



SCIENCE MEETS STYLE: Bridging the Two Cultures by Martin Robbins

Students of writing have often approached "style" as a mystery better admired than analyzed, but some Harvard science majors have found that a computational analysis of a writer's style both increased their admiration for good writing and their skill and confidence in making stylistic choices.

From the first afternoon of an expository writing course, during the fall and spring semesters of 1974-1975, these students in physics, astronomy, math, biology, and pre-med programs were challenged to analyze the style as well as the content of writing on science. As their first class assignment, they were asked to write a "short essay for the general reader," commenting on the quality of the insights and the style of "ancient scientific postulates recently discovered in a supposed archaeological find." These postulates were actually excerpts from Lucretius' Latin poem, *On the Nature of the Universe* (in R. E. Latham's translation). Only one student in both semesters knew that it was Lucretius. But all the students were fascinated that the postulates of Democritus and Epicurus, which Lucretius' poem preserves, had included the conservation of energy and mass, gravity, atomic theory and interparticle forces. Their writing, however, did not clarify generalizations such as "this material offers penetrating insights." Only one or two commented on Lucretius' style, as exhibited in such phrases as "The atoms themselves cannot be swamped by any force." What the students didn't realize was that Lucretius's poetic style in itself expressed the basic weakness of the content of ancient science, its lack of precise measurement.

The excerpts from Lucretius, and the texts, W. E. K. Middleton's *The Scientific Revolution* and Loren Eiseley's *The Firmament of Time*, showed the students that they, too, "stood on the shoulders of giants," giants who expressed themselves simply and clearly.

The first papers that the students did outside class on "My Best Discovery

in Science" exhibited fewer "penetrating insights" than grandiose tendencies. For example: "The purpose of this paper is to relate a rather major personal discussion about the nature of science;" or, "The rediscovery of essential scientific concepts can be both stimulating and rewarding." It is always hard to convince freshmen that their writing is less readable when it is filled with "fancy words," to quote Strunk and White's *The Elements of Style*. This was particularly so for students whose writing echoed the overly formal tone of much writing on science. But *Certain Notes of Instruction*, written by George Gascoigne in 1575, convinced them "the more monosyllables that you use the truer Englishman you shall seem and the less you shall smell of the inkhorn."

Learning the makeup of their language showed the students that "the most ancient English words are of one syllable." It also showed them how word choice controls tone, from the direct "fire" of Anglo-Saxon to the more literary "flame" in French and the formal "conflagration" in Latin. Presenting introductory material on the English language and on the Indo-European families of languages is not new and studying word origins has always led students to be more precise. What was new and particularly challenging to these science majors was doing an analysis of style where they computed percentages of usage. Students in previously-taught literary essay or creative writing courses had complained about the 30 to 40 hours of computation needed to qualify descriptions such as "seldom, rarely" (about 5%, 1%) or "often, usually" (say, 75%, 90%). But the science majors got out their clipboards, one page to detail each structure or usage, and their pocket calculators. Any resistance to the assignment, which was spread over five weeks, was diminished by explaining that the style analysis is similar to first-year work in a traditional art school: use the work of the masters for models. The "masters" they chose included Einstein, Oppenheimer, Gardner, Hoyle,

Bronowski, Asimov, Russell, Whitehead, Carson, and Krutch. Computing the kinds of sentence structure and word usage used led to generalizations on pace and tone. A predominantly coordinate sentence structure reads faster than a subordinate one. Jacob Bronowski's sentences in a representative sample of *The Ascent of Man* were 52% simple, 26% compound, 13% complex, and 9% compound-complex. In contrast with Bronowski's sentences, which were 80% coordinate, Bertrand Russell's sentences in "Characteristics of Scientific Method" were 80% subordinate. As two excellent student essays commented: "One quarter of Bronowski's sentences contain subordinate clauses, which provide pleasant variety"; and "Short sentences stand out in Russell's writing because they are so uncommon." Bronowski's tone was informal, and he "writes with common English words." The tone of Russell's essay was "almost always formal and sometimes stiff . . . whenever he has a choice Russell usually picks the more formal word like 'adumbrates.' Latin and French-based words make up nearly two-thirds of the article." This formal word-level was the exception. In an essay from *Out of My Later*

(continued on back cover)



The Conference Center at Colonial Williamsburg where the bicentennial celebration will take place during the Triennial Council, December 5, 1976.

IS THERE A 'NEW' MEDICAL STUDENT? by Renée Fox

Medical education and socialization in the 1970s are proceeding under circumstances that are markedly different from those of the 1950s when several sociological studies of medical students were undertaken. To begin with, an unprecedented number of young men and women are now aspiring to the career of physician. Although the 1950s were marked by a post-World War II increase in applicants to medical school, what was then considered a "boom" period in this regard did not approach the ratio of at least three applicants for every one medical school place that characterizes the 1970s. At present, this tendency continues unabated and even appears to be gaining momentum. The attraction of so many young people to medicine is occurring at the same time that law schools are experiencing a comparable increase in applicants. This suggests that a more generalized movement toward the liberal professions may be taking place. Why this is happening, what attributes of medicine and law are motivating college students to try to gain entrance to a professional school, from what social backgrounds are these students being drawn are all questions that have not yet been systematically investigated.

The studies of medical socialization undertaken in the 1950s focused on students' interaction with their teachers, with patients, and with each other. Although their relationships with nonphysician members of the medical team were not ignored, they were subordinated to other aspects of the medical subculture. Peer relations were acknowledged as critical to nascent physicianhood and, by implication, to the practice of medicine by mature physicians. Teachers were viewed more as positive than as negative role models. But the center and ultimate goal of medical education and socialization was taken to be the relationship that medical students learned to develop with patients. Ideally, it was supposed to combine high competence in the most advanced, specialized, and vigorous medical scientific treatment of the patient's problems with a comprehensive, humanistic approach to what was sloganistically called "the patient as a whole person."

Professor Fox, chairman of the Department of Sociology at University of Pennsylvania, was a ΦBK Visiting Scholar in 1974 and 1975. This article is excerpted from a paper which appeared in Ethics of Health Care, published by the National Academy of Sciences, 1974.

Medical practice was implicitly depicted as a chain of relationships between individual physicians and their individual patients. Teamwork with fellow physicians, nurses, social workers, and other medical and paramedical professionals was invoked, but there was virtually no reference to the medical care system as system, or as more than the sum of its interpersonal parts. The medical school was studied as a microcosm. Outside its doors lay the larger medical profession that it was training students to enter, but its organization was only occasionally mentioned. And even the social system of the medical school was examined in a selective way. Its academic structure was thoroughly explored, but its economic and political dimensions hardly considered.

There is a great deal of speculation among medical educators about whether the men and women now enrolled in a medical school or hoping to be accepted by one constitute a "new" type of medical student with different conceptions of the profession and their future roles in it than those of their predecessors. Those who contend that there is, indeed, a new medical student say that he (she) is socially concerned, critical of the way that health care is organized and delivered in American society (particularly to the disadvantaged), determined to practice a more equitable, feeling, and less driven medicine than his elders, and committed to actively reforming medicine in ways which will influence the nonmedical sectors of the society.

Those who argue that the present generation of students is not really new regard the social criticism and social commitment statements made by students as "rhetoric" — "ideology" that, however sincere, is ephemerally idealistic. What is more, these skeptical observers maintain, the students who articulate these new values are not representative of most medical students. They come from privileged backgrounds and attend certain elite eastern medical schools where they constitute a vociferous minority of the student body. The data needed to resolve the question, "Is there a 'new' medical student?" are lacking. But those who believe and those who disbelieve in the existence and importance of the new medical student are reacting to the same phenomena. It would seem that medical students of the 1970s must be sufficiently different from those to whom medical educators were previously accustomed to have elicited all this discussion.

In addition to the fact that many more students are now applying to medical school than in the past and that numbers of those who are admitted begin their study of medicine with a "new" socially conscious and critical ideology, medical curricula have changed in ways that distinguish them from the programs of the 1950s. Organized attempts have been taken to loosen and diversify the earlier "lock-step" curriculum. Both elective and free time have been expanded. Multiple "tracks" have been created so that there now exists a number of patterns in which students can proceed through medical school in accordance with their present interests and future career plans. Combined M.D.-Ph.D. programs have been created that allow students to broaden, intensify, and accelerate their competence in a variety of medically related fields. The course of studies is no longer sharply dichotomized into preclinical and clinical years. Rather, a required "core curriculum" has been instituted, which from the first medical school year on tries to integrate the various basic sciences with each other and with clinical training. Numerous medical schools have been experimenting with ways to shorten the duration of professional training. Chiefly, these take the form of selectively granting students early admission or advanced placement, making it possible for them to complete the medical curriculum in three years, and eliminating internships in some fields.

Medical school departments and programs of community medicine, social medicine, preventive medicine, and family medicine have been created. Students have been given opportunities for fieldwork and practicum experiences outside the walls of academic medical centers. The aim here has been to acquaint them with more than "ivory tower" medicine, to familiarize them with the health and medical care delivery problems of disadvantaged groups in the society, and to develop their general ability to think of health, illness, and care in a social system framework. (It is interesting to note that some of these extramural experiences were originally sought out or created by students and subsequently accepted for credit by faculty.) Greater emphasis has been placed on the relevance of behavioral science training to physicians' collective ability to improve the health care system, as well as to their development as humanely competent individual practitioners. Courses and even programs in medical ethics have been launched by medical schools throughout the country. These courses go beyond the

"do's and don'ts of doctorhood" to consider the ethical component in medical decision making and to ponder such questions as "death and dying" and the moral and metaphysical implications of particular biomedical advances. Along with all these other changes, many medical schools have replaced their traditional "A through F" grading systems with a "pass-fail"-type of evaluation. And an increasing number of medical schools have been making concerted efforts to recruit more minority group students.

These modifications of the curriculum and ethos of medical schools have all come about in the past decade. They constitute a set of educational arrangements and perspectives that grow largely out of the criticism and self-criticism to which the American medical profession and health care system have been subject in recent years. These in turn are part of a much broader process of social and cultural change that surfaced in the 1960s and continues to the present. During this period, medical schools, like many other institutions, have been questioned, challenged, and reproached. Various medical, professional, student, government, patient, and community groups have held them responsible for the fact that many of the physicians they have trained have practiced medicine in ways that have contributed to the keenly felt problems with which the American medical system is currently faced. The innovations in medical school curricula already described represent *ad hoc* organized attempts to meet this criticism. Medical educators have introduced these changes on the assumption that they may influence physicians-in-becoming to participate actively in the development of a high quality, reasonably priced national system of health care that is more equitably distributed, accessible, socially aware, and humane.

More explicitly than in the 1950s, the new curriculum is premised on the notion that medical education not only affects the outlook and behavior of individual physicians but also the attributes of the profession and the contours of the entire medical system. In this respect, the present generation of medical educators has high "socialization consciousness." Yet, there are several anomalous features that characterize their view of professional socialization that would seem to belie such an allegation. By and large the current evaluations of what impact curriculum changes have had on students do not include attempts systematically to appraise attitude learning. Rather, the tendency is to measure the

amount and quality of cognitive learning that is taking place, chiefly in the form of National Board Examination scores, and to ascertain what aspects of particular courses students and faculty like and dislike.

They are not exploring the following sorts of questions. Does the supposedly less invidious pass-fail grading system actually quell acquisitively competitive tendencies in students? What effect does it have on students to be alternately dissecting a cadaver in the anatomy laboratory and seeing gravely ill patients in the hospital during their first medical school year, instead of having these two sets of experiences separated in time from one another as they were in the traditional curriculum? Does the increased contact with poor and deprived patients now provided strengthen students' belief that, as physicians, they should and can do something to improve such persons' health and the medical care they receive, or does it discourage and dissuade them from this conviction? Does the core curriculum-multitrack educational sequence result in as coherent and cumulative a socialization process as the one that existed in the 1950s? Are there other discernible effects that the new curriculum can be expected to have on students? Does the increased individualization of course work and medical school experiences that is now permitted reduce the influence of the student peer group? If so, what are the intellectual and psychosocial consequences of such a change?

Along with their failure to inquire into such matters, medical educators seem more reluctant than they were in the past to admit verbally that what they teach significantly shapes attitudes as well as conveys knowledge and that these attitudes may have long-range implications. Medical educators do proceed on this supposition in their daily rounds and in their curriculum planning, but they are inclined to disavow that they really believe this when they are called on to discuss their sentiments and convictions about professional education. The source of such faculty ambivalence is not easy to identify. It is almost as if medical faculty members were protecting themselves against being held too accountable for whatever the beliefs, attitudes, and conduct of the new generation of physicians may turn out to be. This stance may be a defense mechanism to which medical (and other) educators have resorted in an era when they have been continuously subject to criticism concerning the social attitudes that they do and do

not successfully convey. It may also be a way of implicitly acknowledging that a perplexing "generation gap" exists between them and their students for which they cannot account.

Medical students' attitudes toward their own professional socialization seems more ambivalent than those of their instructors. Many students begin their medical school training with the determined hope that it will not transform them into the kinds of persons and physicians that they are trying not to become. As compared with their counterparts in the 1950s, students now tend to view their teachers as negative role models, not necessarily with rancor or disesteem but more as a symbolic expression of their resolve to be "different," "better," more socially responsible physicians than the medical "establishment" with which they identify their instructors. From the outset, however, students are convinced that "The System" the medical school both represents and comprises is seductive and powerful. In their eyes, it has the insidious capacity to change them into what they are resolved not to be. When asked to predict what effect they think their medical education will ultimately have on them, they are inclined to the opinion that, both because of the forcefulness of the system and their own potential pliancy in the face of it, they are likely to end up replicating the past generation's professional attitudes, behavior, and even their personal style of life.

Thus, in the medical school climate of the 1970s, change-oriented students, who are persuaded that the latent socializing impact of their professional education is subtly but irresistibly converting them to the status quo, meet faculty members who deny that medical education per se has potent socializing effects but who have nonetheless altered the traditional curriculum in order to better train young physicians, attitudinally as well as intellectually, to tackle the health care and medical services delivery problems now facing the profession and the society. Complicating the picture further are the attitudes expressed by some of the social scientists with whom medical faculty and students have conferred about the present and future education of physicians. No studies of medical socialization of the magnitude of those undertaken in the 1950s are currently in progress. This seems as much a consequence of social scientists' ambivalence as it is a question of medical schools' receptivity to such undertakings or availability of funds to carry them out.

In recent years, for example, several prominent sociologists of medicine have become critical of the importance that they and their colleagues formerly attached to medical education and socialization. They now contend that the physician's "immediate work environment," the "exigencies . . . and realities of practice," are more significant determinants of the way a man or woman performs in the physician's role than the anticipatory socialization that medical schools supposedly provide. Partly for this reason, they are not enthusiastic about launching studies of becoming a physician in the 1970s and are even less disposed to cast them in the conceptual framework of the 1950s. Insofar as they would be at all willing to conduct research in medical school rather than in medical practice settings, these sociologists would lay greater stress on studying the faculty, the social organization of the medical school, and especially its organization of power than on inquiring into student attitudes, experiences, and culture. They seem to be more interested in political and economic facets of the medical school than sociologists were in the 1950s and more intent on doing research that will have policy implications. One detects in their orientation a certain undercurrent of disappointment over the fact that the sociology of medical school inquiries carried out 20 years ago did not lead to reforms in the educational process that significantly improved the way that medicine is organized and practiced in our society. These activist yearnings and regrets on the part of sociologists, along with their increased social structural determinism, are not conducive to their undertaking studies of medical socialization in the 1970s.

Meanwhile, a new generation of students is passing through a greatly changed medical school en route to becoming physicians. We know remarkably little about these students, or about the impress that their medical education is making on them. Yet, at present, a number of medical schools are considering "rolling back" certain of the curriculum reforms of the 1960s on the grounds that they have already had some undesirable consequences for the intellectual and attitude learning of medical students. Is this an accurate diagnosis and an appropriate set of responses to it? Will such revisions become widespread and, if so, will they usher in a state of retrenchment in the medical profession and the process of being educated and socialized for it? There is little data on such matters.

By way of conclusion, I would like to

essay a portrait of the "new" medical student based on my observations and constructed out of my field notes. Despite the efforts being made to recruit young persons into medical school from minority groups and non-privileged social class backgrounds, the new medical student is still likely to be a white, middle-class man. He arrives in medical school garbed as he was in college, in blue jeans or modishly colored sport slacks and tieless shirt. His hair is long, though usually not unkempt, and he may have grown a moderate beard. When he begins to see patients, he often starts wearing a tie and sometimes a jacket. He may also cut his hair on the short side of long and shave more closely.

Although he is fiercely intent on being accepted by a medical school, unlike his counterparts in the 1950s, the new medical student is generally a "late decider." It is not uncommon for him to have committed himself to becoming a doctor in the second half of his college career. Because of his "delayed" decision, he may have had to take his premedical courses in summer school or in a concentrated post-undergraduate year. In any case, he worked hard and competitively as a college student in order to earn the very high grade point average that made him eligible for admission to medical school. Although aggressively achievement oriented, he deplores it in himself, his classmates, his teachers, the medical profession, his parents, and in American society. As engaged as he is by medicine, he wonders continually whether it is really his "vocation." The "on-call 24 hours a day" demands associated with the traditions and responsibilities of many branches of medicine contribute to these doubts. For he is concerned about what this kind of relentlessness may do to his person, his relationships to patients and colleagues, his family life, and to his capacity to participate in cultural, civic, and recreational activities that he considers healthy and humanizing, as well as pleasurable.

Such a student is likely to have interests in fields like community medicine, public health, family medicine, psychiatry, and pediatrics (pediatrics, he feels obliged to explain, because it is "holistic" medicine and entails caring for "new and future generations"). In the end, these may not be the fields that he will actually enter. But they express the interpersonal, moral, and societal perspective on physicianhood that he brings with him from college. He is actively committed to such humane and social goals as peace, the furtherance of civil rights, the reduction of poverty, the

protection of the environment, population control, and improvement in the "quality of life" for all. He extends the principles that underlie these commitments to medicine and the role of doctor. In his view, health and health care are fundamental rights that ought to be as equitably distributed as possible. For this reason, as he sees it, the physician should care for the psychological and social, as well as physical, aspects of his patient's illness. He should have a "genuine concern for the total health of mankind." He should take initiative in dealing with some of the factors at work in the society that adversely affect health and keep the medical care system from functioning optimally. Although the doctor's dedication should be universalistic, he has special obligations to those who are disadvantaged.

The new medical student is also staunchly egalitarian in his conception of the doctor, the doctor's relationship to patients, and to non-physician members of the medical team. The student disapproves of "all-knowing" or "omnipotent" attitudes and behavior on the part of physicians. He maintains that physicians should approach patients "as human beings" with "respect for their feelings and opinions," rather than as "diseased specimens," or persons incapable of understanding their own medical condition. "Integrity," emotional and moral, as well as intellectual, is basic to this relationship too. It entails more than being honest and consistent in what one says and does. It is actively critical and self-critical, involving the "questioning of self, colleagues, teachers, physicians and the intentions of the institution."

Finally, although the new medical student would not downgrade the importance of training, knowledge, skill, and experience, he also insists that the doctor's values, beliefs, and commitments are critical. He should concern himself with the "philosophical" problems of life and death, suffering and evil, human solidarity and ultimate meaning in which his chosen profession and the human condition are grounded. This is the simultaneously critical, activist, and meditative world view of the new student. How predominant it is, whether it will prevail, and whether in interaction with the medical school environment and the social climate of the seventies it will produce a new type of physician will be revealed in time.

The second part of Professor Schuck's Watergate reviews will appear in the fall issue.

reading recommended by the book committee

humanities

social sciences

natural sciences

GUY A. CARDWELL, ROBERT B. HEILMAN,
FREDERICK J. CROSSON
EARL W. COUNT, RICHARD BEALE DAVIS,
LEONARD W. DOOB, ANDREW GYORGY,
MADELINE R. ROBINSON, VICTORIA SCHUCK,
JAMES C. STONE, ELLIOT ZUPNICK
KIRTLEY F. MATHER

GUY A. CARDWELL

S/Z. Roland Barthes. Translated by Richard Miller. Hill & Wang. \$8.95. A much admired French semiologist applies his principles in an extended, at times strenuous, reading of a tale by Balzac.

The Machiavellian Moment: Florentine Political Thought and the Atlantic Republican Tradition. J. G. A. Pocock. Princeton. \$22.50, p. \$11.50.

The moment is that in which the Aristotelian polis confronts the problem of its own instability in time. This learned study traces the consequences for modern consciousness of the ideal of the republic as revived in the Renaissance.

The Dispute of the New World: The History of a Polemic, 1750-1900. Antonello Gerbi. Translated by Jeremy Boyle. Pittsburgh. \$19.95.

Full and witty. Includes copious summaries and quotations from a host of writers who have contributed to the paradoxical, persistent argument over the supposed hostility of American nature to animal life.

Dramas, Fields, and Metaphors: Symbolic Action in Human Society. Victor Turner. Cornell. \$16.50.

A masterful treatment of symbolic meaning in the social process. Of interest to students of literature or language as well as to anthropologists. The author will serve as general editor for a series of related volumes.

The Aryan Myth: A History of Racist Nationalist Ideas in Europe. Leon Poliakov. Basic Books. \$12.

Encyclopedic in scope; surveys certain received ideas that evidence man's capacity for insistent self-deceptions that can be both comic and tragic.

Frame Analysis: An Essay on the Organization of Experience. Erving Goffman. Harvard. \$12.50.

This essentially synthetic study addresses the question of the structure of reality that individuals experience at any moment of their social lives. It relates closely to one of our central preoccupations: the nature of the self. Apparently a sense of ourselves would, by this analysis, be something like our "authentic" selves; but this of course may be no more than a mentalistic adumbration.

The Life of Emily Dickinson. Richard B. Sewall. Farrar, Straus & Giroux. 2 vols. \$30.

A thorough account of the life of the

poet and of relevant aspects of her physical milieu. Particularly strong, original, and fair on the almost Faulknerian emotional lives of the Dickinsons. Handsomely printed and illustrated.

Truth to Life: The Art of Biography in the Nineteenth Century. A. O. J. Cockshut. Harcourt Brace Jovanovich. \$7.50. Chapters on important English biographers and biographies, and commentaries on such illuminating topics as death scenes, childhood, and self-imposed censorship. Concise and deft.

The Book of Kells: Reproductions from the Manuscript in Trinity College, Dublin. Françoise Henry. Knopf. \$65.

Egon Schiele's Portraits. Alexandra Comini. California. \$65.

The Belles Heures of Jean, Duke of Berry. Millard Meiss and Elizabeth H. Beatson. Braziller. \$50.

The Sculpture of David Wynne, 1968-1974. Phaidon-Schram. \$25.

Wildflowers of Western America. Robert T. Orr and Margaret C. Orr. Knopf. \$17.95. **Annibale Carracci in Bologna.** Boschloo-Schram. 2 vols. \$65.

Hawaiian Sculpture. J. Halley Cox and William H. Davenport. Hawaii. \$15.

Jericho: The South Beheld. Herbert Shuptrine and James Dickey. Oxmoor. \$60.

Each of these luxuriously illustrated volumes is in its own way a delight to look at. Except that *Jericho* tends to be fuzzily lyrical, the texts are scrupulous in supplying appropriate scholarship.

KIRTLEY F. MATHER

The Earth in the Looking Glass. Lloyd Darden. Anchor/Doubleday. \$7.95.

Describes in non-technical language the newly developing technology of "remote sensing," whereby much valuable knowledge may be economically secured about the surface of the earth and its resources by the use of low-flying satellites such as "ERTS" (Earth Resources Technology Satellites, the first of which was launched by NASA in 1972) and "Skylab."

Clean Air: The Policies and Politics of Pollution Control. Charles O. Jones. Pittsburgh. \$13.95.

Analyzes with great wisdom the extraordinary development of "policy beyond capability" in the control of air pollution and presents in scholarly but interesting manner some cogent recommendations concerning the solution of many of our pressing problems.

The Private Lives of Animals. Assembled and edited by Milton Rugoff and Ann Guilfoyle. Grosset & Dunlap. \$17.95.

An extraordinary collection of photographs, unsurpassed in intimacy and detail, covering almost every aspect of the behavior of wild animals, from the largest mammals to minute invertebrates; the explanatory comments by Roger Caras are rich in information and insights.

Minerals: Nature's Fabulous Jewels. Arthur Court and Ian Campbell. Harry N. Abrams. \$35.

This superbly illustrated, large format, artbook is not only to be proudly displayed on one's coffee-table but to be treasured for the wealth of information it contains about minerals in general and, in particular, the spectacular specimens selected for individual treatment.

Gem Hunter's Guide. Russell P. MacFall. Crowell. \$7.95.

Using this helpful guide, with its state-by-state descriptions and maps of "tested digging sites," will not guarantee that you will find mineral specimens like those illustrated in the book described in the preceding paragraph, but it might help you to do so.

The UFO Controversy in America. David Michael Jacobs. Indiana. \$12.50.

The most informative, least biased, most unemotional, and least prejudiced of the plethora of books about "unidentified flying objects" I have seen thus far. As J. Allen Hynek, America's most respected "ufologist" (please forgive me for using that bastard word), says in his introduction, "A scientific opinion demands of the opiner that he be 'acquainted with the literature.'" Reading this book will go far toward meeting that demand.

Science and Society: Past, Present, and Future. Edited by Nicholas H. Steneck. Michigan. \$15.

The proceedings of a symposium recently held at the University of Michigan in celebration of the quinquacentennial of the birth of Copernicus. The contributors constitute a veritable galaxy of Western scholars who have given thought in recent years to the nature and consequences of the two-way impact of "science" and "society" in the cultural history of mankind. Regardless of what those terms mean to the various individuals who use them, the book is a major contribution toward an understanding of the problems generated by their juxtaposition.

The World of Measurements. H. Arthur Klein. Simon & Schuster. \$14.95.

An immensely valuable reference work to which one may turn confidently for abundant information about each of the myriad units of measurement that men have used throughout the ages in their study of all kinds of natural phenomena; its erudite pages are delightfully illumined by the author's inimitable sense of relationships and relevant humor.

EARL W. COUNT

The Explanation of Cultural Change: Models in Prehistory. Ed. Colin Renfrew. Pittsburgh. \$29.95.

Archaeologists talk with their kind —

but lucidly — at a seminar held at the University of Sheffield. Modern archaeology holds a dynamism unsurpassed among the sciences of man: understandably, its perspective upon culture change possesses an incomparable time dimension. From the contents: *The Explanation of Culture Change: Central Concepts*. *Data processing and the Measurement of Variation*. *The Explanation of Artifactual Variability in the Palaeolithic*. *Change in Population Density*. *Subsistence and Land Use*. *The Investigation of Social Change*. *Movement, Trade, and Contact, and their Consequences*. *Systems Theory, Law and the Multivariate Analysis of Change in the Culture System*. An addressed Epilog tells the profession where its practitioners fail to meet criterion. This voyage demands able sea-legs, but it is a fortunate trip if you have them.

Atlas of Ancient Archeology. Ed. Jacqueline Hawkes. McGraw-Hill. \$19.50. It covers the non-classical, non-historical world. For each area, the mappings range from continental small-scale to the topographies of sites. Whenever applicable, there are architects' drafts, line-drawings of monuments; in all cases, basic data and citations to the major literature, plus a trim textual explication. Despite the multiple and distinguished contributions, the editor has managed a remarkable regularity. Altogether, probably a unique and certainly a phenomenal accomplishment.

Voices from the Stone Age. A Search for Cave and Canyon Art. Douglas Mazonowicz. Crowell. \$12.95. The book is much fresher than its title. It is a personal story, from a happy hunter of prehistoric animals and men, as they roam the cave-walls of Spain, France, the Sahara, Utah. The author is a freelance artist, a lecturer and associate of the Carnegie Museum, often a hobnailed guide. "Do not simply look at the paintings: observe them too." May pre-historic men have indeed painted their solutions to their problems?

The Archaeology of Greece and the Aegean. Stewart Perowne. Viking. \$12.95. It is rather like being a modest traveler under an urbane and knowledgeable guide — which this scholar, author, administrator has indeed been on chosen occasion. This is no account of the latest finds, but walks among the long known. You will be nostalgic — or set to become so some day.

The Etruscans. Werner Keller. translated by Alexander and Elizabeth Henderson. Knopf. \$12.50.

Their provenience has long been surmised but never settled. Their language can be read but not understood. Their civilization was the earliest of Europe west of Greece, and they were very gifted. Their achievement went into the perpetual foundations of Rome — but it was only partially acknowledged.

Female of the Species. M. Kay Martin and Barbara Voorhies. Columbia. \$15, p. \$6. A conscientious and informative distillate from what undoubtedly is a very worth-

while university course. It commences with biology, cross-refers to the non-human primates, then proceeds to the status of womanness in horticultural, agricultural, pastoral, industrial societies.

Women of the Forest. Yolanda Murphy and Robert F. Murphy. Columbia. \$10, p. \$3.45. Years of learning to know and to write about the Amazonian Mundurucú assuredly explain the simple excellence of this theme. The steady routine of women's work promotes a grouped endeavor, a kind of functional sisterhood. It is, understandably, more earthy than the fictive struts of the men's clubbing; the contrast radically affects the female-male accommodations. The incursions of modernity are channeled consequently. In a remarkable final chapter, this husband-wife team mounts the status problem of American women: men against the Mundurucú backdrop.

ELLIOT ZUPNICK
The Permanent War Economy: American Capitalism in Decline. Seymour Melman. Simon & Schuster. \$9.95. In this book Melman extends the analysis he began in *Pentagon Capitalism*. Melman traces most of our more important social problems — inflation, unemployment, the decay of the inner cities, the erosion of the infrastructure, the loss of America's competitive edge in world markets, the collapse of the international monetary system, and our inadequate schools — to one cause: The development over the past 35 years of a permanent war economy based on the principle of cost maximization. Although Melman's grand thesis must be rejected as being too simplistic, his book is not without merit. It is essential to be reminded, now and then, of the enormous cost of our military effort, not only in monetary terms, but, more importantly in opportunities foregone.

The Economic Development of the Third World Since 1900. Paul Bairoch. California. \$12. Eschewing general theories and broad generalizations which characterize much of the literature on developing countries, Bairoch's study is based on a careful analysis of the available data. As one would expect, this approach could be devastating to solidly entrenched myths. Bairoch's chapter on the secular trend of the third world's terms of trade is but one case in point. This is an important, timely and interesting study.

Discrimination in Labor Markets. Ed. O. Ashenfelter and A. Rees. Princeton. \$9. Of the five papers in this book, three are empirical studies. Finis Welch concludes that the improvement in the quality of education received by Blacks in recent years is primarily responsible for the increase in the marginal returns Blacks earned from additional years of education. Ashenfelter found that craft unions tend to increase white-black wage differentials while industrial unions tend to narrow them. Oaxaca estimated that discrimination was the most important factor

responsible for male-female wage differentials, accounting for 74% of the gross differentials for whites and for 92% for Blacks.

Sex Discrimination and the Division of Labor. Ed. Cynthia B. Lloyd. Columbia. \$17.50, p. \$6. The 17 papers in this volume explore the economic role of women with particular emphasis on the impact of discrimination on female wages, employment, and income. Taken as a whole, the book reveals both the strengths and weaknesses of economic analysis in providing insight into an important social question. Although the quality of the papers is somewhat uneven, there is not one unworthy of at least serious perusal. And they are so refreshing after all the loud rhetoric which has surrounded this issue.

MADELINE R. ROBINTON
The Problem of Slavery in the Age of Revolution 1770-1823. David Brion Davis. Cornell. \$17.50.

This is the sequel to that brilliant book, *The Problem of Slavery in Western Culture*, published in 1966, which placed Negro slavery in the American hemisphere within the larger context of slavery as it had existed from the beginning of historic times in the Western World and sought to explain the transformation in European and American thinking in the eighteenth century that no longer accepted an institution that had been taken for granted since antiquity.

This, too, is a wise book which makes the reader aware of the complexity of human nature and human motivation; it is also good history. The core of the book deals with the "ideological functions and implications of the British and American anti-slavery movements." It is rich in the diversity it reveals in the responses in Britain and North America (and in France, comparatively) to the anti-slavery forces occasioned by the differences in their institutional development, social structure, cultural heritage and the political and economic exigencies they faced in a period of revolution. It is a book that is basic to the understanding of the anti-slavery forces, their achievement, and their impact on the changing conceptions of human and divine law.

Jews and Arabs: Their Contact through the Ages. S. D. Goitein. Third Revised Edition. Schocken. \$10, p. \$2.95.

This is a reissue of a book written in 1954, published in 1955, with some changes "required by the passing of time and new insights gained in research;" a section called "Recent Developments" has been added and the bibliography updated. The author, Professor S. D. Goitein, is the distinguished authority on the Jewish communities in the Arab world in the Middle Ages based on his studies of the Cairo Geniza documents. It is an extremely useful survey of the history, political and cultural, of Jewish-Arab relations. Beginning with the period 1500 B.C.-500 A.D., it deals with the myths and facts of common origins and recorded contacts. The bulk of the book treats

what Mr. Goitein calls the time of "creative symbiosis," 500 A.D.-1300 A.D.: the Jewish tradition in Islam, the actual and legal position of Jews under Arab Islam, and the linguistic aspects of Jewish-Arab symbiosis in the Arabic literature of the Jews and in Hebrew poetry. A brief final chapter discusses the similarities and differences in the Jewish and Arab cultural revivals in modern times.

Upheaval and Continuity: A Century of German History. Ed. E. J. Feuchtwanger. Pittsburgh. \$5.95.

Thoughtful and thought provoking essays by German and British scholars on the development of Germany since 1971 which were originally presented as a lecture series in London, 1971-1972, at University College and the London School of Economics. The excellent introduction by Dr. Feuchtwanger integrates the various essays into a coherent whole and incorporates some of the discussion that followed the reading of the papers.

Willy Brandt: Portrait of a Statesman.

Terence Prittie. Schocken. \$10.50. Terence Prittie, correspondent for the *Manchester Guardian*, 1946-1963, contributor to the *Atlantic Monthly* and author of a life of Adenauer, has now written a fascinating biography of Willy Brandt. Prittie has tremendous admiration for the man and his qualities of statesmanship. He sheds a good deal of light on Brandt's rise to power, to become Lord Mayor of Berlin and Chancellor of the Federal Republic of Germany, the role he played in the Social Democratic Party and the meaning of his *Ostpolitik*.

Historical Writing in England: c. 550-c. 1307. Antonia Gransden. Cornell. \$37.50.

This is a most valuable critical guide to the chronicles, histories, and biographies, written from the middle of the sixth to the beginning of the fourteenth century.

JAMES C. STONE

One of the newer, more exciting developments in education today is the new interest in the improvement of teaching by college and university faculties. Training in strategies, techniques, and methodologies — traditionally relegated to schools of education as the proper concern only of elementary or secondary school teachers — now is a matter of much concern to faculty in liberal arts colleges and professional and/or graduate schools. Some evidence of this interest may be found in the increased number of "teaching resource centers" on college campuses, the funding of regional consortiums on teaching by private foundations, and the increase in new books on college teaching. Two such books are here reviewed:

College Professors and Their Impact on Students. Robert C. Wilson, et al. Wiley. \$12.95.

Based on two large research studies funded by the U.S. Office of Education, the first part of the text focuses on Faculty Views of Teaching, and draws on

data from 1,000 college teachers at six institutions. The second part, Faculty Impact on Students, is based on data from both professors and students. In particular I commend the chapters that identify faculty-student relationships that were found to be effective, the institutional environment that promotes good teaching, and the importance and contribution to student development of teachers' out-of-class behavior.

The University Teacher as Artist. Joseph Axelrod. Jossey-Bass. \$8.95.

This volume is in distinct contrast with the Wilson, et al., volume. The focus is first on the teacher as artist with data from the field of the humanities. It is followed by a systems analysis of the college or university. The book should be seen as two half-books — one on the effective college teacher and the other on the university as a system of inter-locking subsystems. The latter concept is significant for those interested in change and innovation, but somehow it is lost in the book's present title and format.

The Open University Opens. Ed. Jeremy Tunstall. Massachusetts. \$10, p. \$4.

An interim report of Britain's Open University, a correspondence university transmitted by BBC. Tunstall outlines the problems it has faced, particularly the "substantial failure rate" of its students, and student dissatisfaction with the lack of contact with teachers and with other students. He also catalogues the successes of the program — its cost effectiveness, and its broad appeal. The succeeding selections describe in depth the history, implications, student body, faculty and media component of the Open University. The Open University experience has obvious implications for those interested in alternatives to traditional higher education. However, it has even broader appeal, because **The Open University Opens** describes a completely integrated and innovative method of teaching. In his concluding chapter, Richard Hooper compares the media-Open University success with several American universities' failures with media- and computer-assisted instruction. He says of the American experience, "Existing methods of teaching and learning were taken as given. These methods were stretched by use of new technologies — stretched but not changed."

The Philosophy of the Curriculum: The Need for General Education. Ed. Sidney Hook, et al. Prometheus Books. \$10.95.

Arguments against pressure for "relevant" education and vocational training and numerous theories on ways to re-integrate the liberal arts into the educational system are presented.

The Case Against College. Caroline Bird. McKay. \$9.95.

The book is concerned with student dissatisfaction with college, as documented by random interviews. Dissatisfaction results mainly among low-motivated students, who went to college because it was "the thing to do" or because of parental pressure.

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SCIENCE MEETS STYLE

(continued from page one)

Years, Einstein's words were 67% from the Anglo-Saxon, with the rest from Greek and Latin. Computation can be overdone. The student who reported an average of 20.5 words per sentence in Einstein's essay was received with smiles when he reported that there were 1.74 syllables per word. But the class used the two sessions of the "style seminar" to compare notes and questions in informal reports that also covered paragraph strategies, transitions, rhetorical devices, figures of speech and amount of adjectives. It was encouraging to come into the room during a class break and find the students heatedly discussing style, not content.

What did they really learn from such a detailed analysis of style? First, they all admitted in class that it forced them to review and to use their knowledge of grammar. Without exact definitions, held clearly in mind, the computation would have failed. Second, they realized that each time they re-read the representative sample to compute a particular usage, they got closer to absorbing the gestures of that writer's style. To prove this, they did imitations using an Aesop fable for a story, since making one up distracts the student from doing a spontaneous imitation. In class, after three or four "reports" had described a style, the imitations were shuffled and read. "The remarkable ability of the fox to survive under adverse circumstances is the result of not so much his physical strength, which is, practically speaking, almost negligible . . ." — Russell or Bronowski? After the style analysis and seminar, which occurred midway in the course, the

students wrote papers on what they had learned about style in general, and their own writing in particular. The general observations included comments such as these: "I am more aware of the precision involved in choosing just the right phrase or sentence for a given audience or type of writing;" or, "I began the style analysis with the assumption that style is something one feels . . . but now I believe that logically developed paragraphs and precise vocabulary reflect clear thinking and acute observation." What these science majors observed about their own writing was equally useful: "There are patterns that emerge in my writing, just as there were in the essay that I studied;" and, "I never really understood what controlled the tone of my own writing . . . but now I am wary of heavy subordination, and the use of overly-impressive words."

The students had eagerly found bad science writing in textbooks and magazines before doing the style analysis. After completing it, they had the confidence to criticize their own work. In the second week they had written papers on a process — which in their case might have been a description of making a protein, not a cake. The re-writing of these process papers yielded some instructive "translations" from jargon into English. "Post-dating the basic phase" became "is older than." "Produces coordinated motor-output" became "coordinate movements." The prize-winning glob of jargon was: "Exercise extreme caution so as not to drive the amplifier beyond the prescribed levels, as this act will result in the heating of the plates of the tubes to virtual incandescence and undesirably alter their operating characteristics." Trans-

lated, this meant: "Overloading the amplifier ruins the tubes." These revisions were read as part of the weekly post-mortem where students faced their "deathless prose" — and each other — in tables arranged in a square. Because it was the week after the style project was completed, all the students appreciated both the content and the style of, "At this point, one would normally terminate the experiment," and its translation, "Here, you would usually give up."

There were two additional assignments that used the approach of style analysis — an essay on current trends in science writing and an anthology of good science writing. This final project helped shake them loose from the overly-formal tendencies of the average term paper although footnoting the basic sources and a bibliography were required. Instead of a term paper, they wrote a three to four thousand word critical introduction to the anthology.

The anthologies consisted of four or five articles by various writers on a general topic, or a group of essays by one writer. Most were about either our increasing knowledge of the cosmos or the growing responsibilities of science on this planet. Although the introductions did not require any computational analysis of style, the students found it easy to make observations on the pace and tone of the various essays. The style of their introductions tended to be simple, direct, and effective. They had become aware of how much a writer's style is part of what he says.

Martin Robbins and his Harvard colleague, James Yannatos, are the author and composer of the bicentennial oratorio commissioned by Phi Beta Kappa.

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