Foreword

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This book on the analysis of electroacoustic music is a timely and significant one. Electroacoustic music blossomed in the second half of the twentieth century. Not only did it expand instrumental music to a wider range of sound material, but it also opened a new sonic art form—another branch of music, as different from instrumental music as cinema is from theater.

This new music has been little discussed in writing, in part because much of electroacoustic music does away with the score, a document that had heretofore seemed essential. The lack of an objective representation makes it difficult to study these works. This has resulted in few textbooks about electroacoustic music and even fewer analyses of electroacoustic works. The present book purports to fill this gap and to shed light on some important works of this medium.

I wish to provide some historical background concerning electroacoustic music. Around 1875, two inventions brought a considerable change to our relationship with sound: the gramophone and the telephone. The gramophone, invented by Thomas Edison, engraved sound, which allowed its replication in the absence of the vibrating object that had produced it. From this point on, one could no longer say "verba volent, scripta manent" (words fly away, writings remain with us): recording provides a durable trace of the sound, enabling one to scrutinize it as an object and to modify it in novel ways—for instance, to play it in reverse. The telephone, invented by Alexander Graham Bell, transformed sound into electrical vibrations that could be transported on wires and converted back into sound. The composer Hugues Dufourt has termed this an "electric revolution": the elaboration of sound can benefit from the resources of electric technology.

Initially, these new possibilities were used to transport and reproduce sound and music rather than to produce new sounds and new music. However, at the turn of the century, Thaddeus Cahill built the "dynamophone"—an electrical machine that produced musical sounds with electric dynamos (it was also called the "telharmonium"). Being in the form of electricity, the musical signal could be carried on telephone lines and sent remotely, a concept later evoked by

Stockhausen in his piece *Telemusik* (a work analyzed in this book). The success of Cahill's machine, however great, was short-lived, yet it excited the imagination of Varèse, who insisted all his life that science and technology were to provide new resources for music.

In the first half of the twentieth century, some "electronic instruments" appeared, for instance, the Theremin and the Martenot. These were mostly used to mimic existing acoustic instruments such as the violin. However, during the 1930s there were a few attempts to experiment with recording and electricity in music by such composers as Milhaud, Hindemith, Toch, Varèse, and McLaren. Stokowski called for the realization of scores "directly in tone, not on paper." John Cage's *Imaginary Landscape No. 1* (1939), in all likelihood, is the first musical work that exists not as a score but as a sound recording.

These concepts became especially practical after 1948. In this year, Pierre Schaeffer invented *musique concrète*—recording sounds and then modifying and assembling them to realize the musical work as a concrete recording rather than an abstract score. In 1950, Schaeffer and Pierre Henry composed *Symphonie pour un homme seul*—a single man monitoring the recording at the console. Schaeffer and Henry, as well as Luc Ferrari, François Bayle, and Beatriz Ferreyra, composed "by ear," experimenting and critically listening to sounds and their combinations.

In contradiction, the early practitioners of "electronic music," following Herbert Eimert, Karlheinz Stockhausen, and Gottfried Michael Koenig in Cologne around 1950, were concerned with creating precise, sonic realizations of complex scores, formally elaborated in advance, in the spirit of the serial methods of composition. They insisted on using only electronically produced sounds, whose physical parameters could be precisely controlled. Milton Babbitt had similar preoccupations when he realized such works as his *Ensembles for Synthesizer* on the RCA machine, a precursor of the synthesizers that later became popular.

One of the first major works that combined both electronic and "concrete" sounds was Stockhausen's *Gesang der Jünglinge.* Analyzed in this book by Pascal Decroupet and Elena Ungeheuer, this work was very successful and highly influential. Luigi Nono, also represented in this book, likewise adopted this syncretic approach, as well as associated electronic sounds with instruments (as did Luciano Berio, Mario Davidovsky, Milton Babbitt, and number of others).

In 1957, Max Mathews implemented the first digital computer synthesis of sound at Bell Laboratories. The computer in itself is a neutral medium, since it permits the implementation of a great variety of processes with unprecedented precision and reproducibility. Indeed, nearly all electroacoustic music is now produced digitally.

I had myself begun composing with instruments, and I hadn't been attracted to either *musique concrète* or "electronic music." It seemed to me that *musique concrète* afforded a great variety of sonic material but that the ways to process or assemble the sounds were rudimentary with respect to their richness, which made

it hard to avoid an aesthetics of "collage." "Electronic music" offered a more ductile material. The sounds could be better controlled in their parameters, but I found them dull, lacking life, richness, and identity. I was intrigued when I learned of the new digital possibilities—perhaps they could reconcile richness and control. In the 1960s, I had the good fortune to collaborate with Max Mathews (and, indirectly, John Chowning) in developing the musical possibilities of sound synthesis. Indeed, the sonic resources of the computer had to be conquered, and this exploration provided valuable insight to the perception of musical sounds—one had to find ways to produce interesting sounds, so the development of specific knowledge and expertise was needed. Fortunately, the computer permits the implementation of a large variety of processes as well as the storing of thorough and accurate records of them, making it easy to communicate sonic descriptions, recipes, and sound catalogs.

The categories of "electronic music" and *musique concrète* still exist in the digital domain within two branches: the *synthesis* and *processing* of sound. However, the gap between synthesis and processing can be bridged through such methods as analysis-synthesis. There are still aesthetic arguments between the defenders of "live electronic music" and those who realize "music for tape." A few composers (among them Pierre Boulez) have viewed electroacoustic music as a prolongation of instrumental music, offering a mere extension of the available sound material. According to this conception, electroacoustic music should be performed live in an instrumental fashion. Others insist that music should not remain confined in an instrumental context. Beyond composing solely with ready-made sounds, electroacoustic composition can offer the possibility to compose the sounds themselves. The craft of composition must therefore be liberated from the real-time constraints of performance, resulting in a recording that constitutes the musical work itself—a "cinema for the ear," according to François Bayle. The expression "music for tape" has become somewhat archaic, since sounds today are recorded in digital form (DAT, other format audiotape, compact discs, or any other form of digital memory) rather than on analog tape. In France and Quebec, one often uses the more accurate expression *musique sur support*—"music for the recording medium"—but "music for tape" is still popular and well understood.

Most compositions for tape do not come with a score. The lack of a written document creates great difficulties for the musicologist who insists on carrying out rigorous, "objective" work. One might object that sound recording is an objective trace of the work—in the case of "music for tape," it could almost be said to coincide with the work itself—but it is certainly not a convenient document to consider, no more than Jorge Luis Borges' fictitious maps that coincide with the territories that they represent. Because of this problem, music for tape has been somewhat disregarded by musicology.

In an article for the *Contemporary Music Review*, Marco Stroppa enumerated the difficulties that he confronted in analyzing my piece *Songes*. The lack of a representation analogous to the conventional score prompted Stroppa to renounce the performance of his analysis. Because he found them too gross and

approximate, he dismissed "listening scores": descriptive sketches realized, generally a posteriori, enabling one to follow the piece. As for the technical and operational data, which can give valuable information about works realized with computers, he generally considers them as disheartening and even incomprehensible for nonspecialists, especially since they refer to specific hardware and software that are ephemeral due to the rapid evolution of technology.

These difficulties are real. However, if the software used is structured in a way that provides exploitable archives, the coded traces left by the use of the computer can yield considerable amounts of valuable information for analysis. This is the case for C-synthesis programs such as Csound and Music V. I used the latter in my piece *Songes* (however, Stroppa did not have access to my computer "scores"). Therefore, it proves helpful if the composer makes his or her archives available with proper explanations. To take full advantage of these somewhat cryptic traces, those who undertake the analysis must be enlightened specialists, often composers themselves. This is the case for a number of the analyses presented in this book. For instance, the chapter by Konrad Boehmer describes the precise procedures that Koenig used and explicated in composing his piece *Essay*. In two other chapters, the methods used in computer compositions are discussed and elucidated by the composers themselves: Otto Laske and James Dashow. The chapters on Iannis Xenakis' *Diamorphoses* by Thomas DeLio, Luigi Nono's *Omaggio a Emilio Vedova* by Thomas Licata, and Joji Yuasa's *A Study in White* by Kristian Twombly resort to technical tools that can be great assets for musical analysis, such as sonograms and amplitude graphs, which provide some kind of portrayal or cartography of electroacoustic music.

Apart from the case of early electronic music pieces constructed in a very precise and formal fashion, only a few examples can be cited of earlier analyses of electroacoustic music. Around 1970, François Delalande of GRM-Paris wrote a significant article on the analysis of electroacoustic music, and Enrico Chiarucci produced perceptual ("phenomenological") analyses of works by Stockhausen and Penderecki. As DeLio, Licata, and Twombly do in the present volume, Robert Cogan's *New Images of Musical Sound* used sonograms to portray and analyze several musical works of various times, including electronic and digital works. Insightful analyses have been published by Stanley Haynes, Denis Smalley, Simon Emmerson, Hans Ulrich Humpert, Wolfgang Thies, and Michel Chion. Denis Lorrain's analysis of my piece *Inharmonique* was also a reconstitution, since he provided Music V scores that permitted the replication of certain sections through computer synthesis. This approach was also followed in the computer music synthesis manuals by Charles Dodge and Thomas Jerse and by Richard Boulanger. In a volume edited by Wolfgang Gratzer, *Nähe und Distanz*, the composers themselves, as well as other musicologists, provide analyses of instrumental, electroacoustic, and mixed works. The second volume produced by the Academy of Bourges, entitled *Analysis in Electroacoustic Music*, presents both a few general essays insisting on the importance of this issue as well as some analyses of electroacoustic pieces, with most of them documented by their authors.

The present book is an important contribution to the corpus of music analysis, which one can by no means reduce to a blind and automatic dissection according to a priori principles; each work requires its own approach, which may yield surprises. The detailed study of my own piece *Contours*, by composer Agostino Di Scipio, has been fruitful to me, unveiling certain features that I was unaware of. An insightful analysis participates in the life of the work by revealing unsuspected aspects and novel perspectives, enlightening listeners, and inspiring composers—teaching composition consists largely of analyzing musical works. In the case of electroacoustic music, a proper analysis clearly explicates the technical processes involved and their musical necessity and significance. Thus, the chapters that follow will be helpful to the understanding of electroacoustic music and its raison d'être.

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