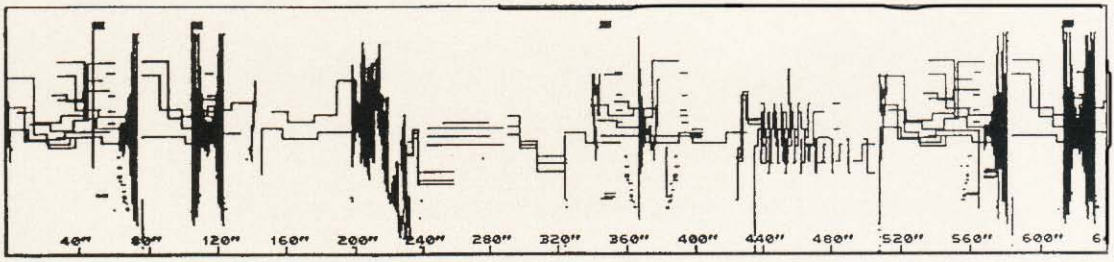
INSTITUT FÜR ELEKTRONISCHE MUSIK
AN DER HOCHSCHULE FÜR MUSIK UND DARSTELLENDE KUNST IN GRAZ

ROBIN MINARD

SOUND INSTALLATION ART



SONDERBAND ZUR RINGVORLESUNG
" DIE KLANGWELT AM RAND DER DATENAUTOBAHN "

BEITRÄGE ZUR ELEKTRONISCHEN MUSIK 6

IMPRESSUM

Herausgeber:	Robert Höldrich Institut für Elektronische Musik (IEM) an der Hochschule für Musik und darstellende Kunst in Graz © 1996
Redaktion:	Robert Höldrich, Andreas Weixler
Druck:	Druckwerk Graz, Druckerei Khil
Erscheinungsort:	Graz, Österreich
Kontaktadresse:	Institut für Elektronische Musik (IEM) an der Hochschule für Musik und darstellende Kunst in Graz Jakoministr. 3-5 A - 8010 Graz, Österreich Tel.: ++43/ +316/ 389 - 7010 (Sekretariat) Fax: ++43/ +316/ 389 - 7008
Titelblatt:	Graphik aus der Komposition "Natté" von Helmut Dencker mit freundlicher Genehmigung des Komponisten.

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Wir hoffen, daß die Schriftreihe "Beiträge zur Elektronischen Musik" eine Anregung für Ihre wissenschaftliche und künstlerische Arbeit bietet.

Robert Höldrich & Andreas Weixler
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The series "Beiträge zur Elektronischen Musik" (contributions to electronic music) presents papers by the Institute of Electronic Music Graz on various topics including acoustics, computer music, music electronics and media philosophy. The contributions present results of research performed at the institute or edited lectures held by members of the institute.

The series shall establish a discussion forum for the above mentioned fields. Articles should be written in English or German. The contributions can also deal with the description of projects and ideas that are still in preparation and not yet completed.

Submissions and inquiries concerning already published articles should be sent to the address mentioned on the previous page.

We hope that the series "Beiträge zur Elektronischen Musik" will provide thought-provoking ideas for your scientific and artistic work.

Robert Höldrich & Andreas Weixler
(the editors)

Vorwort des Herausgebers

Der kanadische Komponist und Klangkünstler Robin Minard war 1995 und 1996 als Gastkomponist am Institut für Elektronische Musik in Graz. In dieser Zeit entstanden mehrere Klanginstallationen.

Darüber hinaus hat Minard ein Seminar zum Thema Klanginstallationen gestaltet, das im Sommersemester 1995 im Rahmen der Veranstaltungreihe "Die Klangwelt am Rand der Datenautobahn - Ringvorlesung zu Gegenwart und Zukunft der Computermusik" am IEM Graz stattgefunden hat. Weitere Vortragende der Ringvorlesung waren Miller Puckette, Mesias Maiguashca, Karlheinz Essl, Klaus Hollinetz, Norbert Schnell, Günther Rabl, Winfried Ritsch und Robert Höldrich.

Robin Minard's Arbeit "Sound Installation Art", der nun vorliegende zweite Sonderband der "Beiträge zur Elektronischen Musik", faßt den Inhalt seiner Vorträge zusammen und gibt einen Überblick über sein künstlerisches Schaffen der letzten Jahren.

Nach Abschluß der Sonderreihe wird den gesammelten Artikeln eine CD mit Tonbeispielen beigelegt werden. Bis zu diesem Zeitpunkt finden sich die Beiträge samt MIDI- und Audiofiles unter **`http://www.mhsg.ac.at/Ciem.`**

Die Herstellung dieser Publikation wurde von den Musikkuratoren des Bundesministers für Wissenschaft und Kunst unterstützt.

Robert Höldrich

Robin Minard

SOUND INSTALLATION ART

Abstract

Die vorliegende Arbeit behandelt das Thema Klanginstallationen unter dem Gesichtspunkt meiner eigenen Arbeiten im Bereich der Elektroakustik. Das Konzept Klanginstallation wird zuerst allgemein in Beziehung zu Installationskunst und zu herkömmlicher Komposition gesetzt. Besondere Berücksichtigung findet das Konzept von elektroakustischen Klanginstallationen, die speziell für öffentliche Räume geschaffen werden. Für dieses Umfeld werden Richtlinien und neue Methoden für das Arbeiten mit Klang vorgestellt. Die Beschreibung eigener Installationen, die zwischen 1984 und 1996 entstanden sind, sollen die praktische Anwendung dieser Prinzipien demonstrieren.

This essay examines the subject of sound installation art with reference to my own work in the area of electroacoustics. The concept of sound installation is discussed in relation to installation art in general and to conventional music composition. Focus then narrows on concepts of electroacoustic installations designed for public spaces. Guidelines for new methods of working with sound in this context are suggested. Descriptions of my own installations created between 1984 and 1996 serve to demonstrate the practical application of principles proposed.

Contents

Introduction

The following text originated from a seminar which I gave on the subject of sound installation at the Institut für Elektronische Musik Graz during the summer semester of 1995. This seminar was part of a series of lectures presented under the title *Die Klangwelt am Rand der Datenautobahn — Ringvorlesung zu Gegenwart und Zukunft der Computermusik*.

Objectives of my seminar were to introduce students to the idea of sound installation as well as to acquaint them with my own work as a sound installation artist. This text is structured in a similar manner. It first gives definition to general concepts of sound installation, situates my work in relation to these definitions, and then supplies specific information about past and present installation projects. During my stay at the IEM during the summer of 1995, a new installation project was developed. This project is briefly outlined in the final part of my text.

Because this publication will be read by an English and German public, I have left quoted German texts in their original form and followed them with English translations.

I wish here to extend special thanks to Prof. Heinz Hönig and Dr. Robert Höldrich of the Institut für Elektronische Musik for their invitation to Graz and for their support of my work in the studio. I also owe thanks to Norbert Schnell for his patient help with the computer programming of my installation project.

1. Sound Installation Art

Over the past years the term *sound installation* has been used to describe a wide variety of interdisciplinary art making. The term has been adopted with reference to any number of works which in some way integrate the element of sound — generally in a non-conventional manner — and which may otherwise be hard to categorise. This very broad use of the term has made it difficult to propose one single, clear definition for the concept of sound installation. As part of the broader category of *installation art* the term may be more exactly understood. This category of works has been defined as an art form "which rejects concentration on one object in favour of a consideration of the relationships between a number of elements or of the interaction between things and their contexts".[1] In sound installation, we find this particular quality of relationships to be expressed between the audio, visual and/or architectural elements of the work and secondly between the sound and the space for which the work is conceived as well as between the sound, the space and the observer.

Installation art has been described as being "concerned not only with art and its boundaries, but with the continual rapprochement, or even fusion, of art and life".[2] We will find this to be an ever more relevant aspect of sound installation as works are increasingly created for presentation within everyday environments and situations.

Interest and activity in the area of sound installation has increased dramatically over the past decade. Such an increase in involvement on the part of artists may be seen simply as a natural tendency for them to fuse various artistic areas within their exploration of technology or, even more simply, as their direct reflection of our multi-media oriented society. I would argue that the cause for this rise in activity lies more deeply within a basic need for artists to merge (or re-merge) art with life; with a need for them to find new and socially relevant modes of artistic expression.

In my own work, the idea of sound installation has meant something very specific: the integration of sound in public environments and therewith the merging of works not only with existing architecture but also with everyday situations and real functioning surroundings. Visual elements of my work have been linked to acoustic considerations and to the broadcasting of sounds in specific ways. Such work

[1]Nicolas de Oliviera, Nicola Oxley and Michael Petry. Installation Art, Thames and Hudson, London, 1994. p.8

[2]ibid. p. 7

inevitably eliminates the boundaries which exist between conventional forms of art making (music, visual arts and architecture) and creates new relationships between the art work itself and the art "consumer".

The *fusion of art and life* is an essential aspect of the installations. One of my primary concerns has been to establish a dialogue between the work I create, the space within which I install the work and a public who either experiences my work in passing or who lives or functions with my work over a longer period of time. My installations most often aim to intensify the public's experience of the chosen space or to provide the public with a new or enriched perception of their surroundings. In this sense the essence of the art work is expressed not solely through the work itself but rather through the relationship which is established between the work and the space for which it is created.

As a composer, when I began creating sound installations in the mid-1980's, these concepts created a confrontation that required a very new approach to music making. First and foremost, it meant conceiving works within a new social context. The removal of music from the traditional concert hall and the placing of it in the much less formal surroundings of public spaces held implications not only for the character of the music itself but also for my basic attitude as a composer. Emphasis was now to be placed on adapting works to existing conditions and on the merging of them within given surroundings. This meant that the specific needs of the individual space would guide the creative process, that in essence "the artistic component [of the work] would be supportive rather than primary".[3] This approach contrasted sharply to the traditionally isolated act of music composition, to its autonomous conception and to its almost exclusively spectacle-oriented character of presentation.

Within such a new approach to music making, traditional musical concepts of form and structure, of register, rhythm, timbre and so forth, seemed inadequate and unsuitable. Traditional methods and goals were therefore re-examined, and the groundwork for a new approach to working with sound was proposed.

Differences were to be reflected not only in the general objectives of the works and in their ultimate "musical meaning", but also in their most basic aspects of conception such as sound medium and methods of broadcast. The fact that works would be designed for integration in public environments in *permanent* or *semi-permanent* fashions strongly influenced artistic choices in these areas. Thoughts were eventually directed exclusively to the field of electroacoustic music and to the non-conventional use of loudspeakers. As this essay proceeds, it will become clear that the medium of

[3]Barry Truax. Letter to the author. July 4, 1995.

electroacoustics is particularly suitable for the concepts proposed. Electroacoustics permits the broadcast of sounds in a continuous fashion and within an unlimited time frame. It allows the creation of quasi-static sound textures — which may be employed to homogeneously "colour" space with sound. Furthermore, it allows for the controlled movement of sounds through space, the creation of new acoustic situations and the slow metamorphosis of sound-space applications.

From this point on, I will deal specifically with sound installation concepts pertaining to electroacoustics. This is not to rule out other sound installation applications which might hold similar objectives or aesthetics (for example sculptural works involving the acoustic generation of sounds) nor to say that the principles proposed here may not be applied to other mediums. But as we narrow our focus on the specific genre of *electroacoustic* sound installation, it will become clear that this medium is the most flexible and appropriate for the processes I wish to describe.

2. Building New Realities

Laying the groundwork for this new approach to working with sound requires the understanding of two basic concepts. The first concept relates to form and musical syntax and deals with the idea of a "non-narrative" mode of musical expression. I will deal with this concept at some length below. The second concept relates directly to the medium of electroacoustics and deals with what I will call, for lack of a better term, "non-high-fidelity". Because this second concept deals not only with basic technical questions, but also with our complex relationships to media and technology, describing it in any depth would take me outside the scope of this essay. For the purpose of this text it will suffice to briefly point out the fundamental differences which I would draw between concepts of "high-fidelity" and "non-high-fidelity".

High fidelity is concerned with conserving a musical work — most often as a recording on tape or CD — and with reproducing this product as faithfully as possible (hence the term high-"fidelity"). In the case of hi-fi, the tape or CD becomes an entity on its own; it is transferable to other locations and situations; we *reproduce* its sounds on loudspeakers with varying degrees of fidelity.

In the case of sound installation, such concepts of fidelity and reproduction do not exist. In sound installation there is an inseparable relationship between the sound source, the method of broadcast and the space for which a work is conceived. Collectively these function together to form a single entity. There is no notion of transferring the work to other locations (except perhaps to very similar locations) because transferring locations inevitably changes relationships within the work. In sound installation — unlike hi-fi — we are not listening to what the speakers represent or reproduce or simulate. Sound installation is concerned with building real spatial experience. It deals with building *new* realities and not with *re-constituting* or *simulating* them.

It is exactly for this reason that one may frequently find the use of low-fidelity loudspeakers in sound installation projects. Speakers are often chosen for their individual sound characteristics related to specific projects rather than for their ability to respond faithfully to any number of inputs. In the area of sound installation a speaker with a non-linear frequency response is *not* a bad commodity.

Within the context of high-fidelity vs. non-high-fidelity, it is important to note one more point: Virtual Reality (which in the domain of electroacoustics is often confused with sound installation) is, in its basic form, an extension of hi-fi. The area of Virtual Reality is concerned with *representation*, *reproduction* and *simulation* and is not "installation art" as defined.

The other important concept related to sound installation is that of a non-narrative musical

expression. Guidelines within this mode of expression place emphasis on acoustic and psychoacoustic principles rather than on traditional musical concepts. Musical parameters such as register, timbre and rhythm take on new meanings as work is guided by the influence of sound elements on spatial perception rather than on the listener's interpretation of a musical narrative or a particular musical syntax. The overall approach to this non-narrative method of working with sound is founded on the basic notions that sound has a direct influence upon our perceptions of space and that we are integrally affected by the sounds which surround us.

My own investigations have revealed two fundamental and contrasting categories of works or methods for working with sound in this manner. These are concepts which deal with the *conditioning* of space and concepts which deal with the *articulation* of space. I will now briefly outline these two contrasting categories. (Each of these categories, and the role of individual sound parameters within them have also been described in my book *Sound Environments / Klangwelten*.[4])

The Conditioning of Space

In general, the "conditioning of space" implies the creation of a static or uniform spatial state — that is to say the "colouring" of space or the utilisation of sound masking to dissimulate other (unwanted) sounds. The term static is employed to describe the immediate nature of a space. It does not exclude slow evolutions in spatial characteristics.

This type of sound application is best described with visual analogies. When working with sound in this manner, one may refer to the "light colouring of space with sound", or to sound's "luminous" effect on the character of a space. Spatial conditioning has much to do with both our conscious and unconscious assessments of general spatial qualities. Here, I am referring not only to sound's influence on our perceptions of the general character or "atmosphere" of a space, but also to much more specific spatial assessments such as perceptions of spatial volume or depth.

We are all familiar with the visual effect of painting the walls of a space with a dark colour. Here, the space seems to close inward. We perceive the space visually as being much narrower than if those same walls were painted with a light colour. There is a direct parallel in working with sound. Experience has shown that different types of sounds, when broadcast homogeneously within a space, may cause that space to appear open and voluminous or close and intimate.

[4]Robin Minard, Sound Environments / Klangwelten, Akademie der Künste, Berlin, 1993.

We do in fact perceive space with our ears as much as with our eyes. Sounds orient the body in space and even guide our visual interpretations of our surroundings. Through factors such as room reverberation time, resonance, sound-reflection characteristics and types of frequency absorption, quite accurate impressions of spatial dimensions, architectures and even construction materials are ascertained by the ear. Once we accept the fact that sound plays such an intricate role in our perceptions of physical space, we must also recognise the fact that the sounds we put into a space can affect our subjective, physical impressions of that space. From this perspective, architecture is no longer a static, hollow object but rather a multi-sensory event; sound composition deals as much with architectural as with musical concerns. With the application of sound we are able to change the perceived character and volume of a space. With slow temporal changes in the characteristics of these sounds, architecture becomes fluid, subtly evolving over time.

It has been pointed out by architect and sound-artist Bernhard Leitner that *time* is not usually considered to be a part of traditional architectural concepts, except perhaps in very elementary ways such as within considerations for the changing of natural daylight in the morning and evening.[5] In the context of his own work, Leitner was referring here to specific uses of sound for the demarcation of space in a very localized, physical sense. His own concepts are concerned much more with the articulation of space rather than with spatial conditioning. But his reference to natural light has brought me to the conclusion that certain applications of sound may influence our perception of space in a manner comparable to that of light, and that a musical form can express an architectural metamorphosis which might best be described as a type of *luminous evolution*.

Musical register has been found to be a particularly important element in this type of spatial treatment. With the accentuation of different registers, we may obtain the effect of "heavy and sombre" or "light and clear" spaces. This hypothesis gave rise to *Music for Environmental Sound Diffusion*, a work I created in 1984. This work, an electroacoustic music composed on tape, was conceived for broadcast over ten ceiling-mounted loudspeakers and two loudspeakers installed at floor-level and placed under large wooden resonators. The installation was first presented at Montreal's Tangente gallery in a large entrance and passage area (situated between a performance hall and office spaces). The use of auto-reverse tape players allowed for an uninterrupted broadcast in the installation space.

The aim of the work was to create a perfectly uniform and continuous spatial effect. The ten overhead loudspeakers, distributed at equal intervals throughout the space, created an unbroken

[5]Bernhard Leitner, in an interview with the author, Berlin, November 18, 1985.

layer of sound above the listener. The floor-level loudspeakers, placed in two corners of the space and installed under large resonators, accentuated certain lower frequencies in the overall sound. This offered a warm acoustic colour to the tones, helping immeasurably to immerse the listener in a quasi-static sound state. Slow evolutions in the accentuation of musical registers were composed on tape.

Similarly in other works which are designed to condition space, the intensity of sound was found to be a fundamental factor. As a rule, one should look for an intensity which entirely fills and colours the space without exceeding an effect of colouration or luminosity.

The theory that the accentuation of musical registers may influence our perception of space, and that there exists an apparent relationship between the influence of sound and the influence of light on this perception, is supported by Kurt Blaukopf in an article which appeared in *la Revue Musicale* in 1971. In "Space in Electronic Music" Blaukopf states, that "the application of reverberation to bass frequencies gives the impression of 'obscure' space, while the augmentation of reverberation in the upper frequency range produces the impression of 'clear' space." Blaukopf continues "clarity and obscurity also existed in live conventional music: Besseler, Schering, Dart and other musicologists pointed out the 'clear' character of music played in baroque churches (where wooden interiors favoured an increased reverberation in high frequencies), as opposed to the 'obscure' character of music played in Gothic cathedrals (characterised by a longer reverberation time in bass frequencies)." He adds that "degrees of obscurity or clarity are, in live music, constants which can only be modified by transferring the concert to another building, whereas the gradation of light and shade can, in electronic music, be modified within the framework of a single musical structure."[6]

Although Blaukopf is referring here to an electroacoustic music conceived for the concert hall, we arrive (as concerns sound installation concepts) at the same conclusion: electroacoustics offers the possibility of modifying our perceptions of space through the use of sound. Through the use of electroacoustics we can simulate, independently of the broadcast area, different spatial qualities: "sombre" to "light", "static" or "evolving".

Furthermore, if a quasi-static sound texture — designed to condition space — is composed of precise frequencies or in precise frequency bands, it may also serve to mask certain "undesirable" sounds (either static or intermittent) which are present in a particular environment. It was at first astonishing for me to find that in my own installations in public spaces, even business persons would often choose to sit and carry on quiet conversation in areas where an installation was playing instead

[6]Kurt Blaukopf, "L'Espace en Musique Electronique", in La Revue Musicale, 1971, No. 269, p. 162. Translation:R.Minard

of going to offices where sounds of the installation could not be heard. This should not have been so surprising. The temporal fluctuation of noise is one of the most important factors in determining its tolerability, the integration of quasi-static "masking" textures in certain areas which are disturbed with intermittent noise, can help to make these spaces effectively calmer.

This effect of sound masking on the general quality of a space is considered to be an important factor in most of my sound installation concepts. This does not infer that the sounds of an installation are considered to be a "positive" element and the sounds of the environment a "negative" one, nor that the sounds of an installation should dominate or "drown out" the sounds of an existing environment. As stated at the outset, installation art is concerned with *relationships*. Here, a relationship must be established between the sounds which are introduced into an environment and the sounds which are already present. Because all sounds effectively mask other sounds, the effect of masking invariably comes into play in one way or another in most works which are destined for integration in real, functioning environments. In other words, sound installations partially mask existing sounds and are partially masked themselves. The matter of "cleaning-up" existing sound environments and the problems associated therewith are perhaps better left as the topic of another essay.[7] Suffice it to say that the objective of many of my works has been to create an atmosphere of silence, and that this is often achieved through carefully considering the role which sound masking plays in a particular work.

When considering the effects of sound masking, it is important to note the following points: 1. low-pitched tones produce a marked masking effect on high-pitched tones whereas high-pitched tones produce little masking upon low-pitched tones (all sounds, regardless of register, will considerably mask tones higher than themselves); 2. the auditory masking of one sound upon another is greatest when the frequencies of the "masking" sound lie within the same frequency band as those of the "masked" sound. In other words, it is possible to increase the effectiveness of a sound texture destined to dissimulate noise, by incorporating into the structure of the sounds themselves frequencies lying in the same frequency band as that of the noise or noises in question.

[7]Interested readers will find information on the area of "acoustic ecology" in the writings of the Canadian composer R. Murray Schafer (for example in his book The Tuning of the World). Important movements in the area of acoustic ecology are the World Soundscape Project — founded by Schafer in 1976 at Canada's Simon Fraser University — as well as the more recently founded World Forum for Acoustic Ecology, also SFU-based.

In his 1965 article, "Acoustical Privacy", American architect William Farrell alludes to this manner of integrating sound in architecture. Farrell's article states that in the acoustical planning of public buildings, "much of earlier work has been devoted to specifying what [noise]-levels should not be exceeded." He proposes, however, that there should exist "a second criterion which indicates levels below which noises should not fall."[8] For Farrell, an important element in the "insulation" of certain public spaces, apart from the installation of acoustical barriers, is the presence of a steady and low-level "functional noise" which would serve to mask disturbing sounds. Unfortunately, his solution for generating this steady noise is questionable from an artistic viewpoint: he proposes to generate a low-level noise through the use of undersized air diffusers and grills on the ducts of existing air-conditioning systems. Although Farrell is correct in his observation that a steady, low-level sound can serve to mask other "unwanted" and otherwise unavoidable sounds, it is argued that sound elements should not be introduced to *dull* our sense of hearing but rather to *sharpen* it. Even if one is not immediately aware of ambient masking sounds, it seems important to me that these sounds work on several levels. On the one hand they may well go unperceived, but at the same time they must invite a listening in infinite detail. Nature works in this way. As we are all aware, a walk in nature can be at one and the same time an experience of quiet solitude as well as an experience of great aural complexity. Here is an example of a silence of intricate and ever-changing detail, one which may be listened to in infinite depth.

Farrell's viewpoint may be extreme: it would be presumptuous to assume that in our battle against noise, we should simply coat all of our public spaces with a layer of continuous sound emitted from maladjusted air-conditioning systems. But experience indicates that the presence of a steady, low-level sound texture, with its ability to mask other sounds, can in fact make a space considerably calmer and therewith more favourable to concentration or relaxation.

I have touched on certain aspects which characterise the "conditioning of space". As suggested, concepts of this type are characterised by a uniform and quasi-static spatial treatment. Electroacoustics allow for absolutely continuous and homogeneous broadcasts. With the accentuation of different registers it is possible to obtain certain effects of colouring or luminosity. Additionally, sounds conceived to condition space are capable of masking undesirable noise. Register, timbre, and the specific frequencies which constitute a musical texture play important roles in the effectiveness of sound masking. In my consideration of the second category, namely that of "spatial articulation", I will examine sound from a different perspective.

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[8]William R. Farrel, (Bolt, Baranek and Newman, Inc., Consultants in Acoustics, Cambridge, Massachusetts), "Acoustical Priva
Architectural Engineering: Environmental Control, ed. Robert E. Fischer. McGraw-Hill Inc., USA, 1965, p.186.

The Articulation of Space

The "articulation of space" generally implies a spatialization of sound. It is concerned with the movement of sounds through space or the spatial localization of sound elements. Although convincing impressions of moving sounds are particularly dependent upon available technologies, psychoacoustics will support the experience that certain "musical" parameters are important contributors to achieving clearness in sound localization and spatial movement.

The preceding section emphasized spatial uniformity. From the point of view of sound broadcasting, we attempted to immerse the listener in a homogeneous sound state, an entirely static spatial condition. Let us now consider other types of spaces, spaces in which one would perceive gradations in colouring effects, where there would be different "regions" of colour or luminosity instead of one uniform spatial colouring. Let us consider spaces in which different musical elements would be localized at different points in space, or areas in which sounds would move through space in a sort of "decorative gesture".

In each of these articulated spaces, as was also the case in conditioned space, we will find that the properties of the sounds employed, as well as their methods of broadcast, play fundamental roles. Here we will be concerned with localizing sounds in space in order to create effects of movement, distance, or spatial depth in relation to the listener.

I have already pointed out that musical register, in association with reverberation times and specific types of broadcasting, plays an important role in the colouring of space. It must also be considered that since higher frequencies are much more directional than lower frequencies, register also enters into consideration in the localization of sounds and therefore in the articulation of space.

Psychoacoustic research shows that angular localization depends largely on the difference in a sound's intensity as it reaches the two ears. This variable loudness difference is caused by the shadow of the head. Since this shadow causes an intensity difference which is greater at higher frequencies than at lower ones, high-frequency sounds are much easier to locate.[9] This same research also tells us something about the relationship between musical timbre (the spectral content of a sound) and spatial localization. "Because the loudness difference at the two ears depends on the frequency of the sound, the quality of a complex sound is not the same at the two ears.... this difference aids in

[9]Vern O. Knudsen and Cyril M. Harris, Acoustical Designing in Architecture, publ. The American Institute of Physics for the Acoustical Society of America, USA, 1950, 1978, pp. 146, 147.

auditory localization."[10] We may conclude that by paying close attention to the *spectral content* of sound materials, even in the use of lower tones, one will gain some control over their amount of localization in space. Here, it is essential to note that the spectral character or "timbre" of individual sounds becomes an important compositional consideration. This consideration is directly associated with *psychoacoustic* concerns (i.e. with degree of spatial localization) rather than with more traditional musical concerns such as, for example, a sound's *dramatic* or *narrative* significance.

It should be emphasized that the degree of spatial localization of certain sounds, or of specific frequencies, will greatly depend on the acoustics of the installation area. Acoustic factors which have a decisive influence on the character of an installation are reverberation time, which frequencies are absorbed or reflected in the space, and the space's specific resonance characteristics. In the case of installations conceived for broadcast in diverse types of environments, it is possible to slightly "tune" the work with its broadcast location. This may be achieved through the use of graphic equalizers to alter dynamic levels at specific frequency bands, or through various methods of frequency shifting to change overall register (for example with "pitch shifters", tape-speed controls or MIDI-note shifting). In a work conceived for broadcast in a specific space however, it is preferable to incorporate the acoustic characteristics of that space into the music's conception.

In 1987, I experimented with using a space's specific resonant frequencies in a long foyer area in the main building of the Technische Universität Berlin. Because this foyer was situated adjacent to the university's electroacoustic studio, it was possible to carry out tests by feeding various types of sounds directly into the space. Sounds were broadcast over eight ceiling-mounted loudspeakers. Through the stimulation of the foyer's resonant frequencies it was possible to create an extremely quiet blanket of sound which spread very evenly throughout the entire foyer area. Here, the choice of a sound material with a minimal amount of harmonic content contributed to the absolute non-localization of this sound element in the broadcast space. Even when standing directly under a loudspeaker one was unable to localize the source of the sound.[11] It was possible to superimpose other types of sounds on this homogeneous layer. Spatial movements were composed in the form of intermittent gestures which ran along the length of the foyer area. In this case, the choice of sound materials with complex timbres and composed of frequencies *not* in tune with the resonance of the space resulted in the very perceivable localization of these sound elements along the foyer ceiling.

Here a combination of spatial concepts is noted. Through the same loudspeaker system, by using

[10]ibid.

[11]Within works such as *Dream House* , American composer LaMonte Young also aims at the entirely homogeneous broadcasting o
refers to this concept as "frozen sounds".

musical timbre and resonant frequencies to control degrees of spatial localization, it is possible to superimpose an articulated on a conditioned space.

In general, our ability to dissociate between sounds of similar timbre increases when these sounds originate from different directions. This factor allows for the combining of sounds of a similar timbre or texture in different parts of a space, without reducing the clarity and the independence of each sound element. At the same time, and for the same reason, the spatial localization of a particular sound considerably reduces its ability to mask exterior noise. The presence of certain conditioning elements, conceived for the masking of unwanted sounds and the light colouring of space, can therefore also be useful within a music concerned primarily with spatial articulation.

Until now I have emphasized the importance of register, timbre and room acoustics in the composition of sounds conceived for the articulation of space. There remain some general comments concerning other elements which also contribute to this type of spatial concept.

As already noted, spatial localization depends to a large extent on the difference in a sound's intensity as it reaches both ears. Beneath these interaural level differences, interaural time differences also play an important role in spatial localization. For this reason, our ability to localize sounds in the horizontal plane is slightly greater than it is in the vertical direction.[12] This fact must be taken into consideration within certain concepts or applications concerned with spatial articulation.

Most listeners also perceive high-pitched tones as being above lower tones in space.[13] In some instances, this allows the creation of a certain "spatial dimension" in a music which is broadcast from a fixed point. When sound moves in space above the listener, for example, it is possible to create impressions of either straight or slightly curved lines by varying the level of a sound's overtone content over its path through space. A line seems to curve subtly upward in space as its harmonic content increases.

Additionally, with regard to the relationship between register and vertical perception, a point may be taken from an article by American composer Henry Brant. From a different perspective, Brant observes that "in general, vertical height creates a persuasive impression of higher pitch, even when the pitches are not actually higher than those being simultaneously produced at a lower positional

[12]ibid. p. 163.

[13]A.S. Bregman and H. Steiger, "Auditory Streaming and Vertical Localization: Interdependence of 'What' and 'Where' Decisions in Audition", in Perception and Psychoacoustics, 1980, no page.

level."[14] According to Brant, the *position* of sounds in space can also influence one's perception of *musical register*.

In concluding, I note that the ear is "drawn" to rhythmic sounds. For this reason, certain rhythmic elements may contribute to the articulation of space. However, one must also consider the fact that rhythmic elements often lend themselves to narrative musical qualities rather than to the creation of spatial states. Apart from the micro-rhythmic structuring of individual sounds (sounds which are characterised by rhythmic pulses or by granular-like textures), rhythmic considerations in the area of sound installation are most often associated with rhythm of form, and not with immediate rhythmic or metric qualities.

[14]Henry Brant, "Space as an Essential Aspect of Musical Composition", in New Music Quarterly, no date, no page.

3. Walk-in Music

The preceding sections have proposed a fundamental groundwork for sound composition and concepts of sound installation in public environments. It should now be clear that we are no longer referring to a traditional musical language. The composer's intentions have changed. Whereas the traditional composer might, for example, have chosen a sound material for its narrative significance or symbolic meaning, choices now are based on quite different criteria. These criteria often have to do with psychoacoustic and architectural concerns.

This new approach to composing resulted in what has been referred to by Matthias Osterwold as a "Begehbare Musik" (translated as *Walk-in Music*). An excerpt from Osterwold's original German text, which appeared in the catalogue to my 1992 installation *Stationen*, is cited here. An English translation follows. This short text provides a good overview of points covered thus far.

Begehbare Musik

"Komponist oder Klangkünstler: Für Robin Minard sind diese Begriffe synonym, seit er 1984 begann, neben der Komposition von Kammer- und Orchestermusik mit ambientaler Musik zu arbeiten. Damit war eine Musik für öffentliche Räume gemeint, eine begehbare Musik, in der sich das Publikum frei bewegen kann, eine Musik, die sich im Hörer durch seine Bewegung im Raum und durch die Reaktion seines im Hörvorgang mitschwingenden Körpers konstituiert. Im Gegensatz zur 'Muzak', der allgegenwärtigen funktionalen Musikberieselung in Räumen des Verkaufs, Verkehrs und der Dienstleistungen, die darauf angelegt ist, überhört zu werden und unbewußte 'positive' Änderungen der Einstellung hervorzurufen, zielen Minards Installationen auf eine sanfte, aber immer schärfer ins Bewußtsein tretende Änderung der Wahrnehmung von Räumen und ihren besonderen akustischen und baulichen Gegebenheiten. Musik wird in spezifisch gewählte Räume und Situationen so implantiert, daß sich das *vorgefundene* akustische Environment mit *vorgegebener* musikalischer Substanz verbindet und vermischt.... Das Anliegen, Musik aus dem Konzertsaal herauszulösen und in den völlig veränderten Kontext offener Raumsituationen zu stellen, geht einher mit der Suche nach einer dafür angemessenen musikalischen Logik und Methodik, in der die elementaren musikalischen Parameter wie Tonhöhe, Klangfarbe und Rhythmus eine neue, mehr auf akustische und psycho-akustische Prinzipien denn auf traditionelle Konzepte gegründete Bedeutung erhalten. Dabei findet der Einfluß von klanglichen Elementen auf die Raumwahrnehmung ebenso Berücksichtigung wie die Wahrnehmung und Deutung visueller Information durch die Rezipienten. An die Stelle zeitlich-linearer Organisation tritt die räumliche Ordnung von Klängen in einer statischen, nicht-erzählenden Musik, die in ihrem Inneren bewegt und wandelbar, aber ohne zeitliche Gerichtetheit ist. Die Verräumlichung von Klängen wie umgekehrt die Umgestaltung von Räumen durch Klänge zielt auf die Durchdringung von Raumerfahrung und Klangerfahrung —

Räume werden zu Musikinstrumenten, während Klang Architektur moduliert und umprägt." [15]

(*Walk-in Music* — Composer or sound artist: for Robin Minard these terms are synonymous, since 1984 when he began working with ambient music alongside his composing of chamber and orchestral pieces. A music for public spaces was intended, a "walk-in" music within which the public is free to move about; a music which is constituted within the listener through his own movements in space and through the reaction of his own body, brought into sympathetic vibration through the processes of hearing. In contrast to "Muzak" — the omnipresent sprinkling of functional music heard in sales rooms and in transport and service areas, put there not to be heard and to give rise to unconscious "positive" changes in the surroundings — Minard's installations aim at gentle yet ever sharper, consciousness-entering changes in the perception of spaces and in their particular acoustic and structural qualities. Music is implanted in specifically chosen spaces and situations so that the *existing* acoustic environment fuse and mix with the *given* musical substance.... The matter of releasing music from the concert hall and putting it in the completely opposed context of the open space is accompanied by a search for a suitable musical logic and method. Elementary musical parameters such as register, timbre and rhythm take on a new meaning, based on acoustic and psychoacoustic principles rather than on traditional concepts. Here, the influence of sound elements on spatial perception must be given just as much consideration as the receiver's perception and interpretation of visual information. In place of temporal-linear organisation, a spatial ordering of sounds in a static, non-narrative music appears, internally moving and changeable but without temporal direction. The spatialization of sounds and, in reverse, the reshaping of spaces through sound, aims at the permeation of our spatial and sound experience — spaces become musical instruments, while at the same time sound modulates and remoulds architecture.)

Osterwold's reference to architecture, spatial perception and the concept of non-narrative musical form are essential to the idea of sound installation. Again, hearing is as important as seeing in our perceptions of space: sounds orient our bodies in space and guide our visual interpretations of our surroundings. I have suggested that through a new consciousness of sound, and through a basic understanding of the acoustic and psychoacoustic phenomena which contribute to our perceptions of space, the basis for new artistic techniques and new artistic expression may be developed. This sensory-based expression deals with the relationships which exist between the sound and the space for which a work is conceived as well as between the sound, the space and the observer. Furthermore, again, we are integrally affected by the sounds which surround us. The individual sounds present in a space and the overall sound character of an environment can either support or frustrate our intended activities there. In this sense, sound must also be considered a primary element in the creation of more humane and acoustically stimulating environments.

Generally, conventional musical concepts have dealt with narrative forms — closed and self-

[15]Matthias Osterwold. in Stationen, Freunde Guter Musik/Podewil, Berlin, 1992. pp. 4-5.

contained — communicated through a musical syntax which unfolds in time. These have been conceived as a function of the traditional concert hall or the traditional mode of music listening. By contrast, the new approach to sound composition which I have described considers the element of sound to be a main contributing factor not only to our conscious and unconscious perceptions of space but also to our conscious and unconscious relationships with our surroundings. It considers architectural space to be a multi-sensory event rather than a static object. It deals with art in general as a perceptual experience, the essence of which unfolds in space through our spatial perceptions and our perceptual investigations of our surroundings.

In most artistic domains, this *creation of psychological space* as a form of artistic expression is replacing traditionally more object-oriented concepts. Recent technologies have allowed for this new sensory-based mode of artistic expression. For the public this implies abandoning the concept of art as a static object — existing independently of space and time — and accepting space itself, and spatial perception, as a new medium for the communication of artistic thought. For artists it implies not merely re-examining traditional methods and goals but also re-evaluating the general role of art in society.

4. Sound Installations 1984 - 1996

In this section, I will describe several of my own sound installation projects. A complete list of installations appears on pages 46 to 49. I would like to stress that the guidelines summarized above did not dictate the creation of these works. On the contrary, after several years of creating sound installations I began to observe certain trends within my own approach to working with sound in public environments. These trends revealed intuitive manners of working with sound in this context. Once observed and understood, they became the basis for my technical guidelines, not vice versa.

Because there seems to be a logical progression in the development of my ideas over the past years — both in the audio and visual domains — my works are presented below in chronological order. I have not drawn any similarities between individual works nor have I categorised my works in any way, although the reader may wish to do so. Wherever possible I have tried to refer back to the concepts suggested in the earlier sections in order both to accentuate the principles I proposed there as well as to demonstrate their practical application within sound installation projects.

As mentioned at the outset of this essay, visual elements in my work are primarily linked to acoustic considerations and to the broadcast of sounds in specific ways. Visual elements, in other words acoustic sculptures or loudspeakers which are visually integrated in specific environments, are considered important in my work for two main reasons. Firstly, sculptural elements, the specific placement of loudspeakers or the use of multiple loudspeaker configurations are used to "process" loudspeaker sounds *acoustically*. This offers control over the specific colouring, spatialization and/or broadcast characteristics of sounds. Sculptural elements may, for example, serve as resonators or reflectors to diffuse or concentrate sounds in specific manners (see *Music for Passageways* 1985, *Soundwalls* 1988 and *Soundcatchers* 1991). Secondly, sculptural elements or the visual arrangement of loudspeakers disguise the loudspeaker itself. Remember that loudspeakers are associated with high-fidelity, re-constitution and simulation. We generally expect normal loudspeakers or loudspeaker boxes to serve this purpose. It has been my experience that the integration of speakers within sculptural elements or the visual integration of loudspeakers within specific environments frees the observer from conventional expectations.

In recent years, the visual aspect of my work has taken on an additional meaning. Since early 1994 a major part of my work has focused on the creation of *plant-like* loudspeaker installations. This focus began with a commission for an outdoor sound installation within the 1994 "Landesgartenschau" (a state agriculture and gardening exhibition) in Paderborn, Germany. For this commission I designed a series of five thin, vertical greenhouses containing waterproof loudspeakers. These speakers, together

with their attached wires, were arranged in plant-like forms; wild grasses grew in the greenhouses alongside the speakers. Although certain plant-like loudspeaker arrangements had already appeared in earlier works — such as in *Stationen*, 1992 — the use of nature as a metaphor has become a central theme in my work since the time of the Landesgartenschau commission. Plant-like loudspeaker installations have included *Klangweg* (1994), *Silent Music* (1994-95), *Weather Station* (1995), *Klangstille* (1995) and *Still / Life* (1996). These works are further described below.

In 1995, during my stay as guest composer at the IEM in Graz, I added to this metaphor with the development of a computer program to be used in combination with these plant-like installations. With the assistance of programmer Norbert Schnell of the IEM, a MAX program was designed to control the parameters of individual sound materials (for example the densities, durations, loudnesses and registers of various sound elements) according to ambient light, temperature and humidity. This allowed different sound materials to "grow and mature" under different light and weather conditions. The resulting system was first installed as part of the installation *Weather Station*, a sound space with 310 "piezo" loudspeakers, various temperature, light and humidity sensors and computer-controlled MIDI instruments (a description of this work appears below on page 40).

Descriptions of Selected Works

Music for Passageways 1985
Sculptural sound space with 32 pipes in well-tempered scale, 32 integrated speakers and 2 auto-reverse stereo tape players.

Presentations: Galerie Tangente, Montréal; Time Based Arts, Amsterdam; Musée d'Art Contemporain de Montréal; Gesellschaft für Aktuelle Kunst, Bremen; Technische Universität Berlin; Centre André-Malraux, Bordeaux.

Music for Passageways is conceived for integration in public areas such as entrance halls, large foyer spaces or other types of open indoor areas. The installation aims to create a heterogeneous field of sound in which musical register is distributed across space. The work creates a sound passageway within which the public is free to circulate.

Sounds composed on audio tape are broadcast over a modified loudspeaker system consisting of thirty-two pipes tuned to a well-tempered scale (with lengths ranging from 16 centimetres to 3,5 meters), thirty-two integrated speakers and two auto-reverse stereo tape players. This modified loudspeaker system — in which each of the thirty-two pipes is attached vertically above a loudspeaker — provides a quadraphonic sound field within which specific sounds are localized according to the

resonant frequencies of the tuned pipes. (Since most sound textures for the installation were produced on commercial synthesizers, the pipes were tuned to the well-tempered scale of these instruments.) Each of the four sides of the installation is composed of eight pipes tuned in ascending minor sixths, with each of the sides being tuned a semi-tone apart. In this manner the installation covers a maximum number of resonant frequencies, with fundamental frequencies and first harmonics included. In addition, each side of the installation is characterised by a unique series of fundamental resonant frequencies, i.e. an augmented chord.

The installation is installed in various fashions, but is always placed in a symmetrical manner with pipe lengths ascending from the four sides toward the interior of the space. Eight low-range loudspeakers are placed in the centre of the space, sixteen mid-range loudspeakers form a curved line from the centre outward, and eight high-range loudspeakers are placed at the periphery of the installation area. This type of physical distribution creates an environment in which musical register is spread out across space.

Music for Passageways allows for the spatial localization of different musical registers and timbres. The installation creates a space within which the listener perceives a certain depth in relation to sound. Depending on the contents of the magnetic tape the work may present either a spatial gradation in colouring effects or an environment where various musical elements are localized in different parts of the space.

Music for Passageways, Lichthof, Technische Universität Berlin. May 1987.
(Photo: F. Hein)

Soundwalls 1988
Sculptural sound space with 3 vertical resonators (310 cm, 276 cm, 246 cm) x 153 cm x 11 cm, 12 integrated sound transducers and 3 auto-reverse stereo tape players.

Produced at the Elektronisches Studio of the TU Berlin.
Presentation: Berlin Kongreßhalle, Kulturstadt Europas, Berlin, August-September, 1988.

Soundwalls was conceived for the main foyer of the Berlin Kongreßhalle. The aim of the work was to create a confined sculptural listening space — that is to say a small acoustically enclosed space where one might concentrate on the sounds of the installation — to be situated within an active entrance foyer.

The installation consists of three large vertical resonators, made of wood and coated with an aluminium-base paint. The metallic structure stands in an open triangle, allowing the public to circulate freely inside. The angles of the three walls create an acoustically enclosed area.

Four sound-transducers are attached inside each wall. The transducers transmit tape-recorded audio signals to the inner faces of the walls causing their thin surfaces to vibrate like loudspeakers. From outside the structure, a relatively quiet mixture of sounds is heard. From inside the structure — when one is surrounded by the three vibrating surfaces — sounds are reflected by the triangular arrangement of the walls and an intimate and much more present listening space is experienced.

Each of the three walls receives two channels of sound recorded on stereo tape and played back continuously over auto-reverse tape players. Although the structure is continually "active", periods of silence and varying degrees of activity are composed onto the tapes. The assignment of audio channels to the three structures alternates between walls so that stereo effects move *between* the walls, in other words *around* the listener.

Soundwalls, Berlin Kongreßhalle, Berlin Kulturstadt Europas 1988.
August to September 1988.
(Photo: G. Oteri)

Soundcatchers 1991
Installation for 4 wall-mounted sound reflectors with integrated microphones; 11 wall-mounted sound reflectors and 2 resonators with integrated speakers; computer-controlled MIDI instruments.

Produced at the Elektronisches Studio of the TU Berlin. Programming assistance: Holger Becker. Presentation: Wissenschaftszentrum Berlin, June 1991.

Soundcatchers was conceived for the courtyard of the Wissenschaftszentrum Berlin (the Berlin Social Science Research Centre). The objective of the work was to create a sound field which would change slowly in register and sound colour across the courtyard area. In addition, the sound content of the installation was to be regulated, with computer, by street noises from outside the installation site.

Various acrylglass reflectors with integrated microphones and loudspeakers were installed on the walls of the space. Reflectors with integrated microphones were placed at a height of approximately 15 meters and were directed toward the busy street in front of the building. A spectral analysis was periodically performed on the sounds picked up by the microphones. This spectral information was reshaped into various MIDI controls, thereby allowing sounds from the street to influence the sound content and activity of the installation.

Reflectors with integrated loudspeakers were placed in several parts of the courtyard. Small reflectors with various integrated high-frequency speakers were installed near the courtyard entrance and were directed into the open courtyard area. Relatively quiet high-frequency sounds played over these speakers were heard only from the courtyard side of the reflectors. Secondly, larger reflectors with integrated mid-range speakers, directed into the reflective corners of the courtyard, produced a diffuse sound colour further toward the interior of the space. Long resonators — such as those described in the installation *Music for Passageways* — with integrated low-range speakers were placed in a resonant area near one of the courtyard exits. This created a third area of low resonant sound. A gradual change in musical register and sound colour was perceived as one crossed the installation site. The activity of the installation itself reflected the overall activity of outdoor traffic sounds. This created slow changes in the character of the installation depending, for example, on the time of day or day of the week.

Soundcatchers, Wissenschaftszentrum Berlin. June 1991.
Sound reflectors with integrated speakers.
(Photo: G. Oteri)

Soundcatchers, Wissenschaftszentrum Berlin. June 1991.
Sound reflectors with integrated microphones.
(Photo: G. Oteri)

Stationen 1992
Installation with integrated microphones, various integrated speakers, and computer-controlled MIDI instruments.

Produced with the assistance of the Elektronisches Studio of the TU Berlin for the series Kunst in Parochial.
Presentation: Parochialkirche Berlin, July 1992.

The following description of *Stationen* was written for the installation's documentation catalogue. [16] Apart from describing the installation itself, this text also gives an idea of the general aesthetic of my work, especially in relation to those installations concerned with the light gradated colouring of space and the integration of sound in specific architectures.

[16] Robin Minard, in Stationen, op. cit. pp. 10-12.