group theory traditionally used by physicists, and might also be useful.

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From the Black Hole to the Infinite Universe

D. Goldsmith, D. Levy
330 pp. Holden-Day, San Francisco, 1974. $6.95

The approach of this paperback book, intertwining a science fiction story with textual material, is interesting, but often the connection between the two is artificial. For example, in the science-fiction part of chapter 8, "Lumps of Matter," space hero Cyril Zaki happens to reminisce about the school classes he had muddled through with formulas such as "PeeVee equals Arty" and then later the chapter describes the bulk properties of gases. Also, the fifteen chapters themselves do not follow an obvious order; each appears to be a nearly self-contained description of one selected astrophysical phenomenon or concept.

The authors, D. Goldsmith and D. Levy, have keen insight, and a number of their descriptions (such as presenting the Doppler shift in terms of the photon's energy) were very enlightening. The figures and captions, with a casual style, are generally good and informative although sometimes misleading. The Hertzsprung-Russell diagram, plotted with temperature increasing toward the right, may be a logical manner of presenting the information, but it is one of a kind because the convention in astronomy and astrophysics is always to have temperature increase toward the left. Two colleagues to whom I showed this figure immediately remarked "Hey, that must be Goldsmith's book!" He was considered the most likely astronomer to ignore the traditions of the field.

By putting the mathematical developments at the end of the chapters after the descriptive explanations, the authors have attempted to tell a wide audience that "understanding modern astrophysics is fun." Much of the discussion is still complex, however, or presupposes knowledge given later, such as the suggestion in chapter 1 that black holes may provide enough mass to reverse the present expansion of the universe, a concept not discussed until chapter 9. Thus the book is recommended as fun reading for scientists and might be a useful text in a one-semester course for people who have had at least a good high-school physics course or its equivalent.

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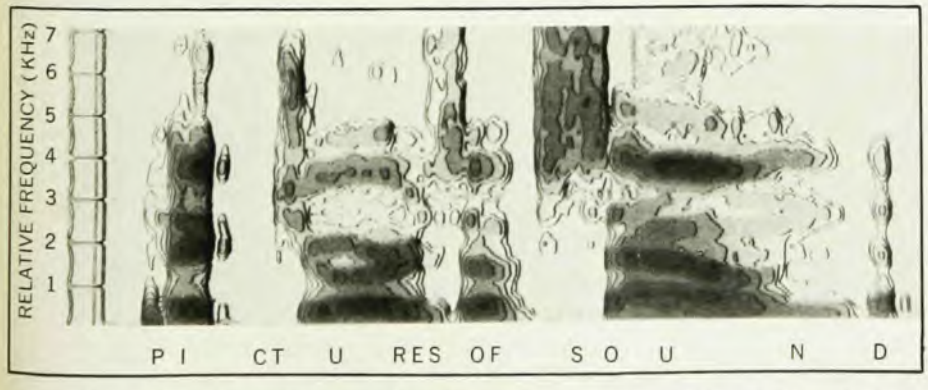
Speech Synthesis

J. L. Flanagan, L. R. Rabiner, eds.
511 pp. Dowden, Hutchinson & Ross, Stroudsburg, Pa., 1973. $22.00

Of the various problems that have been the concern of speech scientists over the past few decades, the synthesis of speech has come closest to achieving a degree of success in practical application. Speech synthesis has also provided an effective tool for the study of the speech process, because it can be used to produce well-controlled stimuli for investigation of speech perception and it involves modelling of the speech production mechanisms. It is appropriate, therefore, that a collection of papers in the area of speech synthesis constitutes one of the series of books entitled "Benchmark Papers on Acoustics." A group of 46 papers, selected carefully by the editors, James L. Flanagan and Lawrence R. Rabiner, represent a wide variety of subjects ranging from those that are of historical interest (but formed significant and exciting contributions at the time they appeared) to more recent topics on digital techniques for synthesis of speech and on com-



The words "pictures of sound" are graphically displayed on a contour spectrogram. This type of representation provides for more accurate amplitude measurements. Photo from Bell Labs.