In the Place of Sound:
Architecture | Music | Acoustics

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Edited by

Colin Ripley with Marco Polo
and Arthur Wrigglesworth

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Introduction: In the Place of Sound

Colin Ripley

In early June 2006, a group of over one hundred artists and researchers met for a three-day conference in the Architecture Building at Ryerson University in Toronto, Canada, to discuss—from as many different viewpoints as possible—the varying relationships between sound and space. This conference was part of sounda**X**is, a city-wide festival involving most of Toronto's new music community and organised by the Toronto Coalition of New Music Presenters, chaired by Daniel Cooper. Of particular interest to the architecture community, and the primary impetus for the development of the Ryerson conference, was the decision to focus the festival around the work of Iannis Xenakis, who, in addition to being an important composer in the last half of the twentieth century, was also an architect of some consequence during the same period. Moreover, in Xenakis' body of work, these two creative modes often inform one another, with ideas from musical composition realized as architectural form. sounda**X**is naturally developed, therefore, as a festival of sound and space, or music and architecture, with the capitalized X from Xenakis representing the intersection of these two modes. Concerts were presented of music that was composed with particular spatiality in mind, or in spaces not normally considered as concert venues; a musicology conference was held to discuss the work of Xenakis; and the Ryerson conference, Architecture|Music|Acoustics—from which the papers in this volume have been taken—specifically addressed the intersection of these disciplines.

Presenters at the A|M|A conference came from very diverse backgrounds with widely divergent approaches to studying the relationship between sound and space. Presenters included acoustic engineers; architectural theorists and historians; and practicing architects whose work engaged in one way or another with issues of sound or acoustics. Presentations were also given by composers, sound artists, and urbanists. Special focus sessions were held on acoustic ecology and on the use of sound in architectural education. While most presentations took the form of the delivery of papers with visual—and occasionally sonic—aids, some took the form of demonstrations or even performances of musical works written expressly for the conference. Four keynote speakers—R. Murray Schafer, Juhani Pallasmaa, Bernhard Leitner, and Bob Essert—provided spark and grounding for the proceedings.

Out of this amazing barrage of ideas, during discussions after concerts and over dinner, a realization emerged among many presenters at the conference that—although this may be an overstatement—a new field of study was in the process of being born. Although most, if not all, of the artists and researchers who came to this con-

ference were and are engaged in a study of some aspect of the relationship between sound and space, many were not aware—or only tangentially aware—of similar work coming from other points of view. For many of us, this conference was our first opportunity to come together as a community of scholars, our first chance to meet each other. Several presenters mentioned to me the difficulty of working in a field that has no recognized journal; while research is published, in architectural journals, musicology journals, or journals of cultural studies, there is to my knowledge no journal dedicated to this area of study, and hence no organised or recognized body of literature. This book could be seen, perhaps, as a first step toward establishing such a literature and, with it, a common understanding of the issues at stake. The sheer diversity of approaches to the question results, at the moment (and this too was clearly evident at the A|M|A conference), in a certain amount of talking at cross-purposes, a certain degree of incommensurability, between different points of view. Without a common literature, it is even difficult to know how to pose questions.

Which raises, of course, a significant question: is the study of the relationships between sound and space important? At this time, when seemingly every aspect of our existence has its own defined domain of academic study, do we really need another?

It appears to me that on a very simple, pragmatic level, the answer to this question must be yes. We know, for example, that every so often an architect becomes interested in the use of sound in his or her design work; anyone who has taught in a school of architecture is aware of this tendency among students. Without a body of literature, this interest always must start from the beginning with each new exploration; no real progress is possible. Such a body of literature should entail access not only to previous architectural explorations in the realm of sound, but also explorations into space by soundmakers—sound artists and composers. Without such access, the architectural explorations are likely to never move beyond a dilettantish amateurism. We need this body of literature, this field of study, in order to do this work.

On a less pragmatic level, we can safely state, I think, that the study of the relationships between sound and space is important, although we do not yet know what the practical results of such a study may be. Sound and space form a critical couple in our everyday environment: no sound exists outside of space, and no space is ever truly silent. Sound and space mutually reinforce one another in our perception; the qualities of a space affect how we perceive a sound and those of a sound affect how we perceive a space. Space and sound are inextricably linked in our experience of what it is to exist in the world.

As human beings, however, we are not simply passive preceptors of either sound or space, but in fact active creators of both. Architects have often been concerned with the acoustic qualities of the spaces they design—this is not a particularly new idea. However, our ability to control and manipulate the soundscapes of our buildings—through technical and other means—is becoming more and more sophisticat-

ed. The ubiquity of artificial sound in the built environment points to an increased importance for architects to understand the meaning and effect of spatial sound.

If this is true within buildings that we design, it is equally true in the environment as a whole. Increased sound levels in the environment may not have the dramatic impact of the end of oil or climate change, but nonetheless remain an important part of humanity's impact on the environment. The soundscapes of our modern cities form a backdrop to the everyday lives of billions of people, yet remain largely unstudied, despite the pioneering (and increasing) efforts of the acoustic ecology community.

Nor is an awareness of, or interest in, the sound|space nexus new. Within the Judeo-Christian tradition, this interest goes back as far as the creation of the world—place-making in the most extreme—by the Word of God. More concretely level, the fall of the walls of Jericho as a result of the sound of Joshua's trumpets could not be a clearer example of this relationship—or, for that matter, of the uneasy, fraught condition that it holds (more on this later). Although the history of this intersection and of its study has been discussed by a number of authors (see for example Sheridan and Van Lengen, 2003; Blesser and Salter, 2007), it is worth a brief mention here.

A Brief History of the Study of Sound and Space

Despite my invocation of mythological origins, the history of the sound|space nexus is usually traced back to Vitruvius' reference to the need for an architect to understand the harmonic properties of music from a mathematical perspective, or his brief discussion of acoustic considerations in the design of theatres. The relationship between the high reverberation times of medieval cathedrals and the development of plainsong—and of counterpoint in the less acoustically live churches of the German reformation—has been pointed out by a number of authors (see for example Rasmussen, 1959, Chapter X).

With the increased emphasis on vision in the Renaissance, architectural thought moved away from a consideration of sound. Exceptions include the famous Whispering Gallery (completed 1698) at the base of the dome in Christopher Wren's St. Paul's Cathedral, and the proposals by Athanasius Kircher for listening devices at an architectural scale (meant, in the main, for gathering intelligence). Meanwhile, the French monk Marin Mersenne, a correspondent with Descartes, made a study of acoustic lenses—in essence, architecturally scaled rooms with explicit and unusual acoustic properties—following the work of the latter with respect to optical lenses. Frances Yates (1969) has traced the transition from the sound-based form of the Elizabethan playhouse, built for the telling of stories, to the optical devices of the Jacobean theatres of Inigo Jones, designed for the presentation of spectacle, while Bruce Smith (1999) has attempted to reconstruct, primarily from literary sources, the soundscape in which those playhouses and theatres were built.

By the late nineteenth century, musical performance culture, as traced by Jacques Attali (1977/1985), had moved fully into the bourgeois space of the concert hall. The acoustic properties of these highly technological spaces became critical, leading to the development (primarily by Walter Sabine) of the mathematical formulae for the calculation of reverberation time that underlie the modern scientific study of acoustics (see, for example, Thompson, 2002). Partly as a result, any serious discussion of the acoustic properties of architectural spaces in the modern world moved into the hands of acoustic engineers.

As Thompson recounts the history, a typically engineering-based approach relying on numerically quantifiable sound levels and their control—rather than on the cultural or artistic meaning of environmental sound—is used to resolve the second significant sound-based issue in the modern world, namely the increased noise of the modern city. As Schafer (1977/1994, p. 82) put it, "the internal combustion engine now provides the fundamental sound of contemporary civilisation."

A consideration of sound is virtually absent in the pioneering Modern architecture of the 1920s and 1930s in Europe, although Amedeo Petrilli (2001) has analysed a concern with acoustics in Le Corbusier's projects for both the League of Nations in Geneva (1927-28) and the Palace of the Soviets in Moscow (1931). Musical instruments—primarily pianos—do appear in some of Le Corbusier's sketches of domestic interiors of the period, but one suspects that they are there to temper his radical architecture with a solid bourgeois respectability rather than out of any actual consideration of music. Sound does not appear—or music, or acoustics—in Gropius' Bauhaus curriculum, although Clement Jewitt (2000) has traced the history of music at the Bauhaus, and notes that the important Dada composer Stepan Wolpe was a Bauhaus student. Sound would, of course, have been an important element of Oskar Schlemmer's theatrical work.

In the decades after the Second World War, the two relationships (sound|space, music|architecture) increased in importance for both architects and musicians. One could cite a number of factors which led to this phenomenon, including the development of electronic sound transmission and production equipment, a focus on spaces for the performing arts within architectural culture, an increased tendency towards abstraction in musical composition, the new omnipresence of the sound film as total environment, and the development within philosophy of phenomenology. Whatever the factors that brought this into being, the period of roughly 1950 to 1975 brought about a number of touchstones in this history.

The first of these, within architecture, is the total environment of the Philips Pavilion at the 1958 Brussels World's Fair, which came about in part from the presence within Le Corbusier's studio of Iannis Xenakis. The Pavilion—discussed in Mary C. Wright's paper in this volume—was in essence an architectural setting for Edgard Varèse's *Poéme électronique*, composed for the event. While Xenakis' precise involve-

ment in the project remains uncertain (unlike his work on window frame compositions at Le Corbusier's Monastery of La Tourette of roughly the same period), Jim Lutz (2004) has pointed out the remarkable graphic similarity between the score for Xenakis' *Metastasis*, written at about the same time, and the sectional figure of the Pavilion (for a thorough discussion of the Philips Pavilion, see Trieb, 1996).

This period also saw—or heard—a number of important pieces of music which developed specifically from the spatial qualities of their performance. John Cage's *4'33"* of 1952 was intended to bring the sounds of the performance space into play in another sort of total environment (see Kahn, 1997; LaBelle, 2006), while Alvin Lucier's *I am Sitting in a Room* of 1969 plays back and records a spoken piece over and over until the words melt away into the acoustic profile of the performance space. Both pieces—like Steve Reich's *Pendulum Music* (1968)—have the perhaps surprising effect, given their construction, of making the listener a participant in a psychological drama. As LaBelle (p. 127) says of *I am Sitting in a Room*, these works suggest that "architecture is intensely bound up with how and in what ways the individual may grapple with the difficulties of being in the world."

Meanwhile, media theorist Marshall McLuhan, in an article published in *Canadian Architect* magazine in 1961, presented another vision of a total environment by pointing out that architectural spaces such as theatres already function as such environments. McLuhan's work can perhaps be seen as building on that of the phenomenologists, such as Merleau-Ponty (1945/2002), while prefiguring discussions to come regarding cyborgs and prosthetics, re-casting hearing as a technology with which to understand and act on the world. Perhaps the most complete iteration of a total environment constructed from sound to date has been the *Dream House* of La Monte Young, which has been in operation since 1964 (see LaBelle, pp. 68-75).

While these thinkers and artists were concerned with the construction of total environments through the use, at least in part, of sound, others became concerned with our relationship to the larger acoustic environment. The field of acoustic ecology was formed in the early 1970s, initiated by the study of urban soundscapes by the Canadian composer R. Murray Schafer and others (most notably Barry Truax and Hildegard Westerkamp) at Simon Fraser University. Schafer's work in this field, including his important text *The Soundscape* (1977/1994) is based strongly on the ear, on listening to the sounds of the environment, rather than on the production of sound (despite, or perhaps in complement to, his well-deserved reputation as a composer). Projects such as the World Soundscape Project, in addition to providing an important archive of environmental sound, have led to the development of tools for the analysis of these sounds—and of a theoretical framework for understanding and working with them, leading to the development of the field of soundscape design—or at least for proposals for the development of this field.

Meanwhile, the 1960s also saw the formation of a field of artistic production which was to become known as sound art. As can be readily understood from even a brief discussion of important pieces of sound art, whether LaMonte Young's *Dream House*, Christina Kubisch's long string instruments, or Robin Minard's installations of piezoelectric speakers, sound art has a tendency to react to and interact with the specifics of its site. This is equally true of the work of some notable artists whose work only occasionally makes use of sound, such as Janet Cardiff's *40-Part Motet*, which creates an acoustic space in parallel to the physical space of its installation, or David Rokeby's *Very Nervous System*, which energizes a room to make sounds in response to the movements of people in the room.

While the work of Bernhard Leitner may seem to place him in the camp of the sound artists, a more accurate term—and one that Professor Leitner prefers—is *sound architect*. Over a remarkably consistent and directed career spanning four decades, Leitner has concentrated not on the production of sound for its own sake, but on the use of sound to produce architectonic structures: walls, columns, domes made of sound (see Traber, 1998).

By the beginning of the current millennium, we were thus faced with a situation in which the relationships between sound and space, music and architecture were being studied and scrutinized through a number of divergent threads, with corresponding strands of artistic and musical production. It is remarkable, given this activity, how little corresponding work was being produced from within the discipline of architecture. In terms of architectural writing about sound, we find in addition to a few scattered journal papers two small books, both dating from 1994: Elizabeth Martin's *Pamphlet Architecture 16: Architecture as a Translation of Music* and a special issue of *A+U: Questions of Perception—Phenomenology of Architecture* with articles by Juhani Pallasmaa and Steven Holl (as well as an article by Alberto Perez-Gomez; reprinted as Holl, 2006). A few well-known architects—notably, again, Steven Holl (Stretto House) but also Renzo Piano (IRCAM) and Peter Zumthor (*Swiss Sound Box*) have attempted to bring ideas from the sonic into their architectural practices. On the whole, however, this issue has been almost completely ignored within architectural thought and production.

The Current Condition

Two key themes arose from the discussions that took place at Ryerson in June 2006 which have become the foundation for the development of this volume, both of which deal with the difficult nature of the discussion. Both of these key concepts, it seems to me, are tightly bound up with the failure of the architectural community to really engage with sound.

The first of these key ideas has to do with the fraught nature of the relationships in question, the cultural unease that develops when sound and space collide. While this term was raised at the conference with specific reference to the experience of visitors to the Philips Pavilion, it soon became clear—and will be clear to any reader of this volume—that it is in fact a more general condition. In part, this fraught condition is due to an extreme dissimilarity between sound-making and the construction of buildings: sound is lightweight, inexpensive (or free) and leaves no (or few) lasting traces, while buildings are heavy, expensive, and more or less permanent. It could also be, in part, due to the extreme disjunction between hearing and vision in our society, rooted, as Juhani Pallasmaa points out, in the different manners by which we perceive sound and light. Sound and vision therefore stand on two sides of a cultural divide, with the sonic arts—music and sound art—on one side and the visual arts—including architecture—on the other. Whatever the cause, one could argue that it is precisely because of the tenuous, difficult nature of this relationship that those who construct our built environment—and architects in particular—can benefit from a more complete consideration of sound; thinking about sound forces the architect to consider the fleeting, the changeable, that which cannot be drawn. Thinking about sound reminds the architect that human beings do not live in silence.

Thinking about sound, though, proves to be not such an easy thing for architects. In fact, the second key concept—the problem of representation—explicitly arises in relation to this problem. Architectural culture trades in representation—that is to say, architects draw (and of course one can't draw sound). With sound, however, perhaps because of its transient nature, it seems to be necessary to deal with the thing itself and not with its representation. Translation thus becomes a dominant mode of production: faced with a phenomenon which resists representation, architects first translate it into a form—graphic, sculptural, or conceptual—which can be represented. Those few intrepid explorers who resist the deferral of translation and insist on confronting the phenomenon of sound, meanwhile, are soon stymied by the lack of tools or, for that matter, vocabulary with which to work.

However, there are indications (beyond the present volume and the conference of which it is a partial record) that a good number of artists, architects and researchers are now engaged in finding solutions to these problems. Certainly the time is right: one could point to a renewed interest in environmentalism for example, or the resurgent interest in a phenomenological approach to architecture. What is more, recent technical developments such as ubiquitous computing have raised interest in responsive architectures, while technical developments in the production of sound—such as the development of narrow-cone directional loudspeakers—have made a more intentional engagement with spatial sound a more realistic proposition.

Not surprisingly, the past few years have seen a number of important books discussing aspects of this multi-stranded area of study. Emily Thompson's *The Sound-*

scape of Modernity (2002) delves into the relationship between architecture and the acoustic sciences in the Modern era. Juhani Pallasmaa's *The Eyes of the Skin* (2005), a re-working of his *A+U* article of a decade before, looks to elucidate a phenomenological approach to architecture understood not simply as a visual art. Brandon LaBelle's long awaited (in the field) *Background Noises* provides a thorough discussion of the history of modern sound art, focusing on the spatial aspects of that field. Meanwhile, Jean-François Augoyard and Henry Torgue's *Sonic Experience: a guide to everyday sounds* (2006; French version 1995) attempts to exhaustively categorize the sounds of our everyday experience. Finally, for the moment, Barry Blesser and Linda-Ruth Salter's *Spaces Speak, are you Listening* (2007) raises a certain call to arms, so to speak, for the development of what the authors call *aural architecture*. Beyond the books, there have also been interesting experiments in built form, such as NOX's *Son-O-House* (2004), and the development of a few research centres working in this field, including the Centre for Research on Sonic Space and the Urban Environment (CRESSON) in Grenoble, France and RMIT University's Spatial Information Architecture Laboratory Sound Studios in Melbourne, Australia. This volume, and the conference it grew out of, have to be seen as part of this increased interest in the sound|space nexus within the world of architecture.

In the Space of Sound

The papers in this volume have all developed from presentations made at the A|M|A conference in 2006. They have been chosen primarily for their ability to shed light on or bring to the fore the overall themes identified above. A number of the papers have seen significant revision from the original presentations. In addition to the twelve full-length papers in the volume, we have also included seven graphic essays which represent the work (also originally presented at the A|M|A conference) of architects who are actively seeking to work with sound.

The book is divided into three sections: *Ghost Spaces*, *Translations*, and *Instruments*. Although the distinctions among these three sections are somewhat arbitrary (several of the papers could fit well into all of the sections), the book has been organised with four papers in each section, along with a number of graphic essays. The first section presents chapters which discuss, in one way or another, the cultural unease that arises at the intersection of sound and space. The book opens with a chapter in which Anna Friz discusses the ghostly acoustic spaces of vanished modernity, discovered either on sound walks or on the radio dial. Anthony Elms reinforces the notion of the transient nature of sonic space through a discussion of the even more ephemeral work of Chicago artist Brennan McGaffey, likening the resulting space to Jennifer Bloomer's concept of a minor architecture. Upali Nanda's analysis of Steven Holl's *Kiasma* museum in Helsinki discusses one root of this ghostly unease: the confusion that can arise

when aural and visual perceptions do not cohere. Nanda sees, and brings forth for us, the possibilities this offers for architectural design. In the final chapter in this section, Matteo Melioli uses software meant for the calculation of fluid flow to visualize the ghostly acoustic spaces within the Basilica San Marco in Venice.

Section II: *Translations* starts off with two graphic essays which try, each in its own way, to translate musical structure into architectural form. Bennett Neiman and Tomek Smierzchalski make use of principles of jazz, translated through precisely determined methods of translation to derive architectural, or at least architectonic projects. This section also ends with two graphic essays, which look at translation in somewhat different ways: Brendan Murray makes use of resonant frequencies at the lower end of human perception to generate topographies, while Chelle Macnaughtan produces haunting drawings and installations from perceiving the architecture of Daniel Libeskind through the writings of Jacques Derrida and the music of John Cage. Derrida's method of *deferral* becomes, for Macnaughtan, a means of investigating not the artefacts being translated, but translation itself.

Between these graphic bookends, three authors take on the issue of translation between sound and space, music and architecture. Galia Hanoch-Roe starts off with a chapter that discusses the relation between music and architecture, using the score as an intermediate (graphic) device that opens up the possibility of a direct translation between the two forms. Michael Chapman then brings up a second form of translation—that between whole works, rather than components—in his discussion of the music of Einstürzende Neubauten read against the architecture of Coop Himmelb(l)au. Finally, Geoffrey Thün uses the work of his students to discuss translation as a concept, suggesting a third, *empathetic* mode of translation.

In the third and final section of the book, the authors discuss projects—built or unbuilt—in which sound plays an important role not as the basis for translation into architectural form, but in a direct, experiential manner. In a way, all of these buildings and projects can be thought of as instruments. David Prior starts off with a look at the development of the concert hall in light of economic and social theories, and considers the future of the concert hall in a world dominated by the iPod. Shannon Mattern broadens this discussion with her study of the acoustic landscape of contemporary American libraries; Mary C. Wright follows with a look at the role of the loudspeaker in contemporary sound-making. These chapters are followed by two graphic essays which consider how we might use architecture to listen to the world: Frances Crow's *Auditory* presents an architecturally-scaled device for listening to the surrounding soundscape, while *Mix House* by Ben Rubin, Joel Sanders, and Karen Van Lengen goes one step further with the design of a house that enables its residents to listen.

Finally, the last three chapters in the book discuss instruments not for listening, but for making sound. Stephen Birkett examines formal strategies in the history of piano design, culminating in his own design for a post-modern piano, while Ted Sheri-

dan presents projects for the construction of musical instruments on the scale of the city—on the scale of building. The book ends, fittingly, with Dereck Revington's poetic and evocative exposition of his *Luminous Veil* in Toronto, surely one of the world's largest string instruments. Revington's chapter reminds us, once again, of the ephemeral nature of sound, the solidity of architectural objects, and the tenuous and temporary nature of human life in between.

The resulting chapters in this book provide a diverse and, hopefully, provocative collection of ideas and images. They are meant not so much as a comprehensive study of the sound|space nexus—such a study may not actually be possible—but as a place to begin the discussion.

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Section I: Ghost Spaces

Vacant City Radio[1]

Anna Friz

Vacancy

In 2001-2002 I recorded the soundscapes of abandoned factories and industrial sites along the Lachine Canal in south-west Montréal while working on Dr. Andra McCartney's *Les Journées Sonores* project. The general goal of her multi-year sound project had been "documenting shifts in the soundscape of the Lachine Canal as it changes with each phase of the [civic] revitalization project" (McCartney, 2003). McCartney employed a number of research assistants to record sounds from the path along the water at regular intervals over a period of years, which gave a sense of the shifts in urban space and development as well as enabling researchers to develop a deeper relationship with a particular area in the city through walking, listening and sound recording. My soundwalk beat of the Lachine Canal wound from the old port of Montréal, through industrial Griffintown, and past the working-class neighbourhoods of Point St-Charles and St-Henri. This area had once been the industrial hub of eastern Canada, but now a landscaped bike path passes new condominiums, the upscale Atwater Market, and only a couple of warehouse compounds littered with shipping containers. As recently as 2002, these same condos were not yet built, and instead there still stood a number of vacant industrial sites and factory buildings, some guarded by rusting fences, others left open—cracked glass like broken teeth in the vacant windows, graffiti tags and murals spreading across the walls (Fig. 1-1). The buildings were in various states of decay, but their colours were still striking: red brick, blue corrugated tin, mahogany ceramic tiling. On my monthly soundwalks of this stretch of canal, I began to circle the buildings that caught my attention, and where the gates or the walls had fallen open, I entered.

A hush had descended over these spaces built to contain massive stores of grain or sugar, or for the manufacturing of goods. Instead of what must have once been the omnipresent racket of production, noises from outside now leaked in through the gaping windows and holes in the roof. I walked across the floor of a large shed to the

1. Vacant City Radio was composed as a radio art piece (meaning art specifically created for the context of a radio broadcast) during a media residency at the Western Front, Vancouver in 2005. In addition to being heard on independent radio in Canada and the U.S., the piece was broadcast on Austrian national public radio in 2005, and DeutschlandRadio Berlin in 2006. The author wishes to acknowledge support for this project from Dr. Andra McCartney at Concordia University, Montréal; Peter Courtemanche and the Reverie: Noise City group residency at the Western Front; and Elizabeth Zimmerman of ORF Kunstradio (Austria).

Figure 1-1. Abandoned warehouse, Montréal. Photo courtesy of the author.

sound of cars roaring by on the street and then stepped into a tiny closed room and found myself in sudden muffled silence. Such sites have been transformed as sonic spaces—the echoes of my footsteps instead of the former din of people and machines, the traffic and construction outside now audible inside (especially the ever-present *beep beep beep* of trucks backing up). I needed to make sound in order to hear the dimensions of the rooms by whistling, tapping, drumming on empty hoppers and turning the wheels of strange rusted contraptions. Sound is most often found in the small things left behind: crushed glass, ceramic tile, or broken brick underfoot; odd twisted bits of metal or empty spray cans; pigeons fluttering up into the ceiling; water dripping from a leaking pipe.

The first site that I ventured into was a decrepit malting silo at the far west end of St-Henri (Fig. 1-2). I brought an intrepid colleague for safety and company, and began audio recording while walking in the debris outside, at the foot of the cylinders. Once inside, we discovered that the building was dangerously rotten though it had only been boarded up for maybe a decade. Sections of the ceiling had caved in. The floor was obscured by crushed bricks, wood, nails, and some strange mixture of grain dust, mud, pigeon shit and rat poison that had acquired the consistency of horse manure. There was nothing eloquent about this decay—it spoke simply of abandonment to the hard winters and the unremitting cycles of freeze and thaw. We climbed rickety stairs, wandered dubious catwalks, and peered out of the glassless windows, wondering how to access the top of the silo cylinders, which seemed to be the only uncompromised portion of the complex. Eventually we encountered a pair of pre-teen boys with spray cans who pointed the way up increasingly unsteady makeshift ladders, then outside and up the exposed side of the building without a guardrail, until

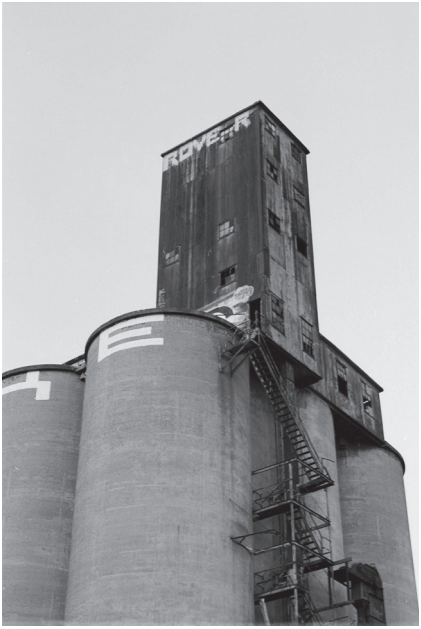

Figure 1-2. Grain silos, Montréal, Photo courtesy of the author.

we reached the floor above the cylinders. The windows here were also smashed in, so the floor crackled with glass underfoot. Hatches punctuated the floor. I opened one, got down on my knees and stuck my head inside.

Black nothingness: a dark so dark and so vast that I couldn't imagine where the walls could be, but I could hear them as soon as I uttered a sound. Many-second reverberations rang in my ears as my startled remarks echoed inside eight undivided storeys in the cylinder. Suddenly I had no sense of space, of gravity. Was I looking up or down? I called into the darkness, half expecting whales to answer. The sound was tremendous, sweet, excruciating, huge. I called again and again. Pulling my head out into the daylight of the top storey, the world surged back into my ears—the beep of a backing truck, the intermittent traffic on the road, the crunch of my colleague's feet over broken glass and debris as he surveyed the rest of the floor. I had returned to a room whose dimensions were designed to suit my scale and scope, while beneath me, in a vast cavern, the echo of my voice grew still.

Why should resonance feel so sublime? Sound filling space, the pattern repeating but transformed; the space as awe-inspiring as any sacred site for its size and sonic properties. Sound transmitted, plangent in our ears, speaks to a dream of immensity, to the diffusion of our voices into something so much larger than ourselves. Emman-

uel Madan, one of the creators of the *Silophone* project in Silo #5 further east on the port of Montréal, notes that experiencing sound inside the massive hollow cylinders is singular:

> It's such an incomparable sonic world inside that the simple experience of hearing it has value on a basic phenomenological level. Being inside there, anybody and everybody has an instinctive impulse to play, to make sound and to hear the results. (Personal communication, March 2002)

When we grew tired of calling and singing into the cylinder, we threw objects down the hatch—nails, wood, and finally glass, skipping shards against the walls to hear the crystalline *ting* of each piece, then the distant *boom* when they hit the metal chute at the bottom.

Such a dream of immensity captured the imagination of early twentieth century Modernist artists and architects alike. Le Corbusier famously praised the large grain storage silos of North America for their design qualities constructed, as they were, of primary forms like cylinders, and of reinforced concrete that "has brought about a revolution in the aesthetics of construction" (Le Corbusier, 1931/1986, p.63). He went as far as to herald such sites as "the magnificent FIRST FRUITS of the new age" (p.31), where engineers had surpassed architects in their ability not only to design efficiently and harmoniously, but had managed to "transcend into realms of beauty, the spirit, and plastic emotion" (p.15). The malting silo that I was exploring might have been too decorated with mahogany-coloured ceramic tile to merit Le Corbusier's praise for purity of form, but certainly many of the silos in the eastern end of the port of Montréal fulfill his love for towering, massive concrete shapes unblemished by ornament. Such silos were built in the early 1900s to capitalize on mass production in manufacturing, and the industrialization of farming and food; they were filled with prairie grain and sugar that had been shipped thousands of kilometres by rail, and their contents were then emptied onto ships bound for international ports. These were modern designs for modern life, representing economy, order, and an underlying ethos of unlimited expansion and progress. Le Corbusier also believed that certain forms universally represented balance and harmony, particularly spheres, cones, and cylinders, so for him the formal aesthetics of the concrete silos produced a symbolic effect beyond their utility; "the tool is the direct and immediate expression of progress" (p.13).

My sonic experience inside the silos was a direct result of the cylindrical shape and great volume of the empty vats, but the awe and disorientation that I felt stemmed also from the fact that the buildings were discarded, and technically closed to public curiosity. My interest was to access these rare phenomena afforded by dereliction, where Le Corbusier would be morally appalled at the wreck: "Obviously, if the roof were to fall in, if the central heating did not work, if the walls cracked, the joys of architecture would be greatly diminished..." (Le Corbusier, p.215).