Marginalized Positions

Uneasy Careers and Intimate Lives. Women in Science, 1789–1979. PNINA G. ABIR-AM and DORINDA OUTRAM, Eds. Rutgers University Press, New Brunswick, NJ, 1987. xvi, 365 pp., illus. $35; paper, $12. Douglass Series on Women's Lives and the Meaning of Gender.

The editors and authors of this volume are headed in the right direction. They want to understand when and why the circumstances of women's and men's participation in scientific inquiry diverged significantly as science ceased to be an amateur endeavor and whether gender was a first- or second-order cause of that divergence. These are questions of profound significance for our understanding of modern science, and the editors pose them trenchantly.

The interpretative essay introducing the volume and the individual essays themselves are serious, scholarly, and lively. Yet even though each chapter contains important asperçus and each poses incisive historiographical questions, the total impact of the volume is diffuse. This is probably inevitable even though the essays were specially commissioned for the volume. As the editors write in their introduction, much more prosopographical work on women scientists will be required to unravel how and why it is that as modern science was institutionalized most women scientists were pushed to the margin of scientific activity and only extraordinarily talented and determined women could make full-time careers doing science.

Uneasy Careers and Intimate Lives sets out to challenge received opinion in the history of science and in women's studies. Specifically, the editors intend the volume to raise questions about the degree to which science between about 1789 and 1979 was an exclusively male activity, the degree to which the personal lives of scientists are separate from their scientific work, and the extent to which individuals operating outside the formal structures of institutional science have made major contributions until well into the 20th century. Part 1 is devoted to the analysis of the social and historical contexts in which women made significant contributions to either the sponsorship or the actual work of science and to an examination of the forms of intimacy available to women who sought active scientific careers. Each chapter explores a particular field, such as botany, ornithology, or astronomy, in which 19th-century women made major contributions as field observers and also examines the interplay between intimate relationships and scientific creativity for the women in question. The weight of the conclusions reached in these explorations is that single women and widows display the most consistent creativity, although instances of egalitarian marriages and shared creativity are also clearly described.

Part 2 contains six biographical essays that explore in detail the personal relationships of outstanding women scientists representing three generations (Maria Mitchell, Clémence Royer, Sofia Kovalevskaia, Marie Curie, Cecilia Payne-Gaposchkin, and Dorothy Wrinch). The generational treatment offers some cumulative sense of the nature of the barriers to full participation in institutionalized science experienced by women. Thus the combination of household obligations and field observation described for 19th-century women constrained by the cult of domesticity was no longer possible for a Wrinch or a Payne-Gaposchkin. Twentieth-century women might have easier access to formal training and fewer family demands, but their ability to gain access to facilities and more than marginal research support was possibly a greater constraint as doing science moved from field observation to laboratory.

The authors share the view that there is no biologically based female world view or mentality that affects cognitive activity or cognitive styles. They also challenge the view that cultural categorizations of nature as "feminine" and science as "masculine" render the woman scientist culturally anomalous and easily marginalized. This leaves them faced with the problem of how to explain the consistent underrepresentation of women in modern science and confused about the operation of gender as a cultural, as opposed to biological, category. The editors indicate that women's underrepresentation in modern science comes from the exclusion of the "domestic" realm from institutional science. In this respect modern scientific activity would be no different from that of the modern business corporation, the armed forces, or celibate religious communities. To be sure, the biographical essays describe many lives in which children are abandoned, husbands are burdensome, or intimate relationships are fraught with tension and bitterness. It is highly likely that a generational study of women surgeons or musicians or lawyers would reveal similar patterns. There *is* a tension between professional work and the family in modern society, but it is not one peculiar to science.

It is easy to point out such weaknesses in any volume that tries to break new ground as this one does by blending social and cultural history with the history of science. These weaknesses are compensated for by the scope of the undertaking, the liveliness of the individual essays, and the interest of the biographical studies.

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Sociopolitical Enumerations

The American Census. A Social History. MARGO J. ANDERSON. Yale University Press, New Haven, CT, 1988. xiv, 257 pp., illus. $20.

The United States Census has been an important part of American life since 1790. It has been used to fulfill the constitutional requirement for reapportioning representation every ten years. In addition, it has contributed to the growth of statistical thinking that is so much a part of modern life. Yet for many Americans census-taking is a poorly understood process intruding on our lives once a decade. Anderson begins this book with the story of a congressman who, in the 1960s, protested that the census seemed like an unnecessary expense when everything he needed was in an almanac. When she is finished, it is clear not only that the census has an important history of its own but that it also is closely linked with the broad patterns of social, political, economic, and intellectual change that have occurred over the last two centuries. This is quite consciously a book not only about the census, or even about the history of statistics; it is about American history as a whole.

The book is organized around the perspectives of continuity and change. Change is reflected in the focus on how the censuses have developed from 1790 to 1980. Anderson deliberately avoided the temptation to write a separate chapter on each census. In order to emphasize the fact that censuses always reflect the social and political concerns of their time, she treats counts that shared methods, assumptions, and influ-

ences as units. Thus, the first chapter treats both the origins of the census and its development through the 1840s. The issue of slavery and emancipation united the counts of 1860 and 1870. From 1880 to 1920, the common themes were immigration and urbanization.

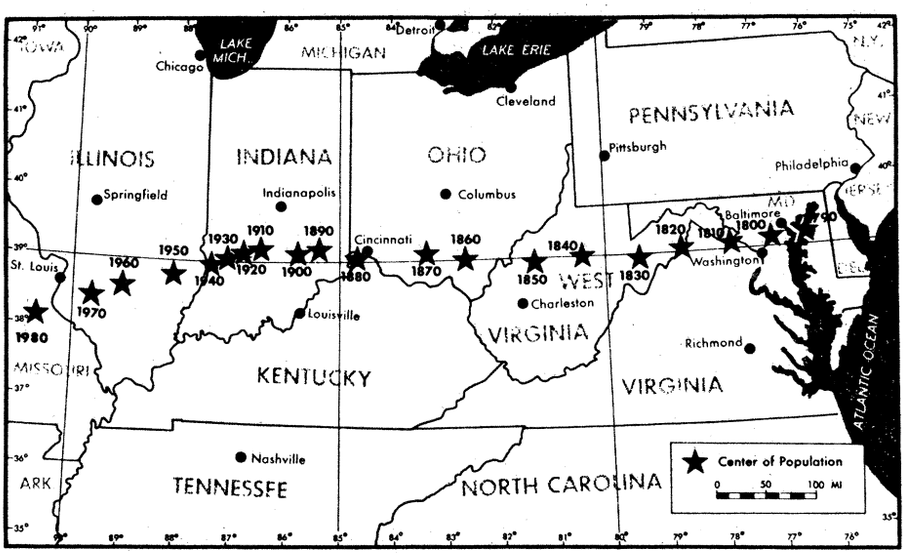
Continuity is also a part of census history in that certain problems, issues, and concerns constantly reappear, even though the solutions are not always the same. Recognizing that the primary purpose of the census is to ensure fair representation in Congress, Anderson describes the recurring contests over apportionment. She starts with the shock politicians experienced when they discovered that mathematics did not always provide simple answers regarding how many representatives a state deserved. Rounding fractions or dropping them could shift the balance of power for a state or party. Other issues intruded on the process to raise the stakes. The earliest debate, in the Constitutional Convention, was over how to count slaves. The solution was to consider a slave three-fifths of a white person. Later struggles reflected concerns over the rise of the West, immigration, the emancipation of slaves, and the growth of cities. After the 1920s census rural congressmen, alarmed over an urban majority composed of recent immigrants, refused to reapportion Congress until 1929. The numbers in the census often became a source of contention.

Anderson rightly goes beyond the allocation of representatives to discuss the apportionment of financial burdens and benefits. Although the Constitution called for direct taxes to be assigned among the states "according to their respective numbers," this was done only during wartime, and not after the Civil War. In the 20th century, federal grants have been given to states and localities on the basis of census figures. This has further made the problem of accuracy, particularly in the counting of minorities, a point of political as well as statistical concern.

The elaboration of the census and the growth of the Census Bureau are another major theme. Anderson traces the evolution of the census from its first simple form to the complex document it is today. She also describes how more elaborate counts required more sophisticated organization. Although the census office grew rapidly during the 19th century, it did not achieve permanent status until 1902. Previously, the office was disbanded when the work was done and had to be started from scratch every decade. In spite of this handicap, the census improved gradually, because of the efforts of dedicated men in and out of government.

Anderson devotes proper attention to the efforts of men like Joseph Kennedy, who supervised a major expansion of the census in 1850, and Francis A. Walker, who worked diligently in and out of government for the improvement of statistics after the Civil War. Unfortunately, Walker also brought his biases against immigrants, whom he called the "beaten men of beaten races" (p. 131), along with his concern for accurate numbers. Walker was not unique, and questions in the census often reflected the prejudices of those who were in a position to shape the schedules. Published results were edited according to the interests of the census staff and the pressures brought to bear by Congress.

The Census Bureau has often been a source of innovation in the collection, processing, and analysis of statistics. Among others, Anderson notes the introduction of the punched card and counting machines in 1890. These were invented by Herman Hollerith, a bureau employee. In the 1930s, new employees introduced statistical theory and



Centers of population in the United States, 1790 to 1980, as calculated by the Census Bureau. "Center of population" is defined as "that point at which an imaginary flat, weightless, and rigid map of the United States would balance if weights of identical value were placed on it so that each weight represented the location of one person on the date of the census." [U.S. Bureau of the Census, *1980 Census of Population*, vol. 1; from *The American Census: A Social History*]

"The Center of Population . . . 1920. The Census Bureau reported that 50 percent of the American population lived in urban areas in 1920. Yet this photo of the center of population for that year conveys a very different story. Rural Americans claimed cultural and moral, if not numerical, dominance." [From *The American Census: A Social History*]

sampling techniques to research on population. One of the first non-military computers was ordered for use in the 1950 count.

Perhaps the most important conclusion that emerges from this book is that numbers are not neutral. The process of counting is subject to errors; decisions must be made about what and what not to count. Then the process of deciding what the figures mean and what action they suggest begins. Anderson reminds us that we must always be sensitive to the process by which statistics came into being. Categories reflect conscious choices of the time about what is important. Those who ignore this lesson use the records of the past at their own peril. Those who assume that the records of today are free of bias are equally foolish.

This book is worth reading not only for those who work with census data but also for anyone concerned with the history of the United States or the development of modern social science. It does, however, leave room for additional studies. No mention is made of the lengthy experience Americans had in taking censuses in the colonial period. Some of the early counts were more sophisticated than the first federal census. Many states took censuses of their own in the 19th century, and there is a need to trace the connections between those counts and the national enumerations. Finally, Anderson has focused on the development of the decennial census, touching on other activities of the Census Bureau, such as agricultural or manufacturing censuses, only when immediately relevant. This is another important part of the history of statistics that has gradually been emerging over the last decade.

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Playful Conceptions

The Child's Construction of Economics. ANNA EMILIA BERTI and ANNA SILVIA BOMBI. Cambridge University Press, New York, and Editions de la Maison des Sciences de l'Homme, Paris, 1988. xii, 236 pp. $44.50. European Monographs in Social Psychology. Translated from the Italian edition (Florence, 1981) by Gerard Duveen.

In this book we are given an opportunity to enter the world of children and explore their incipient knowledge of some rudimentary economic principles that adults in our society take for granted. There is no question that without some degree of understanding in this area life in a modern society cannot begin to be comprehensible. How then do children acquire this necessary social knowledge? Here, for the first time, is a full-length empirical investigation that records children's thinking on economic topics and provides some tentative answers to this question.

This book is a highly readable translation of the original Italian edition with some added material that draws on recent research both in the United States and abroad. It is a rich collection of studies based on interviews with 916 Italian children, ages 3 to 14, of middle-class background. The children were asked questions about the following topics, each of which formed the basis of a separate study: (i) work and remuneration; (ii) how one becomes a worker or owner; (iii) the concept of "the boss"; (iv) how one gets money; (v) the concepts of "rich" and "poor"; (vi) the bank and interest; (vii) production and distribution of goods; (viii) buying and selling; (ix) differences in the price of goods; (x) determinants of price; and (xi) ownership of factory, farmland, and bus. Three additional studies complete the empirical section: replications of study iv with children of factory workers and of merchants, and a replication of study vii in a region where the children could observe the entire production cycle of merchandise.

In all these studies the investigators categorized the responses into three to five levels according to cognitive criteria of adequacy and complexity. Invariably they obtained highly significant correlations with age in the distribution of response levels. In a summary chapter the authors present what they call a developmental synthesis of children's conceptions of economics. Following a Piagetian framework they suggest a sequence of four periods: pre-operatory (ages 3 to 6), intuitive (ages 6 to 7), concrete operatory (ages 7 to 10), and formal operatory (ages 11 to 14). Unfortunately these periods are not aligned with the response levels of the studies; moreover, in each study both levels and age groups are different. Using a best estimate from the available tables and dividing the children into four age groups, I obtained the following response distribution: for the 218 children age 3 to 5, 66% of responses were pre-operatory, 30% intuitive, and 4% concrete; for the 253 children age 6 to 7, 24% of responses were pre-operatory, 51% intuitive, 24% concrete, and 1% formal; for the 349 children age 8 to 11, 4% of responses were pre-operatory, 25% intuitive, 53% concrete, and 18% formal; for the 96 children age 12 to 14, 1% of responses were intuitive, 28% concrete, and 71% formal.

These results are in close quantitative agreement with studies reported in other Western countries and thus are a valuable contribution to and extension of the developmental literature. The direct application of Piagetian stages to levels of economic understanding is not altogether convincing, however, particularly the concrete-formal distinction and the suggestion that the understanding of profit and interest by itself indicates formal operations. What these levels or stages actually represent and how they can be explained are not adequately elucidated by mere age differences and, as is shown above, age overlap. They depend on a number of factors, such as general logical development (studied by Piaget and stressed by the authors), exposure to environmental models (probed by the replication studies with no clear results), and specific learning (briefly discussed by the authors, who present some positive results). Other factors, not usually mentioned, are attitude, interest, and affect.

What is striking about children's responses is their "childish" quality, even at ages 10 to 12, that is, several years after the development of the first mature logical operations around ages 6 to 7. For example, a 12-year-old girl thinks the money a factory owner makes is not enough to pay the workers "because . . . he gets very little, not much for so many workers, the plastic bags which they make don't cost very much at all" (p. 148). Is it farfetched to suggest that these children do not yet *want* to give up their childish, playful conceptions of a human society where personal desire determines an action and fulfillment of desire is unproblematic? Consider these comments of preschool children concerning bus drivers: they come to be driving "because the mummies have to go out" (p. 159); they could not stop being drivers "because when someone has to get on a bus . . . they couldn't and so they'd have to get off" (p. 62). It is not surprising that it takes some years for these children to accept the impersonal qualities of monetary exchange and commodity production—just as it took a long historical development to reach the present economic situation. How would children in economically developing or in socialist countries respond to these questions? I think this is an area in which only genuine cross-cultural studies of the development of both cognition and attitudes can shed light on the various factors contributing to the acquisition of socially mature economic conceptions.

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