

## Preface

---

Listening puts me in the world. Listening gives me a sense of emotion, a sense of movement, and a sense of being there that is missing when I am looking. I am more frightened by thunder than by lightning, even though I know that thunder is harmless and lightning is deadly. I feel far more isolation living with ear plugs than living with blinders. Listening is centripetal; it pulls you into the world. Looking is centrifugal; it separates you from the world. Helen Keller (1954) has reflected on the profoundness of being deaf.

It is the immediacy of the auditory world that led me to write this book about the perception of auditory events. I use the term *events* in a broad way; it includes individual music and speech sounds, musical and speech phrases, thunderclaps and hand claps, the sounds of objects breaking, and the sighs of contentment and the sighs of exasperation. The events covered most extensively are human: music and speech. I will argue throughout that there are basic commonalities in the perception of music and speech. From production to perception, music and speech share acoustic, physiological, and cognitive/organizational processes and constraints.

No book can be complete, and this one is no exception. My interests have led me to emphasize the connection between the physical properties of the sound wave and the percept. Unless we can understand what there is to hear, we can not understand perceiving. This emphasis reflects the theoretical views of J. J. Gibson, who has consistently sought an ecological analysis of the perceptual world. My beliefs have led me to emphasize the perception of events (of whole units) within a context. The context changes the production and transmission of the acoustic sound wave, and the listener must retrieve the event despite the surface variation. This second emphasis reflects the varying theoretical views of M. Wertheimer, W. Kohler, F. Allport, E. Brunswik, W. R. Garner, and J. J. Gibson, who, in spite of their differences, were all interested in the perception of structure. Given these interests and beliefs, many topics are untouched. There is very little discussion of cross-cultural differences, perceptual development, or the aesthetics, meanings, and emotional connotations of music and speech.

This book is written for novices—no prior knowledge is assumed. I have avoided the use of musical scores and have supplemented technical measurements with simpler numerical ratios. Moreover, there is a glossary of terms to help readers skip around the chapters. Suggestions for further reading are listed at the ends of some chapters to supplement the references in the text.

The book is organized roughly into two parts. Chapters 1–6 concern sound production, and chapters 7–13 concern sound perception. All the chapters are relatively self-contained so that readers with different interests may pick and choose among them. I would recommend that every reader begin with chapters 1 and 2. Chapter 1 (A point of view) provides a general orientation. Chapter 2 (The production of sound) provides the technical acoustic material for the rest of the book; it is the key chapter. The rest of the chapters are a mixed bag. Some are primarily about music: chapter 4 (Sound generation by musical instruments); chapter 10 (Grammars of music and language). Some are primarily about speech: chapter 5 (Sound generation by voice: Speaking and singing); chapter 9 (Phonemes: Notes and intervals). Some compare music and speech: chapter 6 (Commonalities: Physical and perceptual); chapter 8 (Identification of speakers, instruments, and environmental events); chapter 11 (Rhythm). And some concern auditory perception in general: chapter 3 (The environment of sound); chapter 7 (Breaking the acoustic wave into events: Stream segregation); chapter 12 (The physiology of listening).

A reader solely concerned with music might read chapters 1, 2, 4, 6, 7, 8, 10, and 11 (chapters 3 and 12 optional); a reader solely concerned with speech might read chapters 1, 2, 5, 6, 7, 8, 9, and 11 (chapters 3 and 12 optional).

This book has been written according to the Peter Principle: it is at the level of my incompetence. I would like to acknowledge the help of several reviewers who saved me from myself and significantly improved the manuscript: Albert Bregman, McGill University; W. J. Dowling, University of Texas at Dallas; Fred Lerdahl, University of Michigan; and Bruno H. Repp, Haskins Laboratories. I would also like to acknowledge individuals who unbeknownst to themselves served as role models: T. Cornsweet (1970) and A. Benade (1960 and 1976), whose books serve as models of writing; the large number of researchers whose ideas have forged my understanding of perception; and the editors of the magazine *The Absolute Sound*, who convinced me that there was more to hear than I heard. I would like to thank Wynne Brown at Brownline Graphics, who skillfully transformed my sketches into figures. Finally, I would gratefully like to thank Connie Ogle in particular, Ann Smith, and Sandy Anderson, who constantly assured me that the book would be finished, assuaged my guilt about causing the clear-cutting of forests, and were able to produce correct text out of colored lines crisscrossing a page.