need this crystallization and distillation of our learning. It seems fair judgment to me that some disservice is being done by lack of scholars in the right places, and by the intrusion of big business methods where they least belong. I have some fears that Einbinder's hard-hitting attack reads so well and convincingly that it may engender only despondency in some and defense and opposition in others, rather than helpfulness and progressive change. I fear too that, whether he is largely right or largely wrong, we shall have to begin to realize that, all their sales pitch notwithstanding, an encyclopedia is *not* a substitute for conventional learning or for books. We shall have to warn students, and even schools and colleagues with increasing frequency, that not even the *Encyclopaedia Britannica* is more than a reference source and key to greater or lesser use of a real library.

Form or Substance: A Matter of Precedence

Melvin Kranzberg

Thousands of Americans—more likely hundreds of thousands—will derive their ideas of machines from this volume of the *Life* Science Library: **Machines** (Time, Inc., New York, 1964. 200 pp. $3.95) by Robert O'Brien and the Editors of *Life*. What will they get from the volume? First, they will be exposed to a rapid-fire, well-written, and surprisingly accurate historical survey of the evolution of machines. They will be made aware of the esthetic qualities inherent in machines by the breathtakingly beautiful picture essay entitled "The beauty of machines at work." They may even get some idea of how common household devices work from another picture essay that describes the faucet, the automatic toaster, the telephone, and the oil burner ("modern flame thrower in the basement"). But above all, they will get the feeling that it is great to be alive in this wondrous world of modern mechanical and electronic devices. As Henry Ford II says in the introduction, "This book shows how far man has come in using his God-given gifts to improve the conditions of his life."

Actually, this 200-page book is two books. The first is the text itself—a history of machines, loosely organized along chronological lines. Each chapter is followed by a picture essay that deals with a topic which sometimes illustrates the text but which often strikes out along different paths.

When one considers the fact that all of the textual material on the history of machines occupies only some 80 pages, one realizes what a fine job has been done. There are virtually no errors, although one might quarrel with a "periodicity" that places the invention of printing in the Middle Ages. However, in any such summary account there are bound to be many omissions. Some topics are not mentioned—for example, the bellows—and some are slighted: with the exception of the lathe, the development of machine tools is discussed in one sentence which is merely a list of the various types. But this is quibbling, and in view of the span of time covered and the vast scope of machine development, the historical material is excellent.

The full-color illustrations used in the picture essays are beautifully done, but the essays themselves are quite another matter. Sometimes they contradict the text—for example, Eli Whitney is credited with the idea of interchangeable parts (p. 60), although the historical text more accurately gives Polhem and LeBlanc priority (pp. 76–79). And the definition of automation in the picture essay (p. 179) is somewhat different from that given in the chapter on automation (p. 167).

When matters not considered in the historical chapters are discussed in the picture essays, things sometimes go awry. In the picture essay "Today's inventor, genius in harness" (pp. 110–121), all the clichés about team invention are repeated, but there is no indication that some statistical and case studies reach quite different conclusions. Similarly, one would not suspect from reading the picture essay "The helping hand of the Patent Office" (pp. 154–165) that many economists, sociologists, and inventors are critical of the policies and procedures of the Patent Office and consider the "helping hand" to be more like *mortmain*.

How are we to account for the disparity between the quality of the historical text and the weakness of the picture essays? Apparently the answer is in the organization—or should one say over-organization?—involved in producing this book. On the title page we find that three very eminent scientists and men of letters (René Dubos, Henry Margenau, and C. P. Snow) are the consulting editors for the *Life* Science Library; we also find that this book was written by Robert O'Brien and the editors of *Life*. O'Brien is a veteran journalist who has done some science writing in his time, and he is undoubtedly responsible for the fast-pace and easy-reading style of the text. But these are only a beginning. On the back of the table of contents is listed the editorial staff for this particular volume in the *Life* Science Library. The list consists of editors, assistants, designers, staff writers, and researchers—a total of 30 people for the editorial and art work on this book alone. But that is not all. On page 196, 40 others are thanked for helping with the preparation of the book. One should not sneer at such a multitude of collaborators—the work of 70 men was required to produce the *Septuagint!*

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But one might well ask just how the *Life*-Time, Inc., organizational arrangement actually functioned, or how it could operate at all. I have made some inquiries and, from the information given me by authoritative sources, I can say that the responsibilities and tasks are allocated in what would appear to be a sensible and logical manner. Furthermore, the famous consulting editors are not just "window dressing"; they are consulted about the substance, structure, and conclusions of the books in this series, and they review closely the manuscripts of books which are in their particular area of competency. The consulting editors also suggest specialists in fields covered by the series. In the case of *Machines*, Frederick G. Kilgour served as "general consultant," and the accuracy and quality of the historical text attest to the high caliber of Kilgour's scholarship.

Given the reputation of the consulting editors and of the "general consultant" for this specific volume, and the fact that all were actually consulted, how are we to account for the variation in quality between the text and the picture essays? The essays, it appears, are not the product of the scholarly consultants nor even of the author-popularizer; they are produced by the Book Division Staff of Time, Inc., and we know that some 30 people comprised the staff for this particular book. Yet there would seem to be nothing wrong with having some 30 people, including some 14 researchers, work together to produce an accurate picture essay, particularly when highly knowledgeable scholars oversee their work. Yet it is precisely at this point that the communications chain seems to have broken down. The scholarly scientists had less contact with the aspects related to the illustrations than with those concerned with the text portions, and the final versions of the picture essays appear to have been composed without the consultants having an opportunity to give them a final check. Perhaps this accounts for the departure of the picture essays from the high standards of the text chapters.

The fact that the text is well written and historically accurate does not mean it is without fault. I am troubled by the fact that the underlying philosophy of the machine expressed in this volume seems more akin to the Panglossian attitude toward science and technology of weekly news and picture magazines than to the scientific skepticism of careful scholars. The reader is told that the assembly line "has a built-in tendency toward further mechanization. . . . This tendency is strangely organic—to many people frighteningly so . . . and it hatches new developments of its own, brews fresh situations, raises disturbing issues." But lest this uncertain future trouble the reader too much, he is immediately assured that "we move toward it [the supramachine of the future] incontestably, swiftly, as if on bright, soaring, machine-milled wings" (p. 84).

In the final chapter, "The promise and problems of automation," the reader is given a similar fright when machines are invested with a life and will of their own: "Yet, even as they serve us, they obey inner laws of selection and mutation, born of some kind of self-correcting sense of organization" (p. 167) and "The machines themselves seem to be groping more and more toward self-sufficiency, impelled by the same blind will with which a vine climbs toward the sun" (p. 168). Again, however, the reader is reassured that all is for the best in an automated world; although the new automatic devices "confront us with mountains to climb, . . . in the struggle up the slopes, we shall earn a better understanding of ourselves, a deeper communion with each other and each other's needs. And from the summit, new lands will beckon, brighter by far than those we have known."

To the *"Life-Time* mentality," apparently, the "problems" of automation mentioned in the title of the last chapter are simply technical problems—namely, improving the automated devices themselves. Two sentences suffice for the human and social problems posed by automation, specific mention being made only of retraining, relocating, and restoring work to those displaced by automation. Are these the only "problems of automation," and are they so trivial that they can be adequately covered in no more than a few phrases?

In view of the growing interest in science on the part of laymen and students, many scientists are concerned about their responsibility in providing nontechnical books for nonscientists and students. It is therefore encouraging to find publisher, scientist, and science writer working toward this end—the production of accurate and interesting, well-written and well-illustrated, popular accounts of science and technology, accounts that will reach a wide audience without sacrificing accuracy and intellectual dignity. Is it too much to hope that modes of collaboration can be found which will more often result in the realization of these mutual aims?

Geography Textbook

The Monsoon Lands of Asia. R. R. Rawson. Aldine, Chicago, 1963. 256 pp. Illus. $6.

As a result of the wide range of its subject matter, this volume varies from heavily factual to highly interpretive. The book is interspersed with well-chosen recent photographs, and the many simplified maps add clarity.

Material poverty is a common feature throughout Monsoon Asia. Food consumption is low, population is predominantly rural, and holdings are small; some farmers own their land, many are tenants, while others are laborers with no land of their own. Although there has been no appreciable increase in farm land or in agricultural output, population continues to increase. A small accumulation of capital is common but, on a per capita basis, it is small in comparison with that in many other parts of the world. For many years large-scale mechanized industry has been concentrated largely in India, Japan, and China, and although home industries generally supplement agriculture, they also provide certain goods for the export trade.

In this book scant attention is given to population pressure and economic progress, although more than half of the world's population is concentrated in Monsoon Asia. Rawson does state, however, that "Change is apparent everywhere," and he cites developments of perhaps greater significance in the future—for example, disputes between India and Pakistan over water, the role of Chinese in Southeast Asia, and the Mekong Valley plan.

Rawson concludes that, although educated Asians "recognize the urgent need for economic progress, they do not necessarily wish to achieve the high degree of material prosperity found in western countries. Asian people have their own values." Nevertheless, both regional and international