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Auditory Scene Analysis.
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Preface

In the late 1960s, when I began to do research on the perceptual organization of sound, I naively thought that surely the questions that I was puzzling about had been studied to death. I could vaguely recollect the term tonal fusion and was sure that some hoary psychologist had figured it out. Gradually, as my own research progressed, I discovered that there had been a trickle of studies, but somehow the impetus was weak. Audition had not attracted the attention that vision had. Nonetheless, I started to explore a phenomenon that I called auditory stream segregation (later dubbed streaming by Ulric Neisser).

It was fortunate that I had never been trained in auditory perception and had only the most primitive idea about the structure of sound. I was free to pursue the phenomena as they unfolded without feeling the need to make them conform to existing psychophysical or neurological concepts. The fact that I was willing to strike off in a direction I knew nothing about can be blamed on one of my teachers in graduate school at Yale—Neil Miller. Miller advocated this strategy: If a phenomenon is strong enough to get in the way of something that you are trying to study, then perhaps it is worth studying in itself. He called it "making a silk purse out of the sow's ear." Auditory stream segregation got in the way of a study that I was trying to do on auditory learning and I decided to follow Miller's advice. I thought of it as a detour at the time, but the detour has occupied about 20 years.

Gradually, a body of research has accumulated, both in my laboratory and elsewhere, and I have developed a way of looking at it. For years I had vaguely thought of writing a book, but it was John Macnamara, a colleague at McGill, who convinced me to actually do it. He arranged for me to talk to his publishers, Harry and Betty Stanton, but I really did not think I would have the time to write the book. Fortunately, I was awarded a two-year research fellowship by the Killam Foundation to do so, and the publishing arrangement was soon concluded with The MIT Press. I was able to finish the writing

on a sabbatical given by McGill University and spent at the Center for Computer Research in Music and Acoustics at Stanford.

Before I plunge into the main argument of this book, I want to take this opportunity to acknowledge the people and organizations who have made it possible.

The ideas and findings that I am going to talk about are the product of the cumulative work of many individuals. I have reworked these ideas and made up a slightly different story about them that makes sense to me, but it is clear that an entire research community has labored to gain an understanding of these problems for a good many years.

I want to particularly acknowledge the stimulation that I have received from the research work and theoretical writing of Christopher J. Darwin, Diana Deutsch, W. Jay Dowling, Stephen Handel, Hermann von Helmholtz, Ira J. Hirsh, Mari R. Jones, Bela Julesz, George A. Miller, Brian C. J. Moore, Otto Ortmann, Irvin Rock, Richard M. Warren, Leo van Noorden, and Giovanni Vicario.

The work in my own laboratory has been advanced by the contributions of many students, assistants, and associates. It would be impossible to mention all of them, but I would like to mention the following with particular appreciation: Pierre Abdel Ahad, Jack Abramson, André Achim, Gary Bernstein, Jock Campbell, Valter Ciocca, Gary Dannenbring, Peter Doehring, Magda Chalikia, Lynn Halpern, Robert Levitan, Christine Liao, Stephen McAdams, Michael Mills, Steven Pinker, Brian Roberts, Wendy Rogers, Alexander Rudnicky, Howard Steiger, Jack Torobin, Yves Tougas, Tony Wolff, and James Wright.

I want to thank John Chowning for inviting me to the Center for Computer Research in Music and Acoustics to spend the summer of 1982 and a sabbatical year in 1986 and 1987. These pleasant and productive periods gave me a chance to become familiar with what the computer music community, especially John Pierce, Max Mathews, and John Chowning, had discovered about the perception of musical sound.

I have also benefited from valuable discussions with other colleagues. These include Pierre Divenyi, Bernard Mont-Reynaud, Earl Schubert, William Schottstaedt, and Mitchell Weintraub. In addition, Alan Belkin, Valter Ciocca, Michael Cohen, Doug Kieslar, John Pierce, Martin Tenenbaum, and Meg Withgott were kind enough to read parts of the manuscript and give me their comments.

Not the least of my obligations are to the organizations whose financial support have made my research possible: the Natural Sciences and Engineering Research Council of Canada, the Defense

Research Board of Canada, the Faculty of Graduate Studies and Research of McGill University, and the Ministry of Education of Quebec (FCAC program). I am particularly indebted to the Killam Foundation for its two-year fellowship. I should also mention the Department of Psychology of McGill University, which has been a congenial place to work.

Finally, it is impossible to express the debt that I owe to my wife, Abigail Elizabeth Sibley. She has put up with me for many years and, although a historian by trade, has entered into my professional milieu with gusto, earning the affection and respect of my colleagues.

This book is a compromise. I was uncertain as to whether to write for the specialist or not. The nonspecialist might need a chapter on the physical nature of sound and might not be interested in the details of experiments. In the end, I decided to write two books in one. The first and last chapters can be read alone to get a general idea of the topic of auditory scene analysis. The first one lays out the problem, gives a few examples of it, and sets it in a theoretical context. The final chapter presents a brief summary of what we do and do not know about the subject.

The remaining chapters are addressed to the person who wishes to find out more about how the research is done and to what extent the evidence supports the conclusions. I have given more detail on research that is less accessible, either because it is unpublished or because it is published in the form of theses.

One way in which the scope of this volume has been limited is by omitting an originally planned chapter on the nature of sound. I have tried to assist the novice in the field of audition by explaining each concept in an intuitive way when I use it. As an additional help I have included, at the end of the book, an alphabetical glossary of terms that appear in the chapters.

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