Book Reviews

On Human Communication. A review, a survey, and a criticism. Colin Cherry. Technology Press, Cambridge, Mass.; Wiley, New York, 1957. 333 pp. Illus. $6.75.

Civilization, as we know it today, would have been impossible without the evolution of phonetic speech and written language. By means of symbols, man has learned how to transmit and to preserve his ideas and inventions. In this way he has also pierced the barriers of time and space.

Recent advances in communication engineering have created a demand for a critical inventory of our fragmentary knowledge of the field of human communication. The initiative was taken by Massachusetts Institute of Technology, and the task was assigned to an expert who is well known in this country and abroad for his breadth of interest, especially for his mathematical studies. Colin Cherry is the Henry Mark Pease reader in telecommunication at the University of London.

This book, the first of a projected series, is a lucid summary pitched to the needs of "newcomers" in communication theory and calculated to reveal the inherent unity between the diverse facets of the subject: linguistics, sociology, neurophysiology, semantics, philosophy, engineering, psychology, and so on.

Following a definition of current terms, Cherry gives a concise, historical review of the rise of "communication science" (specifically, languages and codes, a review of mathematical theory and scientific method, and a discussion of "Brains—real and artificial." It was heartening to me (a social psychologist) to note the author's clarity on this point. The layman has been grossly misled recently by much journalistic humbug eulogizing "electronic brains." Says Cherry: "The inaccessibility and complexity of the central nervous system and of the brain render direct analysis overwhelmingly difficult; the brain may contain more than 10^{10} nerve cells, whereas the most complicated computing machine has only some 10,000 relay units. . . ." (page 60).

Equally refreshing is the treatment of "Signs, language, and communication," in which Cherry appears to be as familiar with the work of such theorists as Carnap (semantics, symbolic logic) and Sapir (linguistics) as with the authorities in his own specialty—the physical analysis of signals, including speech.

The hard core of the book deals with statistical communication theory and the related body of empirical knowledge which, since it rests upon "a solid foundation of mathematics," eludes popularization. The treatment of the relevant topics is limited and is intended chiefly as a guide to the literature of the subject.

Under "Logic of communication," the author presents a miscellany of useful, albeit unrelated, topics. His allusions to John Locke's theory of signs, "semiotic," with its three levels—syntactics, semantics, and pragmatics—and to the little-known work of Charles Peirce and his pragmatic philosophy of signs are very illuminating.

Finally, Cherry reenters the psychological field and deals cursorily with the topics cognition and recognition and with the search for invariants. He concludes his survey with the sound deduction that man is distinguished from the animals by reason of (i) the scope and organization of his concepts and (ii) his capacity to communicate with the aid of language.

This volume fills a long-felt need for a synthesis of the theoretical and empirical knowledge of the field. The bibliography of 367 titles is indicative of the book's broad scope. The design of the study is admirable, and the execution is superb. Moreover, the book itself is, indeed, a model of human communication.

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Galactic Nebulae and Interstellar Matter. Jean Dufay. Translated by A. J. Pomerans. Philosophical Library, New York, 1957. 352 pp. $15.

In 1926, A. S. Eddington of Cambridge University presented before the Royal Society of London an epoch-making Bakerian lecture in which he revived the old and almost forgotten hypothesis of J. Hartmann that interstellar space is filled with clouds of calcium atoms and placed it on a solid foundation of theoretical reasoning. Four years later, R. J. Trümpler at Lick Observatory and C. Schalén in Uppsala established the existence in interstellar space of vast clouds of small, scattering, solid particles which weaken the light of distant stars and cause it to appear redder than would be the case if space were transparent. Since then, an enormous amount of work has been done on the properties of the interstellar medium. Th. Dunham and I established, both theoretically and by means of observations, that hydrogen is the most abundant element in interstellar space and that many large areas of the Milky Way emit a faint glow in the red line of hydrogen alpha. B. Strömgren developed his famous theory of ionized (H II) and un-ionized (H I) regions in the galaxy and deduced their average densities and temperatures. W. A. Hiltner and J. S. Hall discovered the polarization of the transmitted light of distant stars, while J. L. Greenstein and L. Davis explained this effect theoretically as a consequence of a preferential orientation of the crystallike interstellar particles by a large-scale magnetic field, of the order of 10^{-5} gauss. E. Fermi and S. Chandrasekhar had assumed the existence of such a field in order to explain some of the properties of cosmic rays. L. Spitzer, Jr., at Princeton, and his pupils, investigated the cosmogonical effects of the diffuse interstellar medium, while J. H. Oort and H. C. van de Hulst in Leiden pioneered in the field of radio-observations, especially of the 21-cm line of hydrogen, which has given new and wholly unexpected results in several fields of astrophysical research.

Galactic Nebulae and Interstellar Matter is a translation from the original French edition of 1954, with certain minor revisions that bring the text up to date (to 1955). The author states that the book is intended both for the professional astronomer and for the layman interested in astronomy. He has certainly succeeded magnificently with regard to his second objective: the style is easy, and the reader (who must have some modest amount of knowledge of physics) is taken step by step from one intriguing problem to another. But the professional astronomer may find the book somewhat lacking in the most recent developments, such as the discovery of "synchrotron radiation" in the Crab nebula, the origin of cosmic rays, the interaction between stars and nebulae, and so forth.

The translator has, on the whole, succeeded in retaining the delightful style of the French original. But, unfortunately, he has used many strange and often misleading expressions by translating too literally the original French words: the term *Schmidt chamber* (page 112) sounds strange in English, and there are many more instances of the same