Child Development in an Evolutionary Context

Evolution, Development, and Children's Learning. HAROLD D. FISHBEIN. Goodyear, Pacific Palisades, Calif., 1976. xx, 332 pp., illus. $8.95. Goodyear Developmental Psychology Series.

In the 1960's Niko Tinbergen, Konrad Lorenz, John Bowlby, and Jerome Bruner all began making major statements about the importance of evolution for the study of human behavior development. The first two, leaders of ethology, saw in human development a logical practical application for their expertise, which addressed the confrontation of nature and nurture. Skirting this sterile battlefield, they called special attention to functions of play in the growth of competence; it seemed so widespread in the vertebrate world. The last two, leaders of psychoanalysis and cognitive psychology respectively, saw in evolution the wisdom of natural function, which gave context to the phenomena they dealt with; they saw in it, too, a potential way out of the maze of learning theory, in which both attachment and cognition had been long lost. They thus harked back to the visions of their turn-of-the-century forebears, whose interest in evolution was more than perfunctory—visions wiser than later psychology could realize.

Fishbein's book pursues these visions. It is a courageous and pioneering effort. I know of no other psychologist who has given such serious attention to the literature of human evolution, no other book that treats such disparate topics as infant attention, paleoanthropology, neuroembryology, gatherer-hunter socioecology, comparative neuroanatomy, primate socialization, and the development of spatial perception—and what is more, makes a case for their mutual relevance.

Yet I cannot applaud it without reservation. Its defects arise from a virtue—the pluck of its attempted breadth. The book consists of three sections. The first and briefest is a summary of evolutionary theory and as such is very inadequate; it ignores some major developments of the last dozen years. This section also includes a chapter on embryology, the relevance of which will be apparent to the initiate, but not, perhaps, to the neophyte. The second section reviews the hominid fossil record, mammalian brain evolution, primate social behavior, and the socioecology of gathering-hunting peoples. The author makes clear why these things should be of interest to child psychologists—in itself a major service. Each review is basically strong, but falls short of currency, relying too much on secondary sources. The third and longest section is a straightforward review of childhood cognition. It is lively and, as far as I can judge, adequate, but it is not what was promised—a review of the acquisition of *social* competence. I must also wonder whether it vindicates the goal of the book—to demonstrate the relevance of phylogeny. Evolutionary considerations have little prominence in this section, and the book has no overall concluding section. The author suggests instead going back to the first chapter, a poor substitute for an integrative summary. The book's guiding vision will be apparent to some, but I doubt if it will be so to everyone.

Advanced as matters of fact in the book are propositions that are highly controversial and that many would consider to be wrong. The extent to which such doubtful statements can disturb the work of the book is variable, but some point to deeper interpretative problems. Omitted from treatment is the theory of inclusive fitness, a now central concept in thinking on behavioral evolution, and with it the "dark side" of natural history: widespread individualistic and competitive tendencies among vertebrates; systematic competitive infanticide in a number of primate species; high homicide rates in some gatherer-hunter groups; tragic, inevitable, "maladaptive" conflicts within the family. Phenomena such as these, perhaps, were on Darwin's mind when he wrote to Joseph Hooker, "What a book a Devil's Chaplain might write on the clumsy, wasteful, blundering, low and horribly cruel works of nature!" Such things are central to the understanding of the evolution of childhood, as central as reciprocity, play, and tool-making. Second, and more surprisingly, for a book that relies heavily on notions about the design of ontogeny for gathering-hunting life, there is virtually no reference to a number of published reports on gatherer-hunter infancy and childhood. These, presumably, are the natural proving ground for Fishbein's theories. Third, there is no reference to the burgeoning literature of child ethology. Finally, while speculation is stimulating, it can get out of hand; when the anterior thalamus, a way station between the limbic system and the frontal granular cortex, is made to be the seat of "empathy," sympathy fails.

Still, I find myself liking the book in spite of its defects. For one thing, it is the only book I know of about child development that gives Waddington's concept of canalization its appropriate, central place. Aptly defined as a "collusion of genes" to attain a phenotypic target in the face of an incompatible mutation, canalization helps to explain why human populations, clearly genetically different, show no detectable differences in basic cognitive functions. More important, perhaps, for child psychologists, the collusion of genes works too against incompatible experience. Thus, as Jerome Kagan pointed out a few years ago, the results of several forms of early deprivation prove to be less lasting than expected. The system is buffered, by evolutionary design, against easy distraction from its adaptive goals. For parents and educators, this means we can find no excuse for inaction in a child's prior unfortunate experience; the brain is designed to recover from damage, provided conditions are right. However (and Fishbein gives us a grim chart of thalidomide effects to remind us), certain disruptions at certain moments in development may weigh more than others at other moments. It is the task of future research to delineate them.

Specifically, Fishbein charges gatherer-hunter life with having caused, through natural selection, the canalization of basic child competences. Hunting demanded cooperation and spatial abilities; tool-making demanded advanced motor skills; group cohesiveness and stability demanded language; and the economy of sharing demanded rule-making and reciprocity, cognitive competences in the moral sphere. Canalization, produced by natural selection, makes it difficult for a child *not* to get these skills, and play accounts for their growth more than instruction does, learned though they may be. Only the argument in the moral sphere is not convincing. Yes, sharing and rule-learning were canalized by the gathering-hunting era; but so was such potential behavior as masking the size of one's kill and responding to nonreciprocation with vigor and even violence. The work of Irven DeVore, which Fishbein relies heavily on, has taken a turn Fishbein has not followed; it leads to a less pleasant view of human competence. A genuine "evolution of human development" must characterize the unpleasant competences of children as well as those we cherish. As Donald Campbell suggested in his presidential address to the American Psychological Association, it may be just those former ones that are most canalized, and most easily "learned."

It's a pity the title includes the word "learning." This will serve to place the book, erroneously, in many minds,

squarely in a declining research tradition. Learning seems moribund now, not as a phenomenon, of course, but as the organizing idea of behavioral science. The organizing idea, at present, is adaptation—both in the course of evolution and during the life cycle. Learning is only a kind of adaptation, and constraints on learning compel our interest as much as does learning itself. How do we test adaptation? We test it by best fit. Sheldon White writes in the foreword to this book, "Science is . . . ultimately an aesthetic affair." The beauty of Darwin's vision, after a century-long latency, is making a major impact on psychology.

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Biomineralization

The Mechanisms of Mineralization in the Invertebrates and Plants. Papers from a symposium, Georgetown, S.C., Oct. 1974. NORIMITSU WATABE and KARL M. WILBUR, Eds. Published for the Belle W. Baruch Institute for Marine Biology and Coastal Research by University of South Carolina Press, Columbia, 1976. xiv, 462 pp., illus. $27.50. Belle W. Baruch Library in Marine Science, No. 5.

Traditionally, students of biomineralization (hard-tissue formation) have been divided into two main groups—those who emphasize the process and those who emphasize the product. Studying the process involves the source and concentration of the organic and inorganic components and their movement to the sites of mineralization, and studying the product involves the microarchitecture, mineralogy, crystallography, and organic composition *at* the sites. Any general model of biomineralization must relate process and product in a comprehensive fashion.

This book is a collection of 21 papers presented at a second international symposium. (The first was held in Mainz, Germany, in 1970.) The papers are generally of high quality and accurately reflect the state of research on invertebrate biomineralization, but serious readers of the volume will be disappointed to find out that no general mechanism has yet been uncovered that ties process and product coherently together. I hasten to add that this is not the fault of the organizers of the symposium or of the 41 contributors but rather is open testimony to the intractability of the problem itself.

The opening review papers desperately seek to grapple with the problem of bringing process and product together. None is successful, and one even confuses the issue further with semantic recommendations that result in some misleading statements such as, "It is no longer acceptable to consider the occurrence of mineralized deposits as evidence of calcification." In the remaining papers studies of a variety of organisms, dominated, as usual, by the mollusks, are reported. Calcium minerals are seen in all sizes, shapes, and degrees of crystallinity. Organic matrices are recognized and crystal compartments and templates are postulated. Carbonic anhydrases and calcium-binding glycoproteins seem ubiquitous. The variety of minerals grows as the number of organisms studied increases and the data accumulate, yet the underlying mechanism of mineralization seems as exasperatingly remote as ever—process and product remain separated. H. K. Erben in his "Concluding remarks" observes in understated fashion, "This second international symposium [cannot] claim to have given final answers to the fascinating riddles we are confronted with." Unless some new insights or dramatic experimental results are forthcoming a third international symposium is likely to make even less real progress toward the goal of understanding invertebrate biomineralization than did this second.

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