

chapters also is seen in Fox, Tobin, and Brody's paper on mathematics, which inexplicably makes no reference to the probable involvement of visual-spatial ability in mathematics achievement, even though this point is made elsewhere and, in fact, has long been suggested. If it is involved, and if both biological and social factors underlie the male's superior visual-spatial ability (an inescapable conclusion, I think), then Fox *et al.*'s exclusively sociocultural analysis of male mathematical superiority cannot stand.

No more than we can assume that socialization factors act on an essentially neutral biological substratum can we assume that hard-wiring explanations mean that there is some simple input-output relationship between the hard wiring and certain cognitive skills—as though one automatically gives rise to the other without intervening steps. (Oddly, the authors of the biological chapters are far more forthcoming in acknowledging this first principle than are the authors of the chapters emphasizing socialization.) Some points of mutuality are quite obvious. For example, if males are more cortically lateralized than females, the proximate cause of sex differences in visual-spatial skill is most reasonably conceptualized as arising from the cognitive strategies and attentional biases which this neurological difference may predispose in the context of the individual's entire cognitive and social-developmental history. Given their earlier and superior linguistic abilities, it is conceivable that females, more than males, tend to code visual-spatial information linguistically—and, consequently, less efficiently in many instances. In other cases, however, an obvious tension exists between the sociocultural and biological models. For instance, the data on androgenization and cognitive ability are easily compatible with a socialization hypothesis for *females* if we assume that girls who are more sex-stereotypic in appearance will be more sex-stereotypic in cognitive performance; but, as Petersen notes, how then explain the inverse relationship found for boys?

The aforementioned disagreements and potential points of theoretical integration presumably are among those that were to have been addressed in the last paper—an epilogue by C. N. Jacklin. By way of integration, however, Jacklin offers little, and on the areas of disagreement her remarks are more confusing than clarifying. For instance, she unqualifiedly calls the sex difference in cognitive functioning “trivially small” and concludes that the search for explanatory mechanisms therefore “may

be an exercise in futility.” But as evidence she cites the near-zero variances accounted for by sex in studies of “achievement via independence” and “intellectual efficiency,” neither of which she defines or relates to the particular cognitive skills of major concern to the other contributors.

Jacklin also proffers an explanation why current attention has turned to biological factors: Socialization research has less prestige, and it is slow to carry out, making payoff slow in terms of publication. The “prestige” reason may be correct (psychologists have long been enamored of the “harder” biological sciences); but the speed-and-payoff reason surely is mistaken, and I wonder why Jacklin seems to hold so uncharitable a view of her colleagues' research efforts. If sociocultural models are losing interest, perhaps it is because greater promise is being seen in models that recognize and are beginning to try to measure the embeddedness of sociocultural influences in biological foundations.

In summary, this collection of papers is well worth reading and careful study, although it needlessly falls short of its outstanding potential. A final note: the term “opposite sex,” used by several contributors, should be forever retired. As the evidence shows, neither in any physiological nor in any psychological sense are males and females “contrary or antithetical in nature or tendency; diametrically opposed, or altogether different.” On occasion, of course, they will be “across from or facing.”

LAUREN JULIUS HARRIS

*Department of Psychology,
Michigan State University,
East Lansing 48824*

The Power Industry in Britain

Electricity before Nationalisation. A Study of the Development of the Electricity Supply Industry in Britain to 1948. LESLIE HANNAH. Johns Hopkins University Press, Baltimore, 1979. xvi, 468 pp. \$28.50. Johns Hopkins Studies in the History of Technology.

Leslie Hannah has provided a superb analytical case study of modern technology and public policy in this monograph commissioned by the British Electricity Council. The book is, in many respects, a retrospective technology assessment that examines carefully the dynamic interaction of government, public, and private enterprises, including the economic and ideological context that affected the decision-making process. Hannah documents the relative inef-

fectiveness of moral persuasion in resolving conflicts between interest groups or in promoting voluntary energy conservation by the public except during wartime. The extraordinary technological diversity that resulted from localism and divided ownership helped to frustrate early efforts to reform and rationalize the electric power industry and should serve as a warning against simplistic comparisons with other nations. Hannah's study is suggestive of the difficulties of formulating and implementing energy policies and should be required reading by those now engaged in contemplating alternative energy policies for the future. As Thomas P. Hughes observes in the foreword, the technology of electric supply “was not only compounded by politics, but it involved economics, science, geography, sociology, psychology, contingent circumstances, and history” (p. vii).

A central theme of the book is the conflict between the more than 600 municipal and privately owned utilities that were established prior to 1948 and the efforts by political leaders, national commissions, and boards to mitigate the adverse impacts of the conflict. Although the municipals gained a significant advantage from legislation passed in the 1880's, the private utilities employed technical innovations in power generation and distribution as a “favourable battleground in their attempt to turn back the municipal tide” (p. 24). By creating large regional supply systems, firms such as Charles Merz's Newcastle-upon-Tyne Electric Supply Company demonstrated that “efficiency and cheapness was a most effective ambassador to the consumer” (p. 32). A radical reorganization of the industry was proposed by a committee chaired by Sir Archibald Williamson in 1917 as the wartime experience with management of supply “gave an indication of what could be achieved under duress” (p. 56). The resulting Electricity Act of 1919 created an Electricity Commission headed by Sir John Snell but did not establish the District Electric Boards with strong executive authority recommended by the Williamson committee. The Commission's reliance on “exhortation and common sense” proved relatively ineffective “within a system where the incentives were not to reach agreement” (p. 86). The apparent failure of the “policy of persuasion” (p. 91) led to the creation of another select committee chaired by Lord Weir in 1925. The Weir committee managed to diffuse opposition by recommending that existing utilities retain control of generating plants and local distri-

bution and by appeals to national pride. The principal recommendation of the Weir committee was the establishment of a state-financed Central Electricity Board (CEB) with authority to build and operate a national power grid and to promote greater efficiency and scale among the suppliers. The CEB enabling legislation won bipartisan Conservative and Labour support and was passed in 1926.

Under the effective leadership of Sir Andrew Duncan, the CEB adopted a strategy of personal consultation rather than public hearings and made concessions when necessary to avoid confrontation. Opposition to the steel transmission towers, known in Britain as pylons, on esthetic grounds was countered by engaging an architect to design towers that could be spaced widely in the hope that "they might somehow be able to create classical catenary curves as delicate and appealing as those of a suspension bridge" (p. 117). Paintings were commissioned depicting the pylons in an attractive setting, and lines were sometimes rerouted or placed underground. The Minister of Transport answered opponents of placing pylons on the Sussex Downs by asserting that "they have a sense of majesty of their own and the cables stretching between them over the countryside gives one a sense of power, in the service of the people, marching over many miles of country" (p. 118). The timing of the grid construction proved fortunate as the project provided a needed economic stimulus during the depression of the 1930's.

In a chapter on the "electrification of the home," Hannah examines some of the efforts that were made to stimulate increased electrical consumption in Britain. The Electrical Development Association (EDA) founded in 1919 used films such as "Edward and Eda" to promote greater use of electric appliances and rural electrification (p. 204). The EDA's "Wizard in the Wall" advertising campaign encouraged the installation of domestic wall outlets. The Electric Association for Women (EAW) was organized in 1924 and supported financially by the CEB and the utilities. The EAW under the leadership of Caroline Haslett, a trained engineer, was a strong advocate of "electrical housecraft" and educated women in the use of appliances (p. 205). An Emile Zola quotation displayed at the EAW headquarters stated that "the day must come when electricity will be for everyone, as the waters of the rivers and the wind of heaven. It should not merely be supplied, but lavished, that men may use it at their will, as the air they breathe" (p. 186). Electric space heating

was promoted by pricing below incremental costs, a strategy that proved ill-advised when it proved difficult for the grid to meet demand during winter load peaks. Pricing policies that gave erroneous signals to consumers contributed to a serious fuel crisis in 1947 as an unanticipated consequence of the "virtuous spiral of economic progress through the interaction of decreasing costs and rising sales" became evident (p. 161).

The long debate between the advocates of public and private electric enterprise was effectively terminated by the total nationalization of the industry on vesting day, 1 April 1948. Hannah is now engaged in writing a sequel that will explore the history of the industry since 1948.

Hannah's pioneering study suggests the need for equally sophisticated investigations of the history of electrical power and policy for other countries, including the United States. A fruitful comparative analysis with American efforts to establish "Super Power" and "Giant Power" grids during the 1920's and the more successful TVA experiment of the 1930's might be undertaken. It might be illuminating also to compare the pattern that culminated in the nationalization of the electric supply industry with the pattern in such earlier cases as the telegraph and the telephone industries, which also were nationalized in Britain following long debates over the virtues of private versus public enterprise.

JAMES E. BRITAIN

*Department of Social Sciences,
Georgia Institute of Technology,
Atlanta 30332*

Astrophysics

Infrared Astronomy. Proceedings of a NATO Advanced Study Institute, Erice, Sicily, July 1977. GIANCARLO SETTI and GIOVANNI G. FAZIO, Eds. Reidel, Boston, 1979 (distributor, Kluwer Boston, Higham, Mass.). viii, 354 pp., illus. \$39. NATO Advanced Study Institutes Series C, vol. 38.

This volume of symposium proceedings contains 13 lectures and three seminars on topics of current interest in infrared astronomy. The aim of the volume is to acquaint students and researchers with the many advances and future prospects in this exciting branch of astronomy. Considering the breadth, impact, and potential of infrared astronomy, it is not at all surprising that the book is only moderately successful in fulfilling this goal.

A large portion of the book is devoted to the exciting topic of star formation. The heart of this work is a number of lectures on the physical processes in such regions: "Physics and astrophysics of interstellar dust" by J. M. Greenberg, "Physics of molecular clouds from millimeter wave line observations" by P. M. Solomon, "Star formation and related topics" by R. B. Larson, and "Theoretical aspects of the infrared emission from HII regions" by N. Panagia. These, together with contributions by P. G. Mezger ("Interstellar matter") and B. G. Elmegreen ("Shock induced star formation"), constitute an excellent foundation for the study of the earliest stages of stellar evolution. While there is inevitable overlap between them, these contributions give a very broad look at our present understanding of the conditions, physical processes, and evolution of such regions.

On the other hand, the book has a paucity of papers on infrared observations related to star formation. The only observational contribution on this subject is "Infrared observations of HII regions" by G. G. Fazio, in which some observations at 100 micrometers are reviewed and interpreted.

The second major topic of the volume is diffuse background radiation. M. S. Longair presents an excellent theoretical discussion of the cosmic background radiation and the potential of infrared millimeter observations of such radiation. A second excellent contribution, "Cosmic background: measurements of the spectrum" by P. E. Clegg, presents a very clear discussion of radio, millimeter, and submillimeter observations and their implications. A third contribution, "Infrared astronomical background radiation" by M. Harwit, briefly discusses the possible sources of diffuse radiation in the infrared and the inherent difficulties in making measurements of the radiation and contains an excellent set of references. Together, these three papers constitute an excellent review of the subject.

Another paper devoted to the review and discussion of infrared observations is "Infrared emission of the galactic center and extragalactic sources" by G. Rieke. This topic is evolving rapidly, and Rieke has done a good job of summarizing the present status of infrared observations of normal galaxies, quasars, and Seyfert galaxies and their interpretation.

The third major topic of *Infrared Astronomy* is observational techniques. In the basic contribution on the subject by P. Lena, atmospheric properties (absorption, emission, noise, and seeing) are discussed, along with a brief dis-