

lack of the categorization behaviors sighted children engage in during the second year, skills that have been seen as integrally related to language acquisition. Dunlea suggests that "vision seems to be a stimulus for abstracting criterial features necessary to construct categories and for constructing hypotheses about the meaning of words" (p. 161). In contrast to this deficit, the blind children talked about past events to a surprising extent, far more than do sighted children of the same age. Dunlea suggests that this represents an active adaptive strategy for establishing meaning about a shared topic when the usual basis for doing so, shared perception of objects, is not available.

Dunlea notes further that the blind children are not delayed in making further progress in language. Her most interesting claim is that there is a "remarkable tendency for the blind children to progress from one 'stage' of language to another, even though they apparently have not mastered the preceding stage or completed the developmental tasks typically associated with the earlier stage" (p. 161). Two important assumptions are being made here: (i) there is not a single biologically determined universal course of language acquisition; (ii) there is nonetheless a biological imperative to make progress in acquiring language.

Thus Dunlea takes a position that is both biogenetic in its implication that language acquisition has its own maturational imperative and interactionist in its emphasis on adaptive strategies that take constructive advantage of whatever environmental experiences are offered. The earlier report by Landau and Gleitman could be similarly characterized, but the two actually reveal quite different views of the child's mind and hence of cognitive development. Landau and Gleitman emphasize universal constraints on what can be natural lexical concepts for humans, and on this basis find strong similarities between the blind and sighted child. In contrast, Dunlea considers the similarities—at least in the early period reviewed in her book—to be largely superficial, while at the underlying meaning level the blind child's language reflects the effects of visual deprivation that the child actively strives to compensate for by adaptive communicative strategies. The evidence presented here for both a biogenetic language program and adaptive cognitive strategies provides a welcome new perspective on the contentious theoretical issues that have recently divided the field of language acquisition.

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Some Other Books of Interest

Analogies Between Analogies. The Mathematical Reports of S. M. Ulam and His Los Alamos Collaborators. A. R. BEDNAREK and FRANÇOISE ULAM, Eds. University of California Press, Berkeley, 1990. xviii, 565 pp., illus. \$60. Los Alamos Series in Basic and Applied Sciences, 10.

There now exist several books, perhaps most notably his 1976 autobiography, *Adventures of a Mathematician*, concerned with the life and work of the late Stanislaw Ulam. Two in particular have focused on Ulam's activities at Los Alamos National Laboratory, with which he was affiliated for the last 40 years of his life. The first, *From Cardinals to Chaos* (reviewed in *Science* 246, 132 [1989]), included personal memoirs by various associates and was produced in a format embellished for a general readership. The present work, in the format of a technical monograph, brings together those of Ulam's contributions to the laboratory's Reports series that are not currently classified. The volume contains 21 papers in all, preceded by a foreword by Bednarek and some "sketchy remarks" on the collection prepared by Ulam himself. Beginning with "Theory of multiplicative processes" (written with D. Hawkins) and ending with "Speculations about the mechanisms of recognition and discrimination," the papers span the years 1944 to 1982. Among the five singly authored papers is Ulam's preface to his translation of the famed "Scottish Book" (see *Science* 218, 88 [1982]). Authorship of the remaining papers is variously shared with some dozen others (including John von Neumann and Enrico Fermi), who are more fully identified in the foreword. A list of Ulam's publications from 1929 onward, a brief vita, and an index conclude the work.—K.L.

Computing Before Computers. WILLIAM ASPRAY, Ed. Iowa State University Press, Ames, 1990. x, 266 pp., illus. \$27.95.

In this volume five authors "offer . . . a concise survey of computing technology prior to the development of the modern computer," circa 1945, with attention also to the broader context of the technology. Specialists in the study of computer history, the authors "have tried to wear [their] scholarship lightly" for the benefit of the general reader. In the opening chapter, Michael R. Williams traces some two millennia of "early calculation," from the Roman numeral system and the abacus to the time of the First World War. Chapter 2 is an account by Allan G. Bromley of difference and analytical engines, focused on the work of Charles

Babbage. In the next chapters logic machines are discussed by William Aspray and punched-card machines by Martin Campbell-Kelly, and Bromley gives an account of analog computing devices. The treatment concludes with chapters on relay and electronic calculators by Paul E. Cerruzzi. Each chapter includes illustrations showing key machines and their inventors and suggestions for further reading. An "epilog" by Aspray stresses the continuity both in the technology of computing and in the organizations that produced and used it, and an index is provided.—K.L.

Books Received

The Abusing Family. Blair Justice and Rita Justice. 2nd ed. Plenum, New York, 1990. xiv, 297 pp., illus. \$22.95.

Alkaline Rocks. C. Leelanandam, Ed. Geological Society of India, Bangalore, 1989. viii, 311 pp., illus. \$45.

The Almanac of Science and Technology. What's New and What's Known. Richard Golob and Eric Brus, Eds. Harcourt Brace Jovanovich, Boston, 1990. xiv, 530 pp., illus. \$59.95; paper, \$29.95. Prepared by World Information Systems.

Almanac of Soviet Manned Space Flight. Dennis Newkirk. Gulf, Houston, 1990. xvi, 391 pp., illus. \$29.95.

America's Struggle for Leadership in Technology. Jean-Claude Derian. MIT Press, Cambridge, MA, 1990. xiv, 309 pp., illus. \$29.95. Translated from the French edition (Paris, 1988) by Severen Schaeffer.

Animal Experimentation. The Consensus Changes. Gill Langley, Ed. xii, 268 pp., illus. \$45; paper, \$15.95.

Arkansas Mammals. Their Natural History, Classification, and Distribution. John A. Sealander and Gary A. Heidt. 2nd ed. University of Arkansas Press, Fayetteville, 1990. xvi, 308 pp., illus. \$50; paper, \$30.

Atomic Photoeffect. M. Ya. Amusia. K. T. Taylor, translation editor. Plenum, New York, 1990. xii, 317 pp., illus. \$89.50. Physics of Atoms and Molecules. Translated from the Russian manuscript (1984).

Autocrine and Paracrine Mechanisms in Reproductive Endocrinology. Lewis C. Krey, Bela J. Gulyas, and John A. McCracken, Eds. Plenum, New York, 1989. x, 209 pp., illus. \$65. Reproductive Biology. From a workshop, Shrewsbury, MA, Oct. 1988.

Beginning to Read. Thinking and Learning about Print. Marilyn Jager Adams. MIT Press, Cambridge, MA, 1990. x, 494 pp., illus. \$29.95.

Bioorganic Photochemistry. Vol. 1, Photochemistry and the Nucleic Acids. Harry Morrison, Ed. Wiley-Interscience, New York, 1990. x, 437 pp., illus. \$59.95.

Boojums All the Way Through. Communicating Science in a Prosaic Age. N. David Mermin. Cambridge University Press, New York, 1990. xxii, 309 pp., illus. Paper, \$16.95.

Brainstem Control of Wakefulness and Sleep. Mircea Steriade and Robert W. McCarley. Plenum, New York, 1990. xvi, 499 pp., illus. \$85.

Breaking the Boundaries. A One-World Approach to Planning Education. Bishwapriya Sanyal, Ed. Plenum, New York, 1990. x, 267 pp., illus. \$50. Urban Innovation Abroad.

Bridge from Nowhere. A Story of Space, Motion, and the Structure of Matter. William Day. House of Talos, East Lansing, MI, 1989. xiv, 288 pp., illus. Paper, \$19.95.

Ceramic Hardness. I. J. McCollm. Plenum, New York, 1990. xii, 324 pp., illus. \$65.

Chemical Applications on Group Theory. F. Albert Cotton. 3rd ed. Wiley-Interscience, New York, 1990. xvi, 461 pp., illus., + appendix. \$49.95.

Children in a Changing Health System. Assessments and Proposals for Reform. Mark J. Schlesinger and Leon Eisenberg, Eds. Johns Hopkins University Press, Baltimore, 1990. xx, 372 pp. \$55. Johns Hopkins Series in Contemporary Medicine and Public Health.

Cognitive Foundations of Musical Pitch. Carol L. Krumhansl. Oxford University Press, New York, 1990. x, 307 pp., illus. \$60. Oxford Psychology Series, no. 17.