

Chapter 12

Psychological and Physiological Acoustics

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History Lectures, Ira J. Hirsh & Murry B. Sachs



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Introduction

The scope of the Psychological and Physiological Acoustics Technical Committee of the Acoustical Society of America includes “the investigation and the dissemination of information about psychological and physiological responses of man and animals to acoustic stimuli.” This statement encompasses the essence of the study of hearing—the study of what we hear and how we hear it. The ensuing research, scholarship, and educational efforts bridge many disciplines associated with the hearing sense. Moreover, the Psychological and Physiological Acoustics Technical Committee is not isolated within the Acoustical Society of America; there is cross-fertilization between a number of sub areas, including Animal Bioacoustics, Architectural Acoustics, Noise, and Speech Communication.

To provide an overview of the history of the important technical, theoretical, and even practical aspects of the study of the psychology and physiology of hearing is a daunting, if not impossible, task. In their reviews, Professors Ira J. Hirsh and Murray B. Sachs provided well researched, and at times charming, historical reviews of the research questions, the theoretical approaches, and the progress researchers have made answering fundamental questions about how we hear. Concordant with research published in the *Journal of the Acoustical Society of America* through the past seventy-five years, the current reviews emphasize basic questions concerning auditory perceptions and the anatomy and physiology of

the peripheral auditory system. Both chapters also look to recent advances; one needs only to consider recent research concerning hearing loss and deafness in order to appreciate the import of the foundational work successfully completed during the past seventy-five years. Also of note are the descriptions of the how changes in electronic technology, and now biotechnology, have impacted on the evolution of hearing research. In his chapter, Dr. Hirsh (who gratefully acknowledges the editorial help of Neal Viemeister and Dennis MacFadden) organizes the history of psychological acoustics by linking together research on fundamental questions concerning auditory perception—what is absolute sensitivity for most human listeners, how well can listeners determine the location of a sound source, etc. Dr. Sachs, on the other hand, organizes his chapter on physiological acoustics by starting with a current model of the peripheral auditory system, and then describing the variety of work that has led to our current understandings. As the chair of the Psychological and Physiological Acoustics Technical Committee,

I extend a heartfelt thank you to Drs. Hirsh and Sachs for their efforts, and the resulting chapters.

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Psychoacoustics and The Acoustical Society Of America

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What follows is a bird’s-eye view of psychoacoustics, with chief emphasis on the relation between that field and the 75 years of this Acoustical Society of America. The limitations of a single viewer of all the research that could be included are enormous. I can describe matters that seem to this bird major steps along the way. For many of these matters the reader will be referred to secondary sources where the subject is summarized well. Areas of research of great interest to others may not be well represented here.

In 1929, this Society was founded, and the first *Jour-*

nal of the Acoustical Society of America (JASA) was published. In fact, the first few volumes of “acoustics” was largely about “hearing,” a subject matter that is now of principal concern to only one or two of many Technical Committees within the Society.

This Society’s first President, Harvey Fletcher, also had a regular day job at the Bell Telephone Laboratories (BTL). He assembled a remarkable group of scientists and engineers whose names are well known for fundamental papers on auditory capacities in the 1920s and 1930s. The goal, the design of the best telephone system that could