubtedly like to have been at Abbaye de Royaumont in France in October 1975. Jean Piaget and Noam Chomsky, two great minds in the modern field of cognition, met there for the first and only time. Flanked by distinguished scholars from a variety of disciplines—ranging from anthropology to artificial intelligence, from philosophy to biology—Chomsky the specialist and Piaget the generalist debated the assumptions, achievements, and goals of their respective research programs.

The present volume is a documentation of that historic occasion. There are twelve chapters comprising the debate proper, six chapters of afterthoughts on the debate, and three separate appendices that discuss tangential issues. The editor, Massimo Piattelli-Palmarini, has made the proceedings not only palatable, but exciting. He has written a preface and an epilogue for most chapters, placing the issues in perspective and integrating the book's three sections. Howard Gardner's excellent foreword lays the groundwork for the relative novice to the field. In the closing chapter, Jacques Mehler provides a fitting tribute to these two great scholars by setting their achievements in historical perspective.

Two central tensions characterize the debate. The first concerns the nature of devel-

opment: what is development the development of? For Piaget, the biologist-turned-genetic epistemologist, cognitive development consists of the elaboration of sensorimotor schemes into logico-mathematical structures through interaction with the environment. While rejecting empiricism as an explanation for development, Piaget is equally opposed to nativism as an explanation; the elaborate cognitive structures that are the end product of development cannot be the result of random mutation and selection. A nativistic stand, he argues, would have to "go back as far as protozoa and viruses" (p. 26) to locate the origins of these structures. Piaget's familiar position is constructivism, whereby new concepts are formed through the interaction of a limited set of innate mechanisms with the external world. His favorite biological metaphor for genetic-environmental interaction is a mollusk, which takes different forms when raised in different environments. The resulting forms, Piaget contends, cause a change in genotype, a contention challenged by renowned biologist Francois Jacob (pp. 61-62). For Piaget, there is no clear-cut distinction to be drawn between what is innate and what is acquired.

Chomsky, on the other hand, characterizes development as the "successive maturation of specialized hardware" (p. 73), a phrase he borrowed during the debate from Guy Cel-

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lerier, who, in fact, was a colleague of Piaget at the latter's International Center for Genetic Epistemology. Drawing on some simple examples from his own research, which show the dependency of certain linguistic rules on abstractly specified structures (and not on their surface, linear properties), Chomsky argues that there could be no relevant experiences that would lead to the "construction" of such linguistic knowledge. The theory of universal grammar posits a set of abstract specifications that is powerful enough to account for both adult linguistic competence and the variations observed across languages. Chomsky proposes that this universal grammar is innate—a claim, he argues, that is subject to empirical disconfirmation. He opposes Piaget's contention that a structure of such complexity as universal grammar cannot be innately specified on biological grounds. For example, we cannot at present explain the biological evolution of physical organs, yet no one doubts that their properties are genetically determined.

The debate dwells at some length on the nature of the "fixed nucleus," the genetically determined structure from which cognitive structures are derived. For Chomsky, the properties of universal grammar must be present in the fixed nucleus. The child, therefore, has all possible representations of language available at the initial stage of language acquisition, and development consists of eliminating properties that do not correspond to the target language. Piaget attributes considerably less structure to the fixed nucleus and accounts for later complexity with his theory that "any structure at all is going to create others by the possibilities it raises" (p. 157). Chomsky and the philosopher Jerry Fodor vehemently criticize this basic premise of constructivism, arguing on purely logical grounds that it is impossible for higher-order logics to be generated from lower-order ones; properties of the final state must be present in some form in the initial state.

While it is difficult to identify the individual participants with either camp, both Pia-

get and Chomsky had their supporters. For example, Piaget received enthusiastic endorsement from Seymour Papert, who cited examples from research in artificial intelligence in which computers have been programmed to set up and test hypotheses based on relatively simple structures. Chomsky found sympathy among the biologists, particularly Jacob. Other participants, most notably neurobiologist Pierre Changeux, suggested compromise theories. Changeux's notion of a "genetic envelope" posits that the genetic component dictates a range of developmental possibilities for structures. While Piaget is appreciative of such attempts at compromise (p. 278), Chomsky characteristically maintains his radical position. The difference between Chomsky's and Piaget's models appears sharpest on the question: does the environment influence the creation of new structures in any substantive way?

A second tension in the debate concerns the extent to which different cognitive capacities should be treated as independent of each other. Once again, the debate centers on the specificity of language. Chomsky uses his familiar biological metaphor of language as a mental organ and focuses on its distinctive characteristics. To Piaget, on the other hand, language is only a subset of the general semiotic system; he rejects Chomsky's claim that it is qualitatively different from other cognitive capacities. However, when challenged by Chomsky to propose structures in other domains analogous to abstract linguistic structures, Piaget and his supporters, notably Papert, manage to come up with only broad arguments for a general developmental mechanism; they can make no specific counterproposals. Chomsky's skill as a debater is exemplary.

Aside from elucidating the two central tensions described above, the book contains many intellectual nuggets of more than passing interest. David Premack offers a lucid summary of current knowledge about representational capacities in chimpanzees. His unique approach characterizes chimpanzee intelligence as an end in itself and not simply

as a way to explore whether language can be learned only by humans. For example, Premack demonstrates that chimpanzees have "the very critical psychological capacity of being able to recognize representations of one's own behavior" (p. 222), speculating that this capacity is shared by all primates. While Premack delineates the necessary conditions of language and demonstrates their presence in chimpanzees, his interpretation, in respect to the nature of learning, is consistent with that of Chomsky/Fodor: "the main thing human training is doing here for the chimpanzee is disclosing capacities that are present" (p. 222). Given the interdisciplinary nature of the conference participants, the ensuing discussion is lively.

Hilary Putnam and Chomsky/Fodor engage in a lengthy exchange on the concept of innatism and the value of arguing for innateness of specific capacities such as language versus general intelligence. In the appendix, there is additional discussion reflecting the truly interdisciplinary implications of the Piaget-Chomsky debate.

Since the book documents a debate, one is tempted to ask, "Who won?" This is a simplistic question with complex answers, and one to be answered by each reader. Personally, I find the book to be an excellent projective test

for my own biases. Its appearance at this particular point in the history of developmental psychology seems quite timely. In cognitive development, the theory of stages is coming under increasingly severe criticism. There is enormous interest in early manifestations of cognitive skills, such as the number concept. The kinds of questions asked by developmental psychologists are beginning to change. For example, after a period of intense interest in communicative and semantic aspects of language development, researchers are again beginning to ask the question that motivated the field initially: how can we account for the observed regularities in syntactic development in children? A reading of the Piaget-Chomsky debate, even by those most jaded by these issues, will help clarify the basic questions of developmental psychology and cognition. As for those relatively unfamiliar with the works of Piaget and Chomsky, yet with even a passing interest in cognition, language, and development, the book should be at the top of their reading agenda. For specialists and nonspecialists alike, these issues on the nature of language and learning will be a topic of debate for years to come.

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