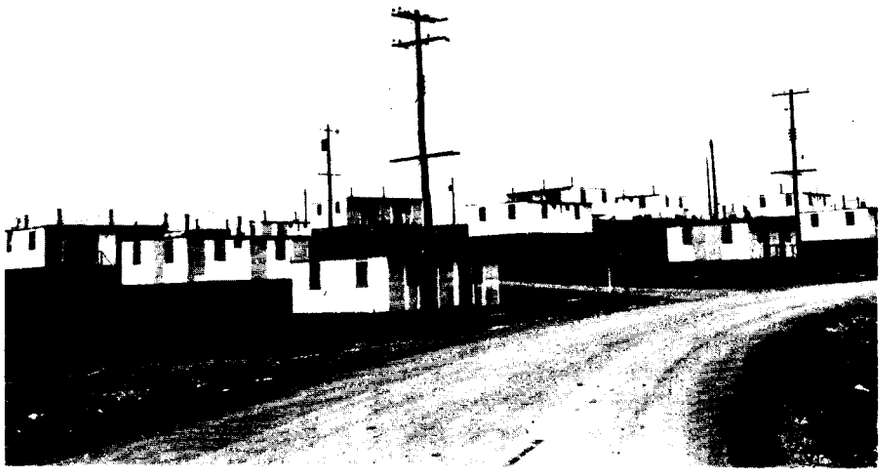

"Victory cottages," each containing two family units, Oak Ridge, December 1947. [From *City Behind a Fence*]

agement or administrative files generated within the research and production facilities themselves. Although such records are not preserved in every case, those that are available could have helped provide the valuable perspective of the workplace—a perspective that is almost totally absent from *City Behind a Fence*. Even the recollections gleaned from the tape-recorded interviews are all cited anonymously; and attitudes and opinions are never meaningfully correlated with the experiences of the subjects on the job.

From *City Behind a Fence* we do learn a great deal about the planning, organization, and operation of the townsite; we learn of the often difficult relationships between Oak Ridgers and their Tennessean neighbors; about racial segregation and discrimination and the associated rationalizations; about the incessant population pressure and its effects (the population of Oak Ridge ballooned from the planned 13,000 to more than 75,000 during the course of the war); about the Army's efforts to keep a low profile while maintaining ultimate authority over nearly every aspect of town life; and about the direct and indirect effects of the Army's insistence on the strictest of security measures. This information and the insights provided by the authors are in many cases new and valuable. They indeed contribute to our ability to understand the atomic bomb project for what it was: a centrally planned scientific, technical, industrial, and social enterprise of unprecedented complexity.

Whether the account actually reveals what it must have been like to live in Oak Ridge during the war is not so clear. In any case, there is little in *City Behind a Fence* to shed light on the closely related question of what it must have been like to work there. And it must be asked whether the decision to discuss the town as isolated from the workplace, leaving the latter to the technical histories, in fact reflects the specializations of the historians more than it is a meaningful or appropriate division of the subject matter at hand. The separation of life from work in wartime Oak Ridge will, I suspect, seem especially arbitrary to those readers of *Science* who have an interest in and some familiarity with the extraordinary and consuming efforts of the scientists, engineers, managers, technicians, and other workers at the various Oak Ridge plants.

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Observations in the Infrared

Infrared Astronomy. Papers from a symposium, Kona, Hawaii, June 1980. C. G. WYNN-WILLIAMS and D. P. CRUIKSHANK, Eds. Reidel, Boston, 1981 (distributor, Kluwer Boston, Hingham, Mass.). xvi, 376 pp., illus. Cloth, $47.50; paper, $23.50. International Astronomical Union Symposium No. 96.

Infrared astronomy has grown explosively over the last 15 years, and the symposium of which this book is the proceedings represented a milestone in the maturing of the field. Instead of the accustomed potpourri of instrumental techniques and observational results, the conference sessions were limited to the infrared aspects of planetary astronomy, interstellar clouds and star-forming regions, galactic structure, and galaxies. The proceedings consist of the 21 review papers presented at the symposium together with the discussions that followed them. The book is a surprisingly well-balanced and up-to-date overview of current research in these fields and should be valuable to a much wider audience than infrared specialists.

Four papers dealing with infrared spectroscopy of the atmospheres of planets, satellites, and asteroids and spectrophotometry of their surfaces provide an impressive catalog of results yielded by these techniques. D. Morrison points out that with the advantages of hindsight it is clear that infrared observers were detecting the effects of volcanism on the Jovian satellite Io long before Voyager. It seems clear from the paper that infrared techniques will continue to play an important role in planetary astronomy, particularly in the study of objects inaccessible to space missions and in studies of atmospheric structure and composition and long-term temporal variations.

Ten of the papers are devoted to infrared studies of molecular clouds and regions of star formation. The archetype of such regions, the Orion molecular cloud, has now been studied in great detail with a wide variety of observational techniques. The improved observations have revealed a progressively more complex situation, and the extraordinary level of activity at the cloud core is far from the previous picture of an interstellar cloud gently condensing to form stars. Observations of a growing number of similar regions attest that the Orion scenario is the rule rather than the exception. It seems that infrared is living up to its early promise of allowing the investigation of star formation processes in molecular clouds but that the road to a full understanding of the processes may be long and hard.

Papers on galactic structure and extragalactic sources make up a substantial part of the proceedings. The paucity of pre-1976 papers referred to in these papers is testimony to the rapid expansion of the field. Three reviews, "Infrared studies of the stellar content in extragalactic systems" (M. Aaronson), "Rapid star formation in galactic nuclei" (G. H. Rieke), and "The infrared properties of active extragalactic nuclei" (B. T. Soifer and G. Neugebauer), cover the application of current infrared techniques to a spectrum of extragalactic objects ranging from spiral galaxies through Seyferts to quasars and BL Lac objects. The nature of the "nonstellar" component of the infrared flux of many nuclei is only beginning to be specified. Though rapid star formation and thermal emission by

dust are consistent with the observations in many cases, the time scale of flux variations rules them out in others. M. S. Longair's "An outsider's view of extragalactic infrared astronomy" provides a stimulating summary and points the way for many developments in the near future.

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The Effects of Persuasion

Cognitive Responses in Persuasion. RICHARD E. PETTY, THOMAS M. OSTROM, and TIMOTHY C. BROCK, Eds. Erlbaum, Hillsdale, N.J., 1981. xviii, 476 pp. $29.95.

Communication and persuasion—the processes underlying our ability to change the attitudes and beliefs of others—have concerned social psychologists for years. Indeed, when Hovland, Janis, and Kelley's landmark volume, *Communication and Persuasion*, appeared in 1953, these topics were perhaps the central focus of social-psychological research. In their classic monograph series, Hovland's group at Yale presented an appealing model for the systematic study of important social questions through laboratory research on attitude change. Controlled experimental investigations of the factors that determine attitude change, they suggested, could be used to understand and combat racial prejudice, social stereotypes, and the pernicious effects of propaganda.

As research progressed, however, the study of persuasion fell on harder times. It became clear that the issues were considerably more complex than had first been appreciated. One underlying assumption of Hovland's approach—that one could examine separately the different components of a persuasive attempt (that is, "who says what, how, and to whom") to arrive at general principles specifying the characteristics of an optimal communication—proved largely unfounded. One simply could not say that balanced communications were better, or worse, than one-sided communications or that logical appeals were more, or less, successful than emotional appeals. Instead, the outcome of a communication depended upon the particular setting, communicator, issue, and audience involved: context-bound conclusions were the rule, simple generalizations the exception. Moreover, although it had proved easy to alter subjects' attitudes in the laboratory, comparable efforts in the "real world" frequently produced minuscule effects.

In response, a subtle, but important, reorientation occurred. The largely passive and rational listener presupposed by Hovland's approach gave way to a more active, dogmatic, and argumentative listener. People do not, the next generation of research suggested, evaluate new evidence and information in coldly rational terms—especially when that evidence contradicts their current beliefs. Instead they may mentally dispute conclusions, present counterarguments, or derogate the communicator. Interest shifted from factors that promote to factors that inhibit persuasion. The effects of persuasive communications were viewed as a joint consequence of factors that affect comprehension of arguments and evidence and factors that affect willingness to yield to those arguments. Both processes, moreover, appeared to depend upon the listener's active cognitive response to the communication.

This approach provided a reasonably compelling interpretation of previous literature. Its basic limitation was that these presumed mediating processes were typically covert and could be used to "explain" virtually any outcome. What was missing was some means of examining more directly people's internal reactions to persuasive communications.

It is this issue that the present volume seeks to address. *Cognitive Responses in Persuasion* presents a collective argument for the utility of an analysis of the processes of persuasion in terms of the active response of the audience.

The first third of the volume presents the basic argument for a cognitive-response analysis. A general historical introduction is followed by a number of empirically based chapters. A wide array of techniques, from protocol analysis to psychophysiological measures, is offered for assessing the listener's active response to a communication. Illustrative experiments, examining the presumed causal significance of such responses in determining the effectiveness of persuasive appeals, are presented. Together, these chapters provide an informative summary, not available elsewhere, of an emerging body of research.

The second third of the book presents a set of applications of a cognitive-response model to various specialized topics in the study of attitude change. These efforts are often fascinating but focus more on potential than on well-documented current applications.

The final section of the book comprises general theoretical statements. Except for the final chapter on memory and cognition, these papers present current summaries of widely known positions. The models do not follow directly from the cognitive-response tradition but do provide alternative frameworks potentially compatible with it.

Overall, this volume is likely to serve different functions for different readers. It is partly a review of the field, partly a persuasive appeal and a promissory note. It should have value for anyone seriously interested in the current state of traditional attitude-change research.

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Oscillatory Populations

The Population Ecology of Cycles in Small Mammals. Mathematical Theory and Biological Fact. JAMES PATRICK FINERTY. Yale University Press, New Haven, Conn., 1981. xiv, 234 pp., illus. $18.50.

Small mammals (especially lemmings and voles but also foxes and lynxes) have long been known for their occasional density irruptions (particularly in arctic, subarctic, and temperate regions). Thus, a Norwegian translator of the Bible in the latter part of the 13th century is known to have likened the lemming irruptions to the Biblical locust plagues in Egypt. The scientific investigation of these irruptions was started by the Norwegian naturalist Robert Collett more than 100 years ago. However, it was not until the 1920's when Charles Elton realized the periodic nature of these irruptions (and hence called them cycles) that ecologists all over the Northern Hemisphere (that is, in the United States, Canada, Northern Europe, and the Soviet Union) began intensive research on these cycles: Do cycles exist? What causes them? How do they influence the ecosystem? Why are not all small mammals in a given region cyclic? Why are not all populations of a given species cyclic throughout its range? These and similar questions have stimulated much thinking among ecologists, and an array of hypotheses concerning population regulation has resulted. Hence, small mammal cycles have had a significant impact on ecological theory as we know it today. Unfortunately, we cannot yet explain why cycles occur even though we are fairly certain of their existence.

Finerty aims in his book to answer some of the questions cycles present.