

## A Personal Perspective

This book is my adventure story about transforming a narrow topic that has engaged my professional interest for three decades into a set of broader issues. The story began in the 1970s when I had the good fortune to develop and commercialize the first digital signal-processing products for the recording industry: an audio delay and an artificial reverberator. Now, more than a quarter century later, that technology has expanded into a multibillion dollar industry permeating our culture and supporting thousands of innovators making incremental contributions. Looking backward, it is clear that my initial goal of electronically reproducing the auditory experience of a concert hall had a much broader meaning than my initial concept. This book expands that limited engineering goal into an interdisciplinary research project: the experience of space by attentive listening. Like most of the thousands of people who have contributed to the aural architecture of spaces, I had not appreciated the artistic, social, historical, and philosophical context of my isolated activities.

The nature of a discussion depends on the scope of the questions being asked: narrow or broad. I could have framed the discussion solely in terms of the physical and mathematical properties of sound waves that contribute to the aural experience of a concert hall. A vast body of literature already takes this approach. It is relevant mainly for specialists who have the professional interest and necessary background to appreciate the details of that subject. Rather, I have chosen to explore the broad *phenomenon* of auditory spatial awareness without regard to a specific discipline, culture, or time period. For me, the global approach is an intellectual adventure with gratifying surprises.

What does it mean to explore a phenomenon? An explanation is never the phenomenon itself, but only a refracted image of it, like looking at a scene through a prism. Although models, theories, and pictures are not reality, they present aspects of a phenomenon. For example, in dealing with musical space, a composer sees one aspect of the phenomenon, whereas architects, archaeologists, anthropologists, audio engineers, psychophysical scientists, and blind individuals each see other aspects. When we have access to multiple views, each with its own biases and limitations, we

acquire greater understanding of the phenomenon. As we explore these views, we must remember that each version of a phenomenon is always constrained by the questions being asked and the answers being offered. On the other hand, the union of diverse viewpoints, like multiple shadows from an object that we cannot see, allows us to form an image of the phenomenon, which by definition always remains inaccessible.

While doing research for this book, I was frequently surprised by the relative ignorance of professionals about the issues and insights of other disciplines. I was also unnerved by my own lack of useful knowledge about other disciplines. Yet with the massive information overload in modern society, interdisciplinary explorations are too inefficient without a guide to help navigate through the mountains of details. Knowing of the existence of other disciplines is very different from extracting relevant information from them. Interdisciplinary explorations of difficult problems are now commonplace, but their varying degrees of success suggest that there are, as yet, no clear answers to the questions of how or when to invest intellectual energy in such activities. However revolutionary its possibilities, crossing into foreign disciplines is still an ad hoc activity that is sometimes productive and sometimes irrelevant. The pioneering work of Julie Thompson Klein (1990, 1996) and others on the properties of cross-disciplinary activities—interdisciplinarity—exemplifies the need for structuring intellectual collaborations across disciplinary boundaries. However, until interdisciplinarity become formalized, with proven predictive utility and methods, cross-disciplinary works such as this one must be considered as experimental. I hope that my efforts will illustrate the intellectual and professional utility that can result from fusing fragmented viewpoints into a composite picture.

Had I been able to write this book decades ago, I would have managed my career from a different perspective. I might have more accurately interpreted the pivotal events that portended major paradigm shifts in my discipline. For example, I would have seen the shift from solving an old engineering problem, artificially reproducing concert hall acoustics, to inventing experiences without constructing buildings. I would have recognized that artificial reverberation was a subset of musical space, which itself is a subset of aural architecture, which depends on auditory spatial awareness. None of these connections was apparent during my career. Unknowingly, I was a member of an expanding generation of aural architects: electroacoustic designers who were liberating auditory space from its physical roots. My own professional history illustrates how I reacted to changes within my discipline without being aware of those events that marked fundamental shifts.

Because, as one its many parents, I was present at the birth of the new discipline of digital audio I had the opportunity to observe how it progressed from infancy to adolescence, and then to maturity. During this progression, the original discipline spawned new disciplines. Many died, but a few thrived to nurture a new generation of disciplines. Although the original parents of digital audio are long retired, and al-

though their grandchildren are thriving, the attitudes of the current generation are still strongly influenced by the values of their parents.

Aural architecture belongs within a family tree of disciplines having branches that spread broadly across thousands of generations. The first marriage of visual and auditory art occurred when paleolithic painters discovered that their paintings of hoofed animals were more intense if they were located in caves producing echoes. Most important, like biological evolution, aural architecture has its own rules for survival, mutation, reproduction, and extinction.

Although the generations of artists, scientists, and engineers who contributed to aural architecture built on the legacies of previous innovators, such legacies are often taken as a given. Yet ignoring legacies does not reduce their impact. Indeed, innovative behavior is itself a reaction to these powerful cultural forces. As much as I take pride in having managed my own career, my activities were actually a response to cultural shifts that elevated the importance of computer technology and audio entertainment within the wider society.

Like our prehistoric ancestors who created wall paintings in resonant caves, my colleagues and I use available tools to create a listening experience for some personal and social purpose. The nature of that experience remains rooted in inherited culture and evolutionary biology. Although the supporting technology moves forward, the experience of aural architecture moves sideways in sweeping spirals. Even after having traveled a long distance, we are not far from the core experience of all peoples. We cannot discern the nature of that movement close-up. We need to take an aerial view to see the larger picture.

As an intellectual travelogue, this book is my attempt to overcome an inadequate education. I enjoyed the challenge of integrating and expanding a vast array of intellectual fragments into a single, broad, and coherent theme: the experience of aural architecture. I also included some speculations because the trip could not be completed without also constructing bridges over the uncharted waters of unexplored topics and missing research.

I take complete responsibility for any errors in fact and logic, and for any speculative foolishness that leaked through the review process. Given the scope of this book, I could not become an expert on the dozens of disciplines that are part of auditory spatial awareness and its application to aural architecture. I hope other scholars will clarify discussions that are either incomplete or debatable, thereby improving, correcting, applying, and extending what is necessarily only a beginning.