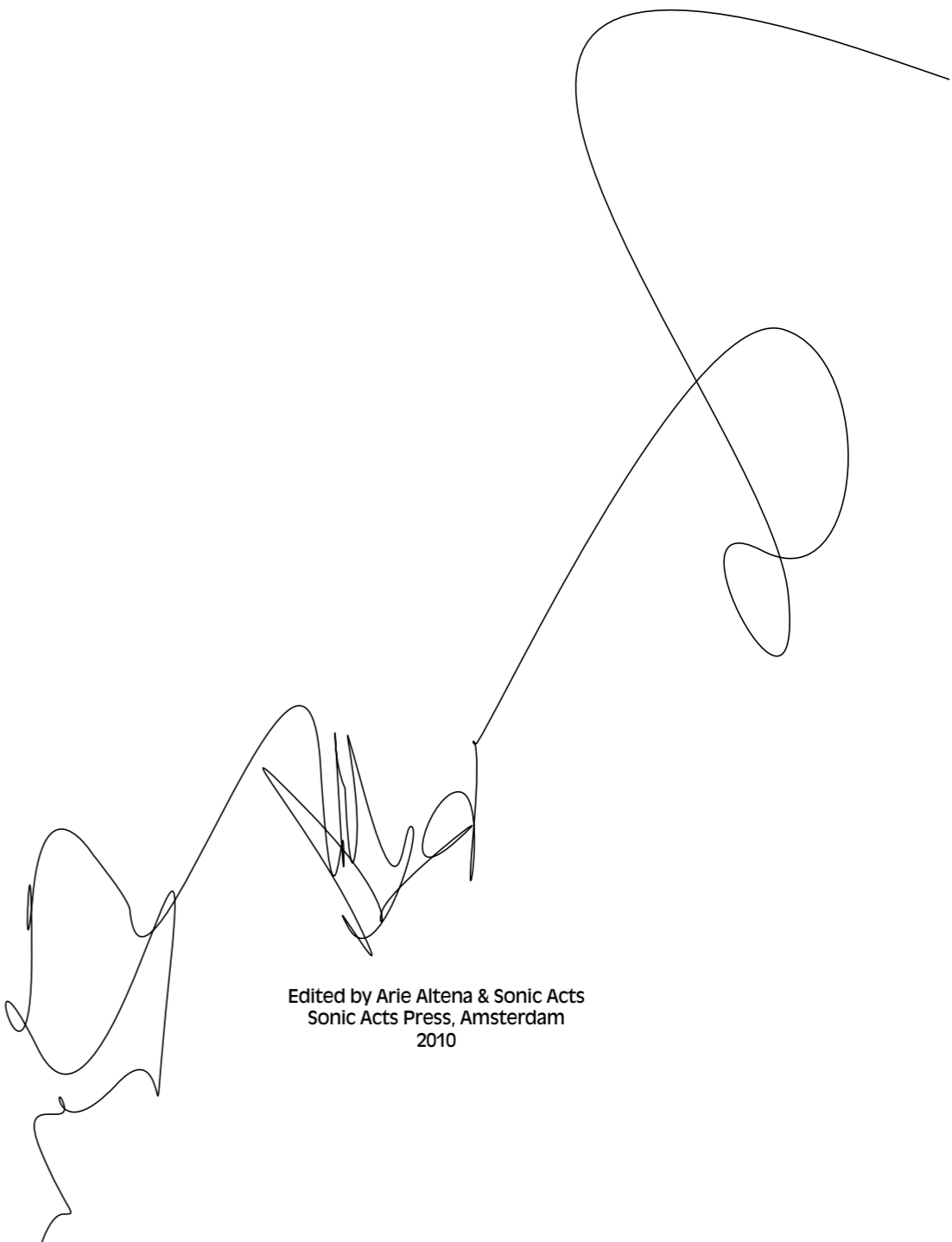
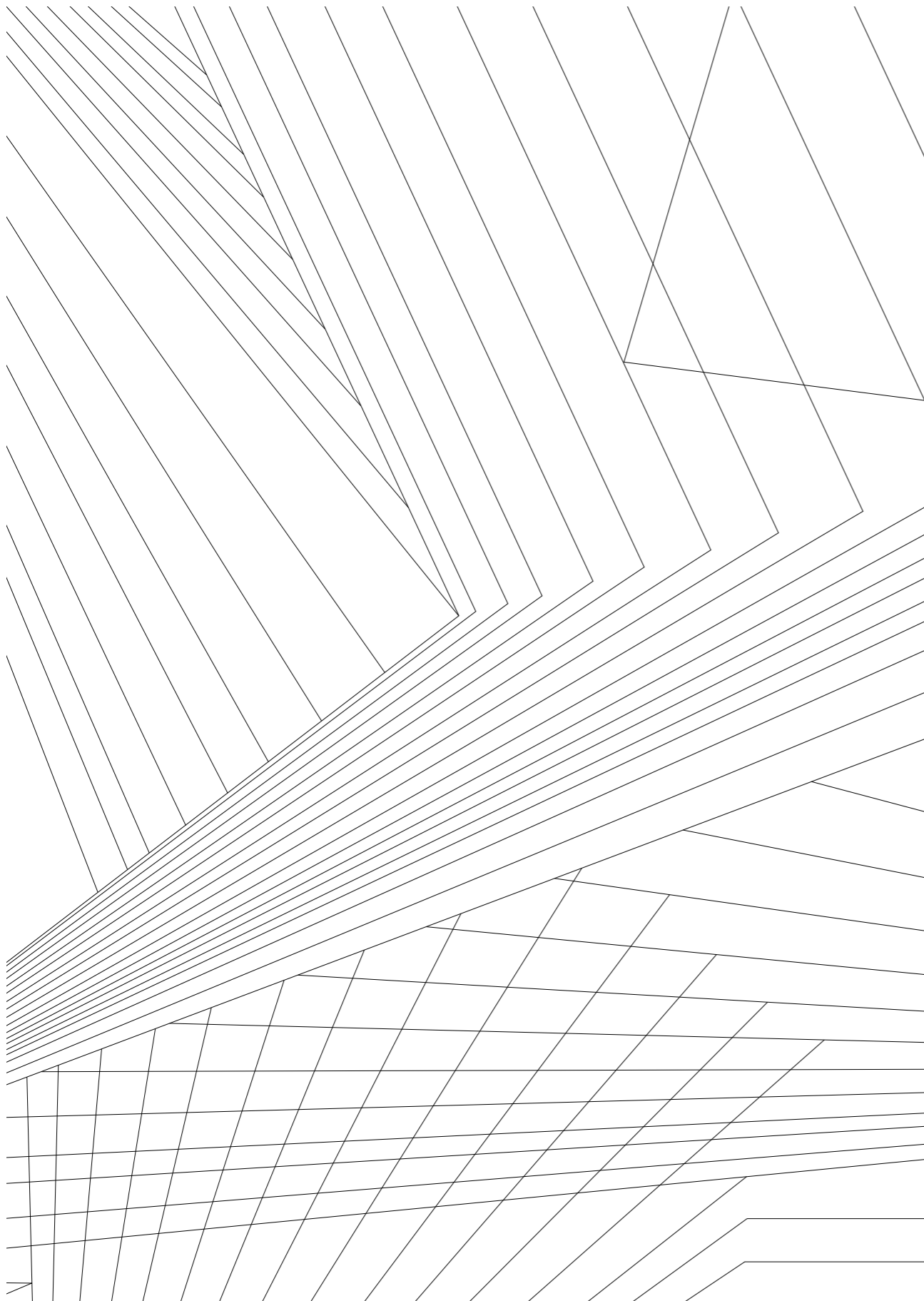


Sonic Acts XIII  
**The Poetics of Space**



Edited by Arie Altena & Sonic Acts  
Sonic Acts Press, Amsterdam  
2010

7

Introduction

22

Voice Over  
Brandon LaBelle

33

Approaches to  
Space and Sound  
Interview with Raviv  
Ganchrow by Arie Altena

51

Long Sounds  
Douglas Kahn

61

Extremities  
Maryanne Amacher  
in Conversation with  
Frank J. Oteri

75

Soundscape  
Composition  
as Global Music:  
Electroacoustic  
Music as Soundscape  
Barry Truax

93

Space is Something that  
Arrives with the Sound  
Interview with Takuro Mizuta  
Lippit by Arie Altena

99

Jordan Belson and  
the Vortex Concerts:  
Cosmic Illusions  
Cindy Keefer

105

E.A.T  
Pepsi Pavilion

111

Immersive Works for  
Complete Experiences  
Interview with TeZ  
by Arie Altena

125

Cyborg Ritual and  
Sentic Technology in  
the Vortex Concerts  
Trace Reddell

137

A Spatial Language  
of Light and Sound  
Interview with Edwin van  
der Heide by Arie Altena

149

The Hybrid Architectures  
of Iannis Xenakis  
Elizabeth Sikiaridi

161

Right Here, Right  
Now, HC Gilje's  
Networks of Specificity  
Mitchell Whitelaw

169

Space is Body Centred  
Interview with Sonia  
Cillari by Annet Dekker

179

Mental and Existential  
Ecology  
Juhani Pallasmaa

189

Diller + Scofidio  
Blur Building

199

Techno-poetry of  
Augmented Reality and  
Interactive Architecture  
Interview with Daan  
Roosegaarde by Arie Altena

207

The Diorama Revisited  
Erkki Huhtamo

229

Pixel Architecture is  
Media Architecture  
Interview with Marc Maurer by  
Arie Altena

237

The Poetics of Hybrid  
Space Changing  
Spatial Sensibilities  
and Ubiquitous  
Mediatization  
Eric Kluitenberg

249

Biographies

253

Image Credits

255

Colophon

# Introduction



This book was compiled and edited in 2009 during the development of the thirteenth Sonic Acts Festival. The research, ideas, and thoughts that led to the Festival, held between 25 and 28 February 2010, were the same as those that guided the compilation of this publication. This book is therefore a counterpart to the Festival, but not a catalogue. Although the title, theme and research are the same, the resulting product differs.

The title *The Poetics of Space* derives from the English translation of the book *La Poétique de l'Espace* (1958) by the French philosopher Gaston Bachelard. Bachelard meticulously described the influence of space and architecture on humans and implicitly argued for an architecture based on experience and imagination, not only on scientific knowledge and functionality. The guiding idea of Sonic Acts' *Poetics of Space* is the exploration of space and spatiality in art, sound, technology, and science. We focused attention on the physical spatial experience, on the physical and psychological impact of spatial designs in a society, which has increasingly put technologically mediated communication and immaterial data-streams at its centre.

The central motif of this book is an examination of spatiality in the arts, more specifically the poetry of (abstract) space and the (psychological) perception of space. In what ways do works of art approach and define space? In what ways do technological artworks examine the visual, auditory and psychological properties of spatiality? What developments have taken place over the past centuries in the relationship between technology, space and architecture? How have technological developments influenced our perception and conception of space and the ways in which we relate to the space around us?

Immersive installations, spatial sound, multi-screen projections, performances that combine sound and vision, and the innovative artistic use of technology often take centre-stage at Sonic Acts. The presentation of such works is combined with an interest in the scientific and conceptual background, and in works by precursors from the history of art and technology. For *The Poetics of Space* we were also interested in how technology redefines public, private, and intimate space, and how it has changed our orientation in, and awareness of, space. The interest of visual and media artists in such issues links up in interesting ways with the research and works of different generations of sound artists and soundscape composers

who have delved deep into our understanding of space through sound, and have enabled a profound exploration of specific spaces and environments. The idea that architecture and spatial design is not only visual, but speaks to all the senses, is a notion which not only informed Bachelard but also the Finnish architect Juhani Pallasmaa, whose *The Eyes of the Skin* was a profound inspiration for the Festival programme. Underlying all of this is not only a critique of ocular-centrism, but also an emphasis on the experiential aspect of art. Needless to say, these are wide-ranging issues that can hardly be covered in one book. But the aforementioned questions and issues do return, sometimes explicitly, sometimes implicitly, throughout the texts presented here.

Sonic Acts commissioned texts from Brandon LaBelle, Douglas Kahn, Trace Reddell, Cindy Keefer, Erkki Huhtamo and Eric Kluitenberg for this book. Brandon LaBelle's poetic performance-text explores how the speaking voice relates to space. Douglas Kahn's essay is about extremely long soundwaves, such as those produced by the eruption of Krakatoa in 1883, and also touches on electrical sound phenomena heard on telephone lines and the work of Gordon Mumma and Alvin Lucier. Trace Reddell interprets the legendary Vortex Concerts of Jordan Belson and Henry Jacobs in the light of cybernetic theory, space travel and cosmology. Cindy Keefer condensed her meticulous research of the Vortex Concerts. Erkki Huhtamo's media-archaeological account, shows how the form of the Diorama, which aimed at creating an immersive experience by creating an illusion of spatial depth, changed through the years from Daguerre's original Diorama to the modern miniature dioramas of popular culture. The essay by Eric Kluitenberg describes the effects of the use of mobile technology on our experience of public and private space and elaborates the concept of Hybrid Space, a spatial condition that characterizes the contemporary condition.

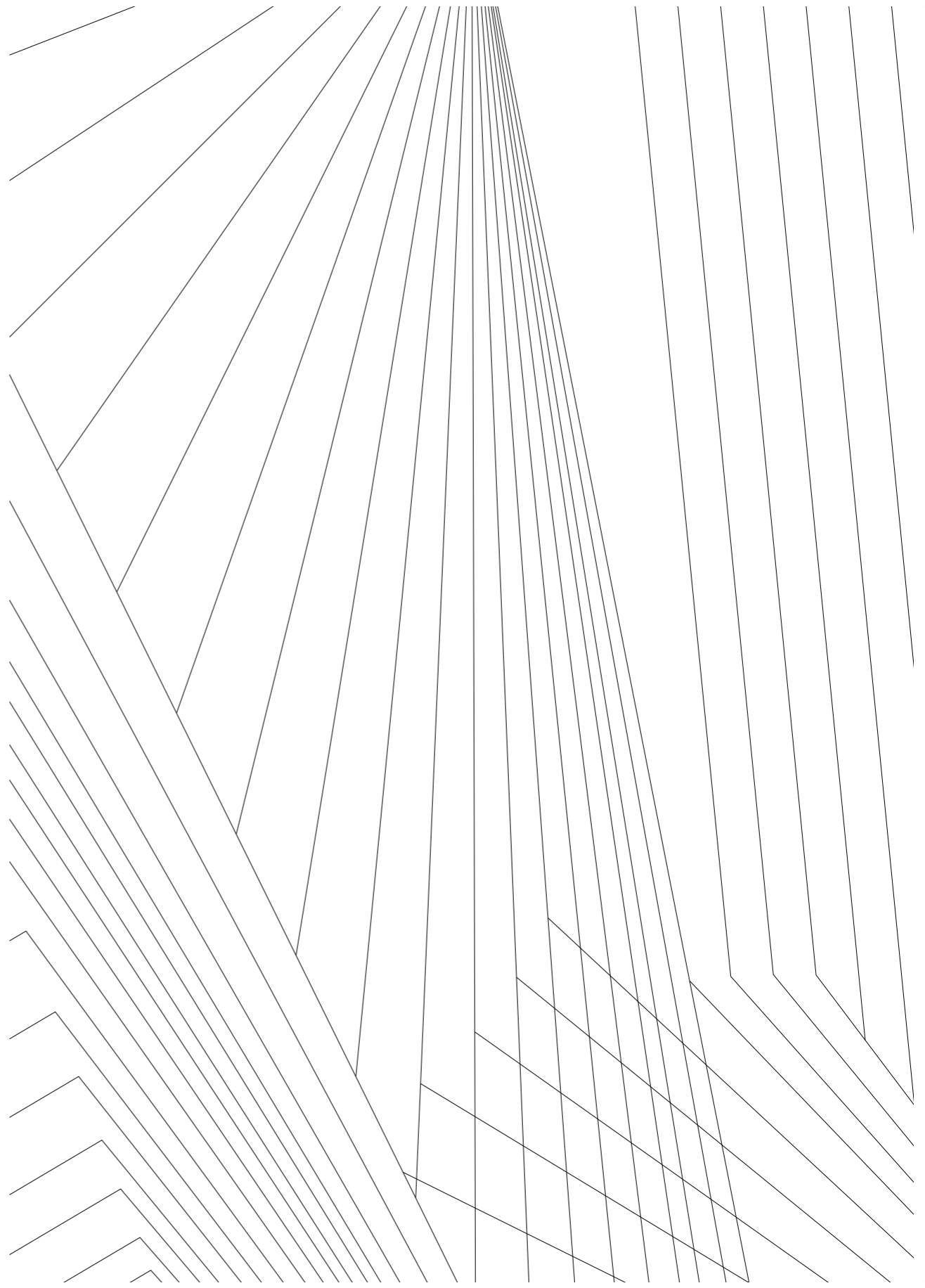
Barry Truax's previously published 'Soundscape Composition as Global Music' is included here because it is a clear overview of the original ideas and history of the World Soundscape Project (1973) and describes the evolution of soundscape composition. Mitchell Whitelaw's essay directly relates to the Sonic Acts XIII exhibition programme, which features a spatial installation by HC Gilje's; Whitelaw establishes a link between tangible spatial installations and immaterial network culture.

## Introduction

Juhani Pallasmaa's 'Mental and Existential Ecology' is a lecture from 2008, in which he pleads for an architecture that places the mental ecology of humans at the centre.

These articles are interspersed with interviews with artists, architects and composers – though these terms are not really applicable to contemporary practitioners. It is especially difficult to label Raviv Ganchrow, whose practical and theoretical explorations of sound and space are the subject of the first interview. Maryanne Amacher's work was very much on our mind while we were working on *The Poetics of Space*. We originally intended to invite her to participate in the Festival, but learned that her health was too frail. She passed away on 22 October 2009. While the Maryanne Amacher Archive has started to sort out her papers, we thought it fitting to re-publish a conversation between her and the American composer Frank J. Oteri from 2004, as it sheds light on many of her interests and furnishes an accessible description of some of her artistic intentions and concerns. Takuro Mizuta Lippit takes the perspective of a performer on working with space and sound. The interviews with TeZ, who works on immersive installations and performances that incorporate spatial sound and *flicker*, and with Edwin van der Heide, are concerned with their artistic and compositional ideas. The interview with Sonia Cillari focuses on the relationship between the body and the experience of (intimate) space. The interview with the Dutch artist Daan Roosegaarde deals with subjects such as Augmented Reality, liquid architecture and how society is radically changed by technology, while the architect Marc Maurer proposes a more down to earth view of architecture that is similarly influenced by contemporary technology. Some of the utopian architectural ideas about immersive environments that informed the thirteenth Sonic Acts Festival are represented by images of Iannis Xenakis' *Diatope* and *Polytopes* (with a text by Elizabeth Sikiaridi); the Pepsi Pavilion by E.A.T., realized in 1970 in Osaka; and the *Blur Building* by Diller + Scofidio.

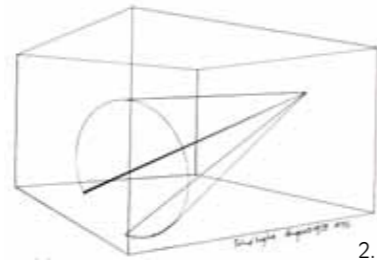
This is a book of many strands, sometimes loosely connected – sometimes tightly interwoven. Together they explore and give shape to a vibrant *Poetics of Space*.



The Poetics of Space



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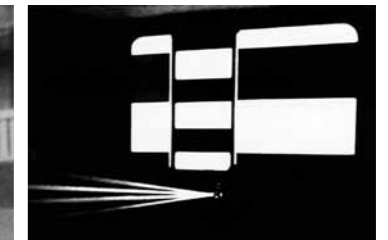
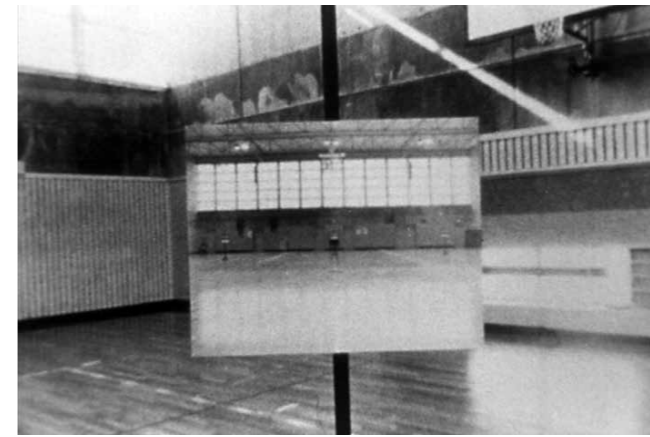


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Sonic Acts XIII



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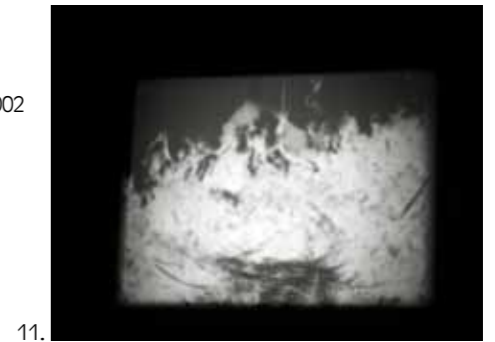


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10.

1. Anthony McCall, **Line Describing A Cone**, 1973
2. Anthony McCall, **Line Describing A Cone**, 1973
3. Anthony McCall, **Line Describing A Cone**, 1973/2002
4. Greg Pope, **Light Trap**, 2008
5. Yutaka Makino, **Conflux**, 2010
6. Lis Rhodes, **Light Music**, 1975
7. Takashi Ito, **Spacy** 1981
8. Lis Rhodes, **Light Music**, 1975
9. Robert Whitman, **Two Holes of Water 3**, 1966
10. Robert Whitman, **Two Holes of Water 3**, 1966
11. Bruce McClure, **And After Several Rapid Strokes of Their Wings**, 2009



11.



The Poetics of Space



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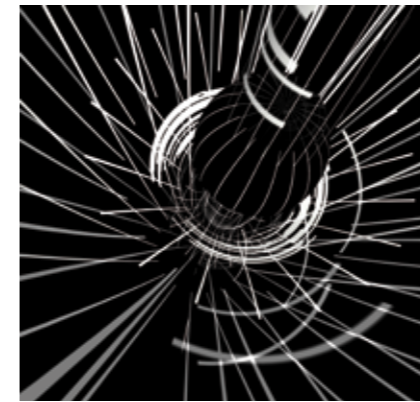
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Sonic Acts XIII



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1. Philip Beesley, **Hylozoic Soil**, 2009
2. Philip Beesley, **Hylozoic Soil**, 2009
3. Edwin van der Heide, **Sound Modulated Light**, 2008
4. Philip Beesley, **Hylozoic Soil**, 2009
5. The AlloSphere at the California NanoSystems Institute
6. Benny Nilsen, **Solid Curtain**, 2010
7. Paul Prudence, **RyNTH**, 2010
8. Jacob Kirkegaard, **Sabulation**, 2010
9. Jacob Kirkegaard, **Labyrinthitis**, 2007
10. Gill Eatherley, **Hand Grenade**, 1972



The Poetics of Space



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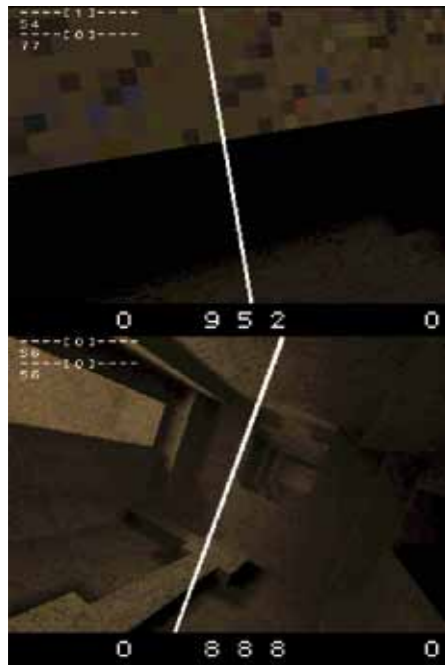


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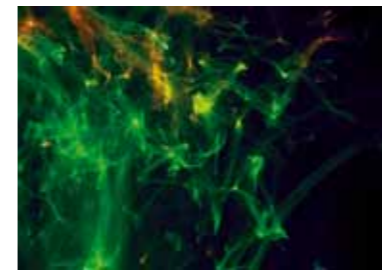
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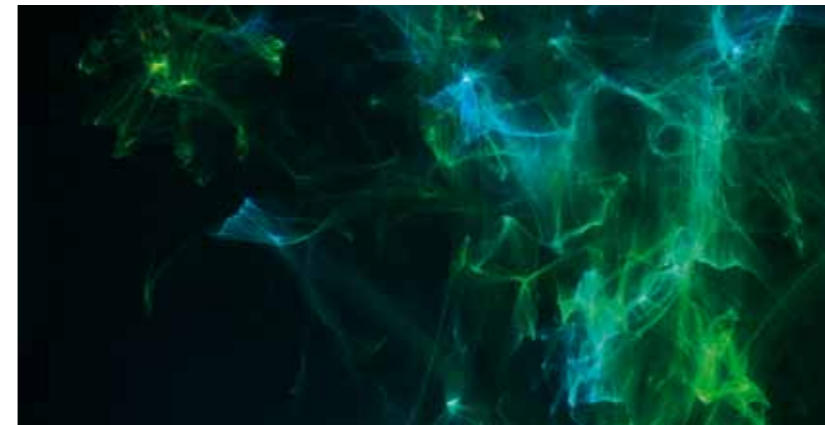
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Sonic Acts XIII

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1. Greg Pope, **Light Trap**, 2008
2. Evelina Domnitch & Dmitry Gelfand, **10000 Peacock Feathers in Foaming Acid**, 2008
3. Carlo Bernardini, **The Light that Generates Space**, 2009
4. JoDi, **SOD**, 1999
5. Carlo Bernardini, **The Light that Generates Space**, 2009
6. JoDi, **SOD**, 1999
7. Yoko Seyama, **Light work #6: In Soil**, 2009
8. Haswell & Hecker, **UPIC Diffusions Session #9**, 2007
9. Yoko Seyama, **Light work #6: In Soil**, 2009
10. Yolande Harris, **The Pink Noise of Pleasure Yachts in Turquoise Sea**, 2009
11. Yoko Seyama, **Light work #6: In Soil**, 2009

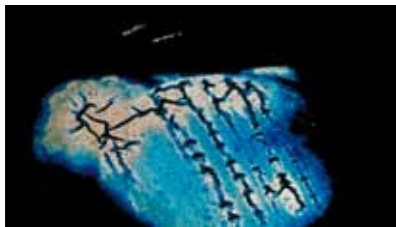


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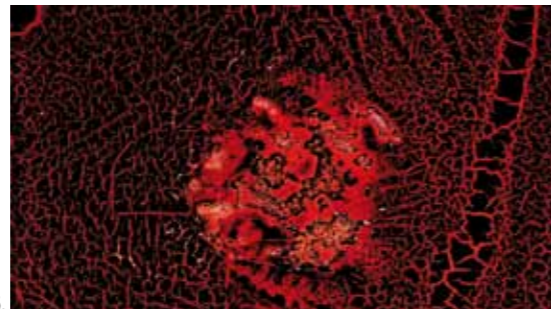
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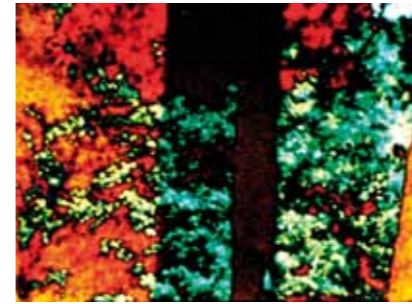
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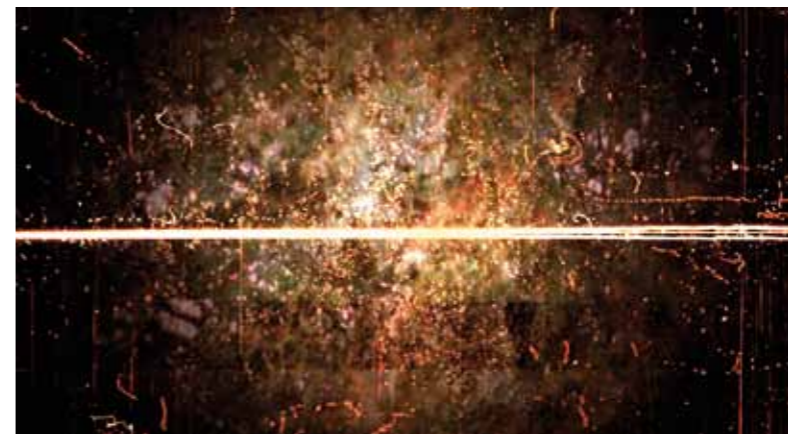
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Sonic Acts XIII

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1. Jürgen Reble & Thomas Köner, **Materia Obscura**, 2009
2. Jürgen Reble & Thomas Köner, **Materia Obscura**, 2009
3. Still from the Allobrain Project, for the AlloSphere, California NanoSystems Institute
4. Jürgen Reble & Thomas Köner, **Materia Obscura**, 2009
5. Jürgen Reble & Thomas Köner, **Materia Obscura**, 2009
6. Jürgen Reble & Thomas Köner, **Materia Obscura**, 2009
7. Daichi Saito, **Trees of Syntax, Leaves of Axis**, 2009
8. Daichi Saito, **Trees of Syntax, Leaves of Axis**, 2009
9. Makino Takashi, **Still in Cosmos**, 2009
10. Makino Takashi, **Still in Cosmos**, 2009
11. Bruce McClure, **And After Several Rapid Strokes of Their Wings**, 2009



The Poetics of Space



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Sonic Acts XIII



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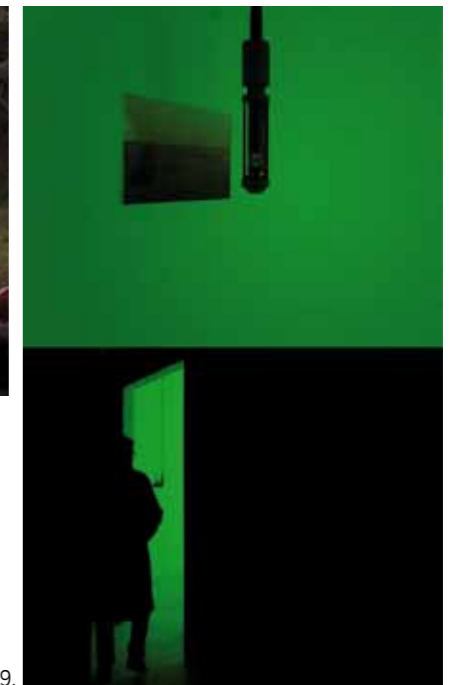
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1. Maryanne Amacher
2. Hildegard Westerkamp
3. Naut Humon at Recombinant Media Labs, 1984
4. Robert Whitman, **Two Holes of Water**, 1966
5. Edwin van der Heide, **Sound Modulated Light**, 2008
6. Jan-Peter E.R. Sonntag, **GAMMAvert**, 2010
7. Duncan Speakman, **as if it were the last time**, 2009
8. Studio Roosegaarde, **Liquid Space 6.1**, 2009
9. Jan-Peter E.R. Sonntag, **GAMMAvert**, 2010



# Voice Over

Brandon LaBelle

## Voice Over

I'm searching for the voice, as an index of sharing, as ground for intimacy, as a reassurance against the tumult and upheaval of this and that. And as that which sets this desire, this searching in motion by always already remaining separate, elusive – and which can never alleviate such tumult; the voice as a fountain of longing. *I always know when you're nervous because your voice shifts register, you hum between words, you pull the hair just behind your ear...*

...

I'm searching for the voice which got away, the voice as lost object, as a pivotal defining sound that overcomes distances, which eases pain to cast the space of this home, this room, into a scene of sharing. And which also breaks wholeness and inserts anguish through its disappearance, a continual vacating that is always part of its presence: the voice is already partial, shadowy, full of holes. I call this voice, *your* voice. Your voice is a play of intimacy, a voice which reciprocates my own – like a double, this other voice shadows mine; it is an echo as well as source of my voice: it is a voice inside my voice – and which vanishes into air.

...

This voice and my own form a difficult bond, a sonorous entanglement that flows in and out of time and space, *like that day I said I couldn't live without you, while the train passed underneath the city street.*

...

This other voice, that is, *your* voice, implicates and partly constitutes my own – your voice is like a vapour within my own, on my tongue. How might I stagger over this description to finally arrive at this relation, to linger over this interweave, for your voice and my voice is a confusion, of origins, of completions, of bodies and otherness, of presence and absence.

...

I stagger over the voice because it demands a strained listening – how can I ever hear all the voice contains and suggests? The voice exceeds representation – it is *more* than, which might be heard as the surfacing of unconscious fantasy, repressed desire, as an excess full of



complicated meaning, or as the beginning of love: to exceed oneself. The voice is a drama in which we exceed ourselves – the voice spills forth, because it must, *like when you told me about how you and your brother used to make radio dramas around the house using a small cassette recorder: capturing the voice, telling stories, making them up and playing them back, and giggling.*

...

In searching for the voice, in talking of this other one, I am also talking of my own. Listening for *your voice* is also listening for mine, yet on the other end, as a sending back through other words, other sounds, other vocalizations and vulnerabilities: your voice is then the giving of my own giving, as a second gift through which my voice resounds, and yours takes shape. A third body. Intimacy is such an intensity of speech, a shadowing and a making that makes all sounds potential and incomplete, for the voice is also always too-much: 'There is a too-much of the voice in the exterior because of the direct transition into the interior, without defences; and there is a too-much of the voice stemming from the inside – it brings out more, and other things, than one would intend. *One is exposed to the voice and the voice exposes too much...*'<sup>1</sup> Mladen Dolar's formulation sets the scene for my voice here, in this room – for I am speaking here, this text captures this voice, my voice which already leaves me and that is immediately part of yours.

...

We listen not only with the ear, but also through the voice.

...

The voice is already a form of media, staggering and displaced – as a telling too-much and a wanting too-much: of making another. For the voice in this sense is already an excess, an object – as Dolar further proposes, the voice is a by-product, a residue, an object found on the way to communication. My voice exposes and also conceals me; I hide behind my voice, it blocks my way, *like when I was a kid and I kept asking questions to the babysitter so as to delay the time I'd have to go to sleep (or to avoid having to say something else).*

...

How does this object take shape? Where does it go, during its itinerant journey?

...

Your voice goes in and out of me; I follow your voice, it takes my own – I lose my voice, in this tumult and swirl of voicing, of the back and forth. It comes back again, a whisper, a murmur, a laugh. You and I. Suddenly you are in my mouth. *I respeak you.*

...

The voice, as object, is lodged in the mouth; it gets stuck while departing; I can't find the words; yet the voice-object pushes the imagination into the thick of expression – it is a bully; this object is a primary production – I craft this object, as a material, yet it forces me into a certain presence, a specific body: I am accountable according to the voice; it carries me along. *You say, 'I couldn't believe it, did you hear what Brandon said yesterday?'*

...

The voice is a mouth-to-mouth.

...

It is also the beginning of media. Haunted materialization. An inside and an outside together.

...

The voice may be heard as a form of labour, to negotiate this inside and outside; a labour enacted to chart one's place in and amongst others: it produces 'you' as otherness so as to register individuation, an 'I'. *My voice here is an attempt to locate myself in and amongst all of you. It calls your attention. Who are you?* The voice, my voice, then is a cartographic implement driven by all the emotional and psychological instances of experience, dream, angst, love, ambition, as visions that come to bear down on language and end up in the mouth, and that works against space: my voice signals myself whether I like it or not, and yet which one both works over, like a material, and in turn is worked over by: the voice-object comes back into my mouth. In this regard, I can't get around myself: I am bound to it. I am its imprint.

Yet the voice also empties me out, it leaves me behind, signalling an ontological ambiguity or radicality: with the voice I am always me *and* never me; I am in turn always you and never you. My voice is in your mouth. In this way, the labour of the voice, enacted to locate oneself, to chart out and make apparent a sort of topography – to say, I am here, or? – brings forward an unstable proprietorship: I am the owner of my voice only in so far I must give it away.

...

The mouth-to-mouth is a gift economy.

...

How to hang on to the voice then, in the midst of all its emptying out, tumult and staggering? For certainly, the voice only retains its power and its beauty through a certain reliability: I trust the voice can work, to deliver myself, to save the other, even in the midst of my own dissolution. Your voice and my voice complete the other even in the midst of misunderstanding, mishearing, and the breaking and rupturing of the voice's circulation beyond the body. Might such reliability find itself through the ability to hear oneself? To hear the voice? That is, the voice demands continual rejuvenation; as soon as it leaves it requires resuscitation. As it falls from the mouth, a deflated excess, the ear picks it up, to not only bring it inside but to bring it into one's own mouth, as a transgressive movement. Hearing comes to animate the voice, to make it breathe as an object. To be heard is to find reassurance that my voice works: its dissipation beyond myself finds recovery in its incorporation into the other.

...

Your voice comes into me. It finds a home, only to leave.

...

I would like to talk about *my* voice, or the voice that remains my own – that is, the one I speak only to myself, undercover and out of bounds; the speech I utter only for my ears. I call this voice, this speech, my *secret voice*. This secret voice is mine and no one else's – it is a voice of self-dialogue, a voice that I both speak and hear at the same moment: I am the source and the recipient, mouth and ear all in one. I speak

to myself when walking down streets, making sure no one sees my mouth moving; I speak in an empty room, at home or in hotels, wondering aloud and making statements to myself, as a way to circulate what is only thought, to make it manifest, to put it in the air. This *speaking to myself* registers this thought, this concern, this wondering, as a life-form. I wrap myself in my voice, for comfort, to care for the momentum and excess of all that happens within and around the body, as raw senses and live nerves.

...

I speak under my breath.

...

I speak to myself because I need *my* voice. It comes at moments of happiness, wonder, anger... when the body requires support, when the mind threads its way into corners of indecision, curiosity, negotiation... and when the emotional life seeks a partner: this voice gives shape to that which can not be spoken aloud to others but which finds its way into articulation, just above the surface of the skin, *like the man on the train who always mumbles to himself*.

...

This *speaking to myself* is a form of rehearsal.

...

The geography of this voice, this secret voice, is neither inside nor outside, it is neither audible nor without volume, but resides and is manifest in the interstices of both – it comes forward as a crack: a crack which immediately signifies and marks a divide, a separation, a schism. This speech is a kind of letting out, a cracking open, so as to let loose what may demand audibility, and yet which must also, above all, remain secret: *my voice* then is mine only in so far as it leaves me; as a meeting ground, as a space, it incorporates what it picks up along the way, upon this trajectory from rising up from within and leaving the mouth, to return again through the ear passage, and into the collection of thoughts taking place. As with all sound waves, my voice collects and is inflected by its spatial coordinates, by the environmental properties, which partially influence its final hearing. This secret voice requires

some form of environmental conditioning – it needs a semblance of conversation, of public movement.

...

I address myself. I am my own voice-over.

...

I need to hear it. To converse with myself as if I am two, split as if another: and this voice is always the same, I recognize it as it speaks to me; it is a secret body reaching out to only fall back upon the flesh – to embrace itself, yet as two sides, an inside and an out, together. Self-media.

...

Allen Weiss emphasizes that, 'reproductive technologies create the paradoxical ontological conditions of simultaneously producing a duplication of and a gap within the real; a perpetuation and transformation of the past; a simulacrum of and prosthesis for the body. Henceforth, reproduction and creativity are no longer distinguishable; temporality can no longer be conceived of as linear and univocal; and human perception is inextricably intertwined with artificial prosthetics.'<sup>2</sup>

...

The voice is an exposed nerve.

...

I'm wondering about Richard Serra's early video work, *Boomerang*, which is set up as a speaking-machine: a woman wears headphones and speaks to herself, though her voice comes to her slightly delayed.

*Yes, I can hear my echo  
And the words are coming back on top of me  
The words are spilling out of my head and then returning into my ear  
It puts a distance between the words and their apprehension or their comprehension  
The words coming back seem slow  
They don't seem to have the same forcefulness as when I speak them*

*I think it's also slowing me down  
I think that it makes my thinking slower  
I have a double-take on myself  
I am once removed from myself*

The work brings the voice into a confusing intersection of word and sound, and in doing so, makes difficult the ability to comprehend, to speak freely, as a flow of thought. As the work reveals, to speak and listen are bound together, and the insertion of this prosthetic apparatus a stage for amplifying the embedded crack within. *Boomerang* stages a break into the fluid relation between the voice as an inner flow and hearing as an outer body. It makes available the crack between signifier and signified to finally open the voice to itself. *Boomerang* brings the voice back to itself, as a medial journey: the woman becomes her own ventriloquist.

...

The voice is always already a speaking-machine. An echo.

...

It is also a sort of architecture. The voice builds its own stage, constructs its own house, searching for a place to sit, or to reside. It needs another: it seeks out another body, a host-body. The voice is an object perennially dislodged or set loose so as to wander, to wonder, to wish for arrival: to find home. The voice is an adventure, a phantom limb.

...

Might the secret voice, the *speaking to myself*, act as a model for understanding the voice in general, as private media that is eternally rehearsing itself in the hopes of being heard?

...

The voice is both a sound, and a mode of hearing. It is the essential listening.

...



Alvin Lucier's *I am sitting in a room* shows the architecture of the voice, as a voice-room. The work searches for a new relation to the cracked voice, the cracking voice: he reworks the stuttering voice-box into a harmonic voice-room. Each cycle of the recording an elongation of Serra's *Boomerang*, with Lucier supplanting his stuttering voice to that of an architectural tonality. *Boomerang* locks the voice inside its own stuttering orchestration, bolting the latch onto its trapped impossibility, while *I am sitting* sets it free.

What then is this voice doing but performing the *I as process* on the way to communication, fulfilling Dolar's proposal that the voice is a by-product, a kind of left-over object, signalling the pulse of a body or the trace of a subject, which may or may not find completion in the voice of the other. It reveals the split subject, not as oozing interior or telepathic mind, but as a form of cracked communication.

...

Where then is my voice? Upon which map does my voice reside, and what is the work it undertakes? *This secret voice spoken only to myself, and which you will never hear*. I might speculate that *my voice* is precisely the work it takes to follow the crack, to trace the cracking always already in process as the ongoing thrust of being in the world. My voice may be the process to reflect upon, examine, and step back from the cracking already in place – while in the same instant, to instantiate my own existing multiplicity. That is to say, in speaking to myself I am already being mad, that is, a schizo, a double-agent, a spy onto myself, turning my voice into a kind of technology: not only to discipline the self, as Foucault uncovers, but to also always keep in touch with the embedded and inherent cracking that defines the self.

...

The voice is this secret pleasure.

...

My voice is mine because of this – where the body folds back on itself, defining language according to buried tongues, the vibratory rhythms against the back of the throat, like the backside to speech, this murmuring articulation of cracked communication, the heartbeat or the break beat of emotional becoming.

...

Might this voice, the voice that I may call my own, also perform as an education into how to listen? The crack of the voice is the beginning of hearing, for its labour is the making of another; as a territorial divide, as a registering of a space, external to myself, to allow other voices to surface.

...

A space of secret pleasures.  
Of hysteria.

...

The secret voice is a kind of diary.

...

Like the wisecrack, the voice cuts in, cracks conversation, interrupts and dips in to what is already there, while staging its own demand, its own giving, its own form of territorial act, leaping over boundaries while setting others up. The voice interjects always already as a sharing that is too-much, as an excess that invites a trembling of emotion, an intimacy that dances around the edges of conversation – the crack is also a kind of strip-tease revealing a flash of skin, a loose garment, an ankle or a shoulder, which sends shivers across the space of conversation. *Speaking to myself* then might be a kind of rehearsal enacted in secret, to tread across language in preparation of the final act: to script potential performances backstage. And in doing so, to tour the environment one's voice seems to contain or define, explore its limits, register its fevers and shortcomings, while confronting the shimmering aspects embedded therein.

...

Where is this voice now, on this page? Might these words also conceal others, hovering just below, the secret diary of the secret voice, and which surface, within the interstices always already there in language, and on the page? *I talk gibberish*.

...

Might the secret voice be heard as an emotional body; it aims to manage, through the sonority of voicing, the dynamics of feeling by moving toward language, yet a language only for oneself. A form of self-inscription for future playback: a scripted voice-over to be perennially retrieved.

...

As Upton Sinclair muses, 'Certainly we know [...] that every particle of energy in the universe affects to some slight extent every other particle. The problem of detecting such energy is merely one of getting a sufficiently sensitive device. Who can say that our thoughts are not causing vibrations?'<sup>3</sup>

...

The secret voice is a vibration.

...

#### Notes

1. Mladen Dolar, *A Voice and Nothing More* (Cambridge Mass.: MIT Press, 2006), p. 81.
2. Allen S. Weiss, *Breathless: Sound Recording, Disembodiment, and the Transformation of Lyrical Nostalgia* (Middletown, Conn: Wesleyan University Press, 2002), p. 101.
3. Upton Sinclair, *Mental Radio: Does it Work, and How?* (London: T. Werner Laurie, 1930), p. 119.

# Approaches to Space and Sound

Interview with Raviv Ganchrow

Arie Altena



Raviv Ganchrow creates sound installations that make space audible through sound interventions. In his work he researches the relation between space and sound on the most fundamental level. He bridges the fields of architecture and sound, music and spatiality, and studied both architecture and sonology. When talking about his work he touches just as frequently on art history and architectural theory, as he does on modern classical music, the history of sound recording technology and the changes in listening behaviour. I interviewed him in his house in Amsterdam in October 2009.

You have a background in architecture and sonology, and you are primarily interested in the relation between space and sound. How do you connect those disciplines?

The relation between sound and architecture has been a blind spot for a long time, at least in the way architecture is being taught. My personal interest in sound extends to a period before my studies in architecture when, back in Israel, I was creating sculpture and installations that often had a sonic component. The particular school I attended in New York to study architecture allowed for independent research, and already in the first year I was auditing a course on audiology in a nearby medical school because I was interested in the biological structure of the ear and the listening apparatus. At the time I was trying to find material on sound and architecture, but at the school of architecture, the only book on acoustics was Wallace C. Sabine's *Collected Papers on Acoustics*, an original publication from 1923, filled with dust, and it seemed as if nobody had ever lent it from the library. I was trying to piece together a history of sound and architecture that I thought was there, but that turned out to be virtually nonexistent. At that time, it was manifest in pockets that were not necessarily connected. Only in the last ten years or so, there has been a substantial increase in the number of books published around this topic.

What are the pockets where thinking on sound and architecture were present?

I immediately think of the architecture of concert halls, and spatialization of sound in electroacoustic music.

Various disciplines have touched on the connection between sound and space and on relations between listening and the environment of sound. It ranges from anthropology and physics to art history, media studies and music theory. You can find interesting aspects in less obvious fields, such as archaeology, that have recently coined the term 'archaeoacoustics'. While studying in New York I was rather naive about the European history of early electronic music that was already dealing with questions of phonography and spatialization since the late 1940s, not to mention the earlier histories of polychoral music. Since my time at Sonology, I have become much more attuned to the connection between sound and space in the history of music, as well as in the development of purpose-built acoustic spaces, for instance the history of the concert hall. Greek amphitheatres already show a rather clear understanding of tectonic arrangements that facilitate an efficient transmission of voice. But an architectural construction founded upon an applied knowledge

of acoustics is a rather recent development. It was only in the late nineteenth century that the acoustic fingerprint of the Neues Gewandhaus in Leipzig was successfully reproduced in the design of the Boston Symphony hall by utilizing Wallace Sabine's newly discovered coefficients of absorption. And in many ways we are still replicating the aural yardstick propagated by the Leipzig 'shoe box' design. A more obscure instance of acoustics applied to building practices can be found in the example of the so-called sound mirrors – a proposed network of listening structures forming an early warning system, or listening shield, along the eastern coast of Britain. In the late 1920s the military built several large-scale prototypes of these mirrors. It ended up being a transitional technology so they were never really used in wartime, but in the project they achieved a sophisticated implementation of acoustic principles by relating frequency sizes to the dimensioning of built structure as well as achieving amplification using only physical acoustics. I conducted research into the remaining mirrors at the Denge site on the Kent coast and have published some thoughts on the topic. Aside from the looking into how these structures operate physically, I was interested in reading the case of the sound mirrors as a formative moment within the broader reconfiguration of listening habits – when an optic model of viewing is replaced with an acoustic model of listening. There are other instances where one can possibly locate paradigmatic shifts in the understandings of sound in relation to the techniques of listening. Early collaborations between Marshall McLuhan and the anthropologist Edmund Carpenter produced a pointed critique of the ocular-centric nature of Western cultures. Some of the most compelling evidence they introduce comes from a comparison of navigation methods and approaches to depiction between the Inuit culture of Northern Canada – where there is a much greater reliance on the ear – and common practices within our own traditions. According to their reading, the reliance on the ear constitutes a completely different conception of space, an 'Acoustic Space', that can be contrasted with our own normative 'Ocular Space'.

Why has sound played such a small role in the realm of architecture until now?

One of the problems with architecture and sound is that architecture, as a design practice, must operate primarily in a realm of representation. The design of a building is usually completed long before construction begins. The challenge for the architect is to be able to comprehend and convey the characteristics of an 'experience' solely from within the realms of drawings, models and possibly writing, in other words through *languages of representation*. Sound recordings, that enable us to 'capture' and 'reproduce' sounds, exists only since Edison's invention in 1877; this is a recent event in terms of the history of architecture. It is significant that since the development of the phonograph we are literally able to hold a piece of sound and replay it for the first time. In contrast, preoccupations with vision and light in architecture go back to antiquity, as evidenced in works such as Euclid's or Ibn al-Haytham's books on optics. The development of lenses in the Middle Ages and Renaissance allows an exact understanding and control of light phenomena. Subsequently the knowledge of foreshortening and the understanding of how shadows fold around three-dimensional surfaces were utilized in architectural designs quite early. In the European context, the understanding of central point perspective, along with the development of different forms of representation and drawing during

and after the Renaissance allowed for complex orchestrations of ocular-spatial events. The techniques to do the same with sound were simply not available at that time. In that sense it may not only be an intentional ocular-centrism in architecture, the delay of the initiation of sound into the design process may also be due to a lack of proper tools for handling sound. But I also think there is a more theoretical issue that needs to be addressed: sonic preoccupations will only become relevant in building practices when acoustics are incorporated fundamentally as an equal participant in the structuring of 'form'; in other words, as an essential component in the production of space. The shift towards this kind of understanding of 'form' may be asking for too much; nonetheless, the tools that allow for such articulations are under development.

Isn't it possible now to make interactive acoustic models of a space with computer programs, and test, for instance, the reverberation of spaces before building them...

It's moving in that direction. The technique of ray-tracing, incorporated in image-rendering programs, is also applicable to calculations in sound, and there are already programs that can produce such acoustic simulations. The problem is that it is very calculation intense. You can do it for one point in space, but you really have to virtually walk through the space to perceive the acoustic differences. I think it will take a few more years before we see such techniques incorporated into standard computer drafting programs. That said, I'm somewhat sceptical that acoustics will be incorporated in a meaningful manner into commercial CAD-packages. For instance, just look the transformation from drafting boards to computer screens: In terms of visual representation, the default rendering of space on CAD-programs is based on a Renaissance idea of linear perspective and axonometric projection. Most of these programs have naturalized representation to an extent that it reduces the potency of the representational 'hinge' in the development of a project. By using the standardized interface, one is immediately working in a quasi-3D space that has many presumptions on how the eye works and how space 'is'. But representation is never neutral and this is only one way of imagining space. With sound there is a very different perception of space in the first place, it lies much more in the mediation between body and movement. It's about engaging space. If you want to have a CAD representation that engages this notion of space, I would argue that the interfaces have to be fundamentally altered, possibly in a manner that begins to affect the way ocular space is represented as well."

You were looking for an architecture of sound. Can you give an example of a project you were working on during your time in New York?

My thesis project started with the question of relations between 'form' and 'acoustics'. *Passages* is an architectural design that dealt with physical acoustics and intentionally excluded the loudspeaker. The loudspeaker is a Pandora's box for space and acoustics because it can literally create space without the need for physical structure. In terms of 'form', acoustics relates to transformation in reverberation, diffusion, diffraction, but the resulting sonic formations depend on what happens in the environment at any given moment. I was very attracted to the idea of a perpetually unfinished form, a form that is continually being finished by events

that are occurring beyond the control of the architect. You can control the basis of interactions, but the form sound takes in architectural terms is never complete and is based on a continual renewal.

Isn't that a description of how sound behaves in any space?

Yes, but I was interested in incorporating this unruly aspect as an intentional part of the design. The proposal intended to create a container that organizes a certain orchestration of sound but not the audible events. *Passages* is a design for a pedestrian underpass at a busy urban intersection. The design consisted of one continuous open field of interactions – a fitting tectonic for the nature of acoustics. The fundamental difference between light and sound is that sound has no clear-cut borders. If you put up a wall you are visually separated from the space that is behind it. But sound will always manage to seep through solid surfaces, it changes its form and filters its spectrum, but there are no hard cuts. In *Passages* there are no defined paths through the space. Some areas are tuned to vocal frequencies, increasing the awareness of 'self-presence', while others filter traffic sounds. There is a sound mirror embedded in a portal that transfers sound to another precise location. There is a silenced zone constructed of sound-damping materials. There is a very reverberant drum space with a metallic walkway above it. There are Helmholtz resonators of different dimensions that go down to the traffic, so you get a sequence of hissing sounds. The design was an interesting experiment, and it remains a prototype. Once I finished it I didn't have complete trust in the experiential outcome, thinking that it was possibly too subtle an intervention. I was afraid these careful tunings and orchestrations would go unnoticed. In hindsight, what was overlooked are the structuring capacities of listening itself. The visual training through architecture had certainly enhanced my vision, but what I was not aware of at the time was the fact that listening and the ear are equally malleable. Listening differently structures the audible world in a different way. Attention to hearing literally changes the experience of 'surroundings', possibly in a more potent manner than equivalent tunings of vision, because with vision you always have the relatively static material referents to fall back upon. In sound, the space you experience is in flux – it is exactly what you make of it. It is a quintessential perceiver-centric space. In that sense addressing the sonic aspect of architecture is not so much about adding sound into the built environment, it is really about rethinking listening.

In *Passages* you propose orchestrating a sound experience for people who are passing by using the everyday urban sounds, specifically traffic. It is not about cancelling out those 'bad' sounds, which would have been maybe closer to the approach of the R. Murray Schafer school of acoustic ecology...

In *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900–1933*, Emily Thompson draws attention to the fact that the early history of architectural acoustics is contemporaneous with concerns for noise abatement in the urban context. The minute you can measure decibels, you can say things are 'too loud'. Thompson shows how the early Sabine work on acoustics and the first electronic recording devices that could be used outdoors in urban spaces coincided with the early skyscraper constructions and an over-densification



of the street-level arteries in New York. So the history of early building acoustics is essentially intertwined with the early days of the noise abatement movement. It is somehow unfortunate that a similar narrative of sound suppression is found in acoustic ecology. One of the critiques I would have towards the acoustic ecology movement is its moralizing of sound: one of the key points of departure for this movement is a presumed *degradation* of a *natural* acoustic environment. I would challenge such a moralistic view of the ambient soundscape and even more so the implicit idea that there is such a thing as a 'natural acoustic' space. There is a wonderful moment in an interview with John Cage, where he is seated in his New York apartment overlooking traffic, and he remarks how pleasurable these sounds are because they are different every time you listen to them. On the other hand, one very important aspect of R. Murray Schafer's writings is the idea of learning to listen to sounds. If we teach tonality as a basis for music you have to spend the rest of your life trying to get away from tonal systems. One of the problems of common practice tonal music is that it has its basis in periodic signals and relations between values of periodicity. With the exception of 'timbre', such ideas of music draw a very hard line between music and consider all those non-periodic signals to be 'noise'. If you teach children to listen, rather than teaching 'scales', tonality becomes just one option amongst many other musical possibilities. That is why timbre was so important to the Futurists as well as to several modernist and contemporary classical composers. The moment you start to listen to timbre, you are opening the door to listening to the environment. I believe that listening itself is a synthesis of multiple, simultaneous factors – it is inclusive of an acoustic environment as well as of personal, subjective and cultural influences. The more I learn to listen in a certain way, the more the everyday environment surrounding me seems to have changed. When I am bicycling I am attentive to the difference in reflected ambient sound bouncing off various surfaces in the city. You can hear the difference between a brick wall or a facade with vegetation – a glass bus-stop along the bike path is an enormous acoustic event. I am listening to those kinds of things. There was a certain moment, during my sonology research, when I began to notice that ambient sounds would reflexively call up in my imagination equivalent waveforms or amplitude envelopes; maybe it had to do with crossing some comprehensive threshold in relation to sound – these noises were not only linked to the objects that produced these sounds but they also had *independent* palpable 'shapes'. And the same applies to the spatial dimensions of sound, once you understand this invisible spatial layer of interactions it begins to inform and shape your experience. When I am in a concert nowadays, my attention is not focused on the stage anymore, because I have become so attentive to the three-dimensional spatial qualities of sound.

Is there is a heightened awareness of space in contemporary music? I see it in many concerts at DNK in Amsterdam, a series that has also featured your work. There seems to be a redefinition of listening that comes out of noise music, and there is also the interest in drones that has resurfaced in the last few years...

The example of drones is a very good one. From a compositional point of view drones have been attacked for their structural simplicity and avoidance of compositional questions. I see that as a misunderstanding of the genre – drones take

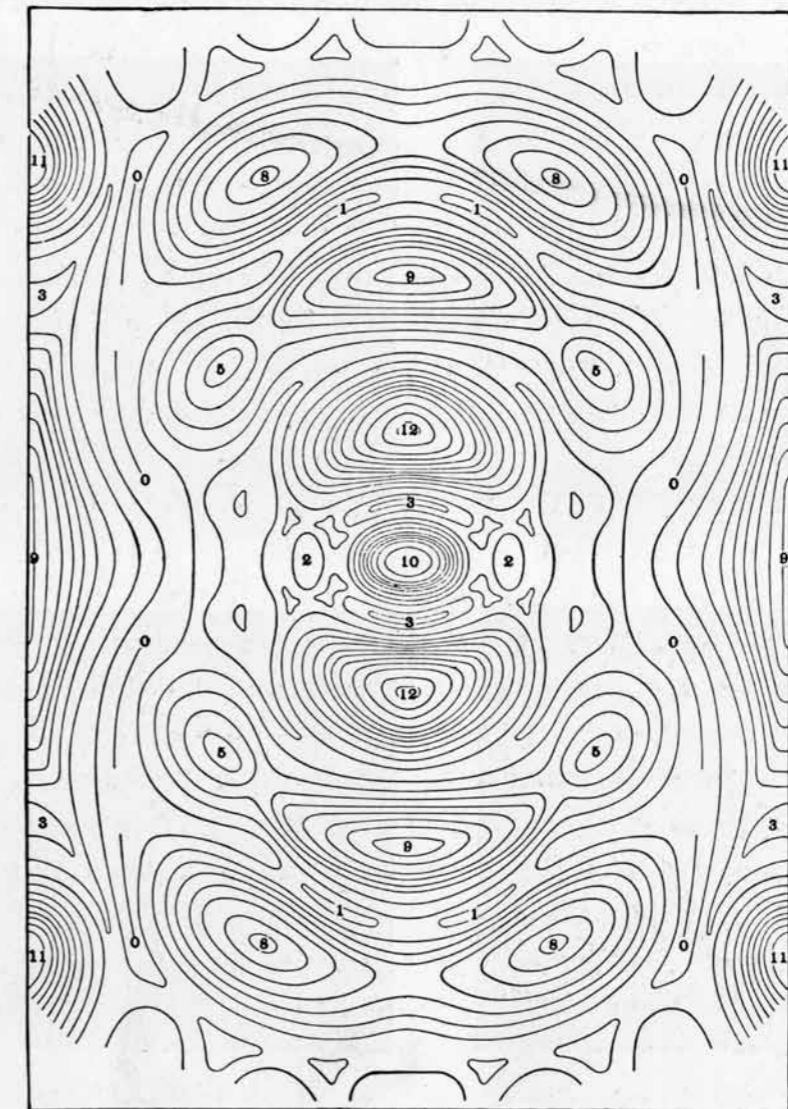


FIG. 8. Distribution of intensity on the head level in a room with a barrel-shaped ceiling, with center of curvature on the floor level.

Distribution of sound intensity (1923). Wallace Clement Sabine, an American physicist and founder of the field of architectural acoustics, researched the acoustic qualities of public buildings. This included experiments on the transmission of sounds through rooms and walls or the absorption characteristics of certain media. The graphical representation above shows the phenomenon of sound interference in a small room, where the (hypothetical) source of sound is placed in the centre (No. 10) and the sound waves are reflected by the walls, resulting in areas of high (many circles) and low intensity of sound. Sabine, Wallace Clement. 'Architectural Acoustics', in: *Collected Papers On Acoustics*. Cambridge: Harvard University Press. 1923.



In sound, the space you experience is in flux – it is exactly what you make of it. It is a quintessential perceiver-centric space. In that sense addressing the sonic aspect of architecture is not so much about adding sound into the built environment, it is really about rethinking listening.

the *experience* of sound as the starting point of the music, instead of approaching music as structuring of sounds that can then be experienced. To listen to drones is to be explicitly immersed in a fog of sound. Likewise, music that works with spatiality demands an effort on the part of the audience, and I think people are hungry for such experiences today. In these kinds of aural situations there is no possibility of 'passive' listening – or consumptive listening. Such difficult listening experiences can be rewarding just for the fact that it is something that cannot be reproduced in other environments; it really has to do with the experience of an event in a particular location at a particular moment in time. In other forms of spatial performance, as is the case with drones, the social context of music is brought to the fore: you come together to experience something unusual that cannot be recreated in the privatized audio environments of headphones or stereo systems. Maybe it has to do with an updating of certain notions of 'ritual'. I see it as an important counterbalance to today's total accessibility of music. Another influencing factor is now that multi-channel firewire sound interfaces have become cheaper, musicians and composers are experimenting even more with multi-source sound, but often without clear intentions or without knowing what is exactly happening. It breeds new types of spatial music, on which it is still difficult to comment, as these are still in an experimental phase of development. That said, I try to distance myself a bit from discussions of spatialization. Adding more loudspeakers or sources to a piece of music can also be a smoke screen of spectacularity that covers over half-baked aesthetic intentions, and in general I hesitate to endorse space as an essential turn in music. In many modes of music the question of space is not a relevant question at all and I think that it is still debatable if space is really a musical parameter in and of itself. We should not forget that even a single sound from one loudspeaker, or coming out of one side of a headphone in your ear, is already completely spatial. There is no such thing as non-spatial sound. If the dimensionality of the sound is important, or the intelligibility of complexity is, then it can be interesting to work with spatialization.

Can you give an example of music in which space is indeed important?

My quintessential examples are the later compositions by Luigi Nono, from the moment he starts working in Freiburg using live electronics. He then gets into an idea of space which incorporates, yet is not at all about spatialization. For instance, his opera *Prometeo*. His works for strings like *Fragmente* and *Stille an Diotima* also have an incredible spatial intensity that has nothing to do with spatialization. These works have to do with a certain mode of listening and a very different appearance of tonality in relation to the experience of the sounds.

Does it have anything to do with the way that he deals with time in those works?

How he exactly does it, is a complex question. I would suggest that in this work, space and time become one continuous mass of space-time. *Prometeo* has a very pronounced spatial agenda in the way it deals with the placement of audience and performers. There is an understanding of sound in the Alvin Lucier sense of tones-occupying-space, but it doesn't take that as a starting point for the piece, as Lucier does, which for me is the major difference between Lucier and Nono.

What do you think about the work of Iannis Xenakis? As an architect and composer, it seems that he was interested in some of the same issues that you are exploring...

I am not an expert on Xenakis. I seem to be missing the mathematics gene in my biological makeup to really understand his *Formalized Music*. But from what I have encountered, it would seem that his stochastic approach to sound organization is one of his more radical contributions, more so, I would say, than his formulations of architecture and sound. I find the influence of his background as an engineer very interesting. His thesis was about reinforced concrete, then a cutting edge technology and a very technical, mathematics-intense subject. I once gave a speculative reading of his work in which I compared his approach to sound distribution with the understanding of tension and compression distribution in reinforced concrete. If you understand those calculations, you can find many analogies to the way in which he structures and distributes sound. If Varèse has 'chemical' or 'atmospheric' understandings of spatial sound then I would say Xenakis has 'tensile' or 'thermodynamic' understandings. As an expert on cast concrete you must grasp that solid material is actually very much alive, it is full of these forces that are interacting with each other, forces that are locked into the solid material. In general buildings tend to breathe, they are alive just in terms of the contraction and expansion through the influence of light in the day-night cycle. My proposition was that if you understand solid materials in terms of fluid dynamics, you would better understand his distribution patterns of sound as well as light in three-dimensional space. His *Diatope* project, from 1978, which was presented in the forecourt of the Centre Pompidou, is interesting seen from the tradition of the *Gesamtkunstwerk*, though that is a history I am critical of, particularly the idea of a 'total experience' where all aspects of the work of art are under supervision. Still Xenakis remains an enigmatic figure. He was not part of the media art discourse when he was creating his audiovisual environments and he was never really part of either the French or the German camps of electronic music; it is only now that we are beginning to contextualize his projects. He was an outsider in the best sense of the word, a touchstone for conversations between architecture and music.

The spatial aspect might have hardly been researched by composers in the past, on the other hand, it was there already in Renaissance music for instance...

In the Western tradition it is probably true that the spatial aspect has not often played a major role, but Javanese gamelan and Balinese *ketjak* music, for example, are very spatial, and without wanting to oversimplify or eroticize these forms of music, there are some striking parallels to the acoustic vernacular of rainforests: those acousmatic listening situations where dense vegetation confines vision to the close-at-hand while the ear perceives to all these different layers of sound events, from the drone of cicadas to the yelps of monkeys and the pattering of rain on the canopy. Likewise the Indian Khyal tradition of vocal music, and of course, in connection to drones, cosmologies of vibration are related to certain aspects of Indian music. In the Western tradition we have indeed early evidence of spatial orientations in music with the *cori spezzati* in Venice. But the development of that style is closely connected to the history of Venice and its affluence. There was a certain excessiveness to Venice at the time, that allowed for the *cori spezzati*

to take hold. The layout of St Mark's basilica was very specific and allowed for the distribution of various choir lofts throughout the interior space, and composers started experimenting with space-sound relationships. The technique reached its peak in the work of Giovanni Gabrieli and the style migrated to various other centres in Europe. One explanation that I have heard Lucier voice in an interview is that the invention of modern notation techniques effectively cut off the Western tradition of music from its spatial history. The invention of print allowed for the spread of notation, but also necessitated its standardization. Because one only notates time and pitch, and not space, the spatial aspects of music disappears from view. So while notation made it possible to transmit a musical tradition over great geographic distances, without having to transport the instruments and the musicians, at the same time it started to exclude from music aspects that were already at a very high level of development in Gregorian chanting – another important form of spatial music – as well as in the *cori spezzati*.

Is this changing now?

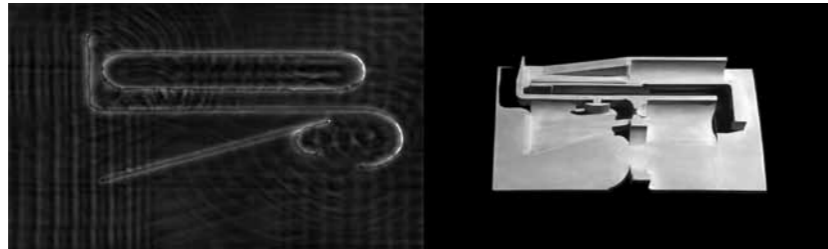
There is indeed more interest in sound and space in general, and in these early histories as well. There also seems to be an openness from the side of the general listening public to experience such auditory events. I believe this is partly connected to the manner in which technical media influence the way we are listening. In my youth, I was hardwired to a Walkman and there are certain periods in my life where I can point out that one cassette that constitutes the soundtrack for that period. Then for many years I had no portable player, until a few years ago when I bought an MP3 player for recording purposes, but also loaded some music onto it. I only listened to it once, outdoors while walking, and all I could hear was the sound of the music, occurring inside my ears, overlapping with the sounds of the environment. It was one continuous thing, and I said to myself, maybe listening to the sounds of the environment is enough. Today's vernacular listening habits are very peculiar. People spend a substantial portion of their lives locked up in cars, listening to music. I find this very interesting because you have the sound of the motor, the traffic and the music together. If you become aware of that, they all start to act together. An important flip of consciousness towards sound is happening now through our listening behaviours has to do with the contemporary use of sound technologies. The current lo-fi tendencies in the audio development amaze me. I really enjoy seeing the 'hoodies' on the tram listening to their bass-heavy hip-hop blaring out tiny loudspeakers on cell phones. The boombox phenomena I could sort of understand, but this is really bizarre. Of course it is about the assertion of a personal space, an expression of identity, but at the same time such listening experience nullifies the entire audiophile discussion of 'qualities' in musical reproduction. This is a different form of listening altogether.





30-foot hemispherical sound mirror at Denge, Kent Coast, UK. This image is part of a research project consisting of essays, photos, recordings and drawings of the remaining sound mirrors on the southeastern coast of Britain. The research charts the shift from optical projection to radiant echo, as is understood to be embodied within the example of acoustic early warning technologies developed over the course of the 1920s.





Top – Raviv Ganchrow, **Undertow**, 2008. Phased array sound installation of electromagnetic fluctuations in the audible spectrum drawn from the immediate environment. The setup utilizes custom built magnetic signal microphones that enable one to 'listen in' on the invisible spatial topography of electromagnetic interactions in the immediate environment of the installation.



Middle – Raviv Ganchrow, **Passages**. Sonic mapping and model from an architectural design for a pedestrian underpass in an urban intersection where tectonic form anticipates interaction measured in terms of directions and durations. Within the underpass walls are sonic mirrors, domes that serve as acoustic lenses and passageways that act as acoustic filters creating a topography where materials and forms are primarily understood as stepping stones to an interaction that unfolds in time.

Bottom – Raviv Ganchrow, **Inwound**, 2008. Spatial sound installation at Berlin's Potsdamer Platz, part of Tuned City, Berlin, 2008. By utilizing transducers that are literally plugged into the urban clutter, *Inwound* drew in the surrounding environmental vibrations from the various levels of the station and reconfigured them into an intensified relational field of sound. The phased array installation was housed in a provisional listening chamber set up within the subterranean mechanical spaces of the Potsdamer Platz station, temporarily opened to the public for the occasion.

What do you think about 5.1 surround sound in cinemas, another contemporary listening situation where you can have sound coming from the back whereas the image is in front of you?

This technology does not really have to do with spatial understandings of sound. In my view it is an extension of ideas of stereo, which in itself is an analogy to binocular vision and a 'picture windows' idea of sound. Stereo setups fit very well with the frontality of the standard cinematic experience. Surround sound formats merely enforce that frontality to include sounds-to-the-side or sounds-from-the-back. It is when you use technologies like Wave Field Synthesis in a cinema that you start to create very weird effects. If a soundscape similar to your experience of everyday-sound envelopes you in the auditorium, but you are still looking at a flat screen at the end of the hall, a noticeable disjunction is created between expressions in image and sound. One sensation approximates a realism whereas the other remains a synthetic representation. Incidentally, the Fraunhofer Institute in Germany continued to develop Wave Field Synthesis after the patent of Delft University, where the research started in the 1980s, expired. The intention was to develop it as the next standard for surround sound in cinemas. The story goes that when an industry representative from Hollywood came over to inspect the technology, they found that the sound was becoming so dominant that it began to detract from the visual experience and as such was counter-productive for the cinematic industry. So now we have an audio technology with some extensive years of research and development and we are not sure what to do with it. Wave Field Synthesis is a very complex system to create something that is actually quite simple: it's a playback system that begins to approximate the sound of the environment; in other words, the way we hear sounds in everyday life.

Can you tell me a bit about the Wave Field Synthesis project you were involved in?

In 2006, following my research with phased-arrays at Sonology, I was commissioned by the Game of Life Foundation to develop a Wave Field Synthesis system for spatially oriented electroacoustic music concerts. I was responsible for designing and building the system, and Wouter Snoei, with the assistance of Jan Trützschler von Falkenstein, worked on the programming and the interface. I developed the original algorithm for phased-array techniques during my research at Sonology. Its a mobile system than can be set up in a variety of spaces and configurations and is made up of 192 coaxial speakers and 8 subwoofers. It is a platform in which you can experiment with the spatial dimensions of sound by adding a choreographic, or tectonic, component to composition strategies. I was interested in this as a design project, as I understood it to be an armature that created 'space' only through sound. You can see some aspects of this interest in the working out of the detailing and overall presence of the system. One unexpected characteristic of the system is that it seems to give a weight to sounds, sound is almost imbued with a dimensional gravity. From a perceptual point of view the sound quality is quite different from other multi-channel systems. Nearly any sound that you put into it becomes attractive to listen to. But that is also one of the dangers of the system, it allows for pyrotechnics of sound, it is an open door for unnecessary spectacularity.

It should become interesting from a compositional perspective?

Yes, that is why I gave the example of Luigi Nono. In his piece *Omaggio a György Kurtág* he employs the Halaphon, his 'digital spatializer', to grab the rapidly decaying tones emitted by live performers and transfers the sound through a sequence of loudspeakers. His intention is not just to have the sound move around, but to 'prolong-the-leaving'. What is about to disappear from audibility lingers on just a little bit longer. Often the problem with spatialization methods is the spatial metaphors on which they are based. Systems like quadraphonics and 5.1 have a very Cartesian understanding of space: there is an imagined *empty space* within which loudspeakers are placed and within which the sounds are imagined to be moving around. Wave Field Synthesis is based on a very different conceptualization and understanding of sound. I call it 'Phased Space'. I use the term to describe an understanding of acoustic space that exists prior to the act of listening, the space of the wave interactions themselves. My recent work intervenes in this Phased Space, yet is oriented towards acts of listening. Phased Space is never how we perceive the sound – we will always graft qualities to sound, yet it also recognizes that there is an inaccessible aspect to sound behaviour that the perceived tones only hint at. I am currently working on a project that gives space for both aspects of sound that has to do both with a transcription of Phased Space, at the same time without denying the indexical nature of sound. One of my *Strategies Toward Space*, titled *Inwound*, captured some of these qualities. It was a subterranean listening chamber at Potsdamer Platz, and was first realized as part of *Tuned City Berlin*. In this project you are listening through the environment itself in a manner that reveals a very dense field of vibrational interactions that follow the contours of audible sound, but which have a very different presence from that experienced in normative listening. I am very interested in that aspect of sound that hovers on a threshold between the indexical and the abstract, in trying to communicate something that is simultaneously abstract and completely everyday and obvious.

Can you explain how you dealt with space and sound in your piece *Aggregate* in the DNK series in Amsterdam?

In *Aggregate* I wanted to do something with the context of 'performance', where you have the expectation of seeing a sound event in a location, normally with a starting and end time – as opposed to a sound installation that you can negotiate in various time frames. I wanted to make a piece that dealt with that social context of listening and that becomes part of the inclusive spatial strategies of the sounds. *Aggregate* is part of a series that I call *Strategies Toward Space*. Each strategy has a different sound appearance based on the space and the context to which it is applied. The strategies consist of approaches towards certain aspects of the sonic environment. *Aggregate* focuses on the latent aural spatialities tucked within the various cavities, surfaces and materials, in this case of the DNK-SMART Project Space hall in Amsterdam. The sonic transformations aimed at intensifying and collapsing these spaces into one another. For example, the physical dimensions of the space correspond with particular resonances that are also a set of frequencies, defining the acoustic fingerprint of the space. Also, all the materials that make up the hall, including the furniture and fixtures along with the physical characteristics

of the space are propositions for frequency interactions. Microphones were set up to capture the sounds from the empty hall and specialized transducers were attached to various surfaces and materials in the space, picking up the very subtle vibrations of those materials. Over the course of the 32-minute cycle, you are listening to space through its own physical presence. One of the methods I employed is a technique pioneered by Alvin Lucier to set these frequencies into resonance through a process of looped recording and playback of the ambient sounds of the hall. By feeding back into it loops of various duration, you get the resonant frequencies of the materials as well as a presence of the audience affecting the cycles. The resonance of the room also starts to infect the frequencies of material resonances, and it becomes one chaotic system of interactions. The event started with a simple role reversal where the audience stood in the location usually reserved for the performers. The sound cycle itself was set off by the mechanical drone of folding in the empty tiered-seating. That, in turn, set off a series of recording-playback loops that are cycled through the various materials and through the empty space. With such strategies you need to work in the space itself over quite an extensive period of time, each new location needs to be gauged and tested in its own right. The durations and tunings from one space inevitably do not correspond to another. A strategy like *Aggregate* would take on a completely different presence in another location.

You also presented another work at DNK on the same night...

*Undertow* was installed in the entrance space, near the reception desk. It picks up magnetic fluctuations in the audible spectrum, for instance those coming from computers and the communication and electrical infrastructure built into the reception desk, and makes those vibrations audible through an array of loudspeakers. It is about displacing and presencing those vibrations. In fact much of what I do in my work is about making something present, more in the pictorial sense than in terms of a music tradition. That is one of the reasons why I shy away from performing. I have no background in music. I do not see what I am doing as extending the practice of music, although it may relate to it in more ways than one. Through my work, I try to get at a more fundamental connection between space and sound, one that is not symbolic, not synesthetic, but one that probes such relations at the level of fluctuations.

It's about physics?

It is empirical, or maybe phenomenal is a better word. In the sense that experience is phenomenal, it deals with that plane of experience and existence.

What do you call yourself? A sound artist?

When I was in the military in Israel, there was a club scene, and on Friday nights just one place served something to eat after 2 o'clock in the morning. You could get grilled cheese sandwiches – and that was it. The peculiar thing about the place was that you couldn't ask the guy for a grilled cheese sandwich, it was like a game, you had to ask him for something like a salmon ciabatta, put some mustard on it, and some pastrami too. Only then he'd hand you a grilled cheese sandwich. So you can call me an artist, sound artist, architect, even composer, but I will end

up handing you a grilled cheese sandwich. For a long time I have had great difficulty in even naming for myself what I do. It does not really exist as a cultural domain. It touches on philosophy, it touches on architectural theory, it touches on histories of art, on music, and it sits somewhere in between all these. Now I think it is a strength to keep it as an intermediate zone. It relates to different domains, but it is not a category unto itself. One of my role models in this respect would be Aby Warburg, but viewed not as an art historian but rather as an artist because of his methods and approach that interrogates relations between forms, cultures and contexts. Sometimes you have to violate the definitions of disciplines to get to more fundamental understandings. Part of my drive is to get a grip on that which has always interested me. It's something that has always been with me, and the closer I get, the less it has a name.

# Long Sounds

Douglas Kahn



The reflex is to imagine a long sound as a held note, a drone, an 'eternal music', or something murmuring away on a geological or cosmological time-scale. Yet, there are also long sounds that have travelled a great distance or, more importantly, have acquired their specific character from all that occupies the in-between, the channel, the medium of space. There are sounds that are long on time and long on space.

They are not mutually exclusive. Pythagoras inferred a continuous music of the universe by correlating the ratios of the positions and movements of heavenly bodies to musical intervals, as modelled from the vibrating string of the monochord. Harmonious sounds would be continuously washing over the earth from great distances. Aristotle was not convinced. In *De Caelo (On the Heavens)* he pointed out that celestial spheres are extremely large and travelling at great speed; if they were to make a sound it would be the loudest sound imaginable. Thunder could split rocks, he said; this sound would be much louder than thunder. The Pythagoreans countered that because we have grown up within this sound as a fish does in water, we are oblivious to it. No one can actually hear it, except those blessed with special sensitivity, such as Pythagoras himself. The rest of us can know this long-long sound only through reason. On a more prosaic daily basis, rolling thunder is the longest long distance sound we hear, even if it fails to break rocks.

For the longest time, the longest sounds heard were the cataclysmic Krakatoa explosions of 27 August 1883. They 'were heard in Ceylon, in Burmah, at Manilla, at Doreh in the Geelvink Bay (New Guinea), and at Perth on the west coast of Australia [...] If a circle is drawn from Krakatoa with a radio of 30 degrees, 1800 geographical miles, or 3333 kilometres, the circle will go exactly over the furthest points where the sound was heard.'<sup>1</sup> The sounds were an odd thunder; they were heard predominantly as fire from heavy guns signalling a distant battle or a military exercise, a pending attack, a distress call and even a cannon salute from a departing ship.

The most distant sound registered was from the island of Rodrigues, a British possession in the Indian Ocean, 2968 miles away from the eruption. When reports were 'heard coming from the eastward, like the distant roars of heavy guns', soldiers were sent to their posts.<sup>2</sup> At Diego Garcia and in several other locations the sounds were thought to have been guns fired by a ship in distress; at Karimun, 355 miles from Krakatoa, 'several native boats were dispatched to render assistance', and 522 miles away in Singapore two steamers were sent out to check for the distressed vessel.<sup>3</sup> In St. Lucia Bay, 1116 miles away, 'The noise of the eruption was plainly heard all over Borneo. The natives inland, who murdered poor Wittl when they heard the noise, thought we were coming to attack them from the east and west coasts and bolted away from their village.'<sup>4</sup>

The same report, published in *Nature* less than a year after the explosion, noted that the sound covered about one-sixth of the circumference of the earth and one-fifteenth of its surface, while a report from the British Royal Society put the coverage at one-thirteenth.<sup>5</sup> The sounds were not uniform. They were heard in certain directions better than others, and at times people closer to the eruption heard little or nothing at all while people further away in the same direction clearly heard a loud sound. The Dutch geologist Rogier Verbeek attributed the trajectory of the sound to the wind and speculated that clouds of ash 'would act on the sound waves like a thick soft cushion', muffling the sound at shorter distances while it

travelled over the cloud to places further away.<sup>6</sup> Pressure waves travelled around the earth seven times. Lord Kelvin once imagined that barometric pressure, if sped up, would provide a sound of the weather. The sound waves from Krakatoa would have swept over the weather and pushed it to a new pitch.

The sounds were not merely heard in the air. In Singapore, noises in telephones rendered them useless. 'By shouting at the top of one's voice the clerk at the other end heard the voice, but not one single sentence was understood.'<sup>7</sup>

'During the recent earthquake of Java and eruptions of the volcano of Krakatoa, the telephone lines in Singapore were unworkable owing to a deafening roar which drowned the voice. Only shouting could be heard on the lines because of the noise, which resembled that of a distant waterfall. On one line, in which a small subaqueous cable about a mile in length, from Singapore to Ishore, formed part of the circuit, the roar was mingled with occasional reports like that of a pistol. The noises in question were heard during the eruption on August 27 last, but can hardly be considered, says *Engineering*, as due to acoustical effects, notwithstanding the violence of the eruption. The cause is perhaps rather to be sought in the disturbance of the terrestrial magnetic field or in the electric state of the atmosphere by the terrific explosion.'<sup>8</sup>

Here, a phenomenon is heard first through signal then sound. Since the signal is travelling near the speed of light, it arrives more quickly than if it had travelled at the speed of sound alone. While listening to the radio, we hear the lightning as it strikes, while the thunder rumbles in later at the speed of sound.

### Spontaneous Electrical Currents

Long-distance sounds had long been heard through telegraph and telephone lines. Thomas Watson, Alexander Graham Bell's assistant, heard strange noises in 1876. After working on the telephone all day, he stayed on the telephone all night, although no one was on the other end, spending hours deep into the morning listening to the sounds received on a long iron line stretched over the rooftops of Boston. During the day he could hear 'cross-talk' bleeding over from nearby telegraph lines. At night the chatter of commerce died down noticeably, and what remained of telegraphic transactions was easily recognized as faint dots and dashes. They were replaced and overwhelmed by sounds Watson could not identify. Some sounds he described are known for their appearance just before dawn, a chirping chorus sounding like a field densely filled with small birds. Other sounds had musical and noisy qualities, and all qualities in between. He thought they might originate in solar storms or be messages from an extraterrestrial intelligence, were it not for their lack of regular patterns that might belong to a language, but he was comfortable in not knowing. If he spent hours not knowing, obviously he was enjoying.

These sounds were familiar to the extent they were a product of earth currents, which at the time could mean electric, magnetic, or electromagnetic activity occurring in the earth, the atmosphere, and their interaction. By 1876, the influence of atmospheric electricity, lightning, aurora, magnetic storms, cycles of sunspots and solar flares had already been experienced in the practice of telegraphy for several decades. These influences were first registered in the throbbing or jumpy perturbations of a compass needle or early telegraphs and galvanometers, and in the

disturbed functioning and crude sounds of telegraph devices, including the sounds of ghosted communications, sparks and explosions.

'Spontaneous electrical currents', that is, electricity not provided by batteries to telegraph lines, were scientifically measured by W. H. Barlow beginning 'on the evening of the 19th of March, 1847, a brilliant aurora was seen [in England] and during the whole time of its remaining visible, strong alternating deflections occurred on all the [needles of telegraphic] instruments.'<sup>9</sup> Barlow conducted his experiment using galvanometers in circuit with telegraph lines 40 to 50 miles in length to test the incidence, direction and intensity of 'spontaneous' currents in the atmosphere. By the 1870s, earth currents were commonly associated with 'the appearance of Aurorae Boreales, or to magnetic storms', and with their hemispheric character, 'spread almost simultaneously over the telegraph world'.<sup>10</sup> The 'telegraph world' in this case was described by the sphere of influence of both the British telegraphic empire and the aurora borealis that, on 4 February 1872, 'was seen as far south as Africa and the Persian Gulf and created a battery of effects in telegraph mechanisms.'<sup>11</sup> Its effects were registered on the lines located in the USA, in Toronto, Paris, Gibraltar, Malta, Constantinople, Alexandria, Suez, Bombay, Persia, et cetera. The 'magneto-electric' disturbance of the aurora had already been correlated to the cycle of sunspots, solar flares and 'protuberances of the sun'. Although the transmission of this influence across the expanse of space from the sun to the earth was not understood, it was suspected that, from England through its empire and beyond, the mysterious force responsible must certainly pervade the entire universe.<sup>12</sup>

A prominent class of sounds created by this global reach was the sound of sparks. Some of the largest sparks occurred at the ends of submarine cables and, in general, longer lines produced more pronounced effects. They were usually mild, however, compared to the rich electrical environments of thunderstorms. The effects of a nearby storm could injure and kill telegraphers, fuse the metal in the equipment, and send huge sparks several metres long among objects in the telegraph office.<sup>13</sup>

Thunderstorms three to four hundred miles away could be seen on a galvanometer attached to a telegraph line and eventually heard using the transducer that was the telephone. One person claimed in 1885 to be able to hear approaching storms six to twelve hours away not through electromagnetic means, but through Aeolian means, using a telephone line as the monochord and his house as the resonant body.

'Probably some thousand Americans have noticed the automatic storm-signalling of wires by sound-vibration. I allowed a telephone-wire to remain for a long time attached to one corner of my (frame) house because of its practical utility as a weather-prophet. When not a leaf was stirring in the neighbourhood and not a breath to be felt, the deep undulations were audible in almost every room, although mufflers had been duly applied. Before that, some hours in advance of every severe storm, the upper story was hardly inhabitable on account of the unearthly uproar....'<sup>14</sup>

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### Bombs and Earthquakes

The durational visual-audio time lag of lightning-thunder underscores Friedrich Kittler's essay 'Lightning and Series – Event and Thunder'.<sup>15</sup> In it he tracks the shrinking space of times between light, projectiles, and sound. These were the physical material of a technological self-knowledge of history: 'Thanks to firearms and printing presses, the West starts to view itself as historical.'<sup>16</sup> Firearms in the early modern period were used to produce historical events, but they were also used to develop notions of frequency against which temporality would be measured. Father Marin Mersenne timed the delay between the visible flash of a firearm at a distance and the resulting sound against the pulse of his heartbeat or the swing of a seconds pendulum.<sup>17</sup> The instantaneousness of light and sight was God's work of infinity, just as there was no delay in the action of the sun, whereas sound was tied to earthly concerns. The speed of sound, however, also involved the earthly concerns of space; the sound of a firearm does not happen in a vacuum. Confronted with the difference between Mersenne's speed of sound and his own calculations, Robert Boyle said that it 'may possibly proceed from the differing consistence of the English air and the French'. He would be the person to know, since it was Boyle who used a vacuum pump to show that the simple physical presence of sound required a medium of at least air.<sup>18</sup> What effect different media encountered in intervening space might have on a bullet was a different matter.

By modern times, the series of military events in history built up with greater frequency that ends near the infinitely-short of lightning, as Kittler describes it, the arc of Fourier's sine wave swelling 'on this exponential function of continuous accretion, to refer to Leonhard Euler's mathematical studies on ballistics, [after which] we continue to ride *Gravity's Rainbow* forever: from the catapult to the cannon to the rocket, until the lightning out of clear skies destroyed the first city. Hiroshima – 67 billionth of a second, the duration of a uranium explosion.'<sup>19</sup> Of course, it was not a rocket but a bomber that dropped the atom bomb, and there was no ballistic arc; instead, the bomb floated down on a parachute. What militarized time delay once granted by a firearm in an experiential way was reduced to an infinitely-short 67 billionth of a second, a speed other machines like computers emulate, rendering the post-human condition: 'As temporal beings nothing is denied more to us than to know time.'<sup>20</sup> It was experienced in another manner altogether by spatial beings.

The destruction of Hiroshima and then Nagasaki did indeed involve an experience of frequency unknowable to mere temporal beings, one that began in the difference between the speed of light and sound: the *pika don*, Japanese for the flash of light followed by the sound of the explosion. Reports from the Hibakusha, the bomb-affected people, mention a 'noiseless flash' of light, *the pika* of the *pika don*, the *don* being onomatopoeic for the thunderous explosion. As Robert Jay Lifton summarized first hand reports from Hiroshima, 'Only those at some distance from the explosion could clearly distinguish the sequence of the great flash of light accompanied by the lacerating heat of the fireball, then the sound and force of the blast, and finally the impressive multicoloured cloud rising above the city.'<sup>21</sup>

Friedrich Kittler, however, in the same essay can be heard as a spatial being operating on a geophysical scale. Using a late-nineteenth century device

of technological time-compression, he describes the personal, non-post-human delectation of a Kantian sublime (reverberating perhaps from the Lisbon Earthquake of 1775).

'Take an earthquake like the one in Kobe with thousands of casualties, seismographically record its inaudible slow vibrations, replay the signals of the entire horrific day in 10 seconds – and a sound will emerge. In the case of earthquakes that, like those in the Pacific, result from the clash of two tectonic plates, the sound will resemble a high-pitched slap, in the case of those that, like those in the Atlantic, are the result of the drifting apart of two continental plates, it will, conversely, sound like a soft sigh. Thus, the spectrum, that is, a frequency composition, gives the violent events timbre or quality: America becomes Asia. A short time ago I was privileged to hear the timbre of such quakes and I will not forget it for the rest of my life.'<sup>22</sup>

During the early 1960s, the American composer Gordon Mumma heard similar recordings. He had a clerical position at Willow Run Laboratories in Ann Arbor, Michigan, writing up quarterly research reports for air-traffic control, systems and logistics analysis, et cetera. Willow Run was attached to the University of Michigan, and was involved in classified military research, but Mumma had only a low-level security clearance. The Acoustics and Seismics Laboratory was located at Willow Run where it operated under a Department of Army contract, and was involved in classified seismological research monitoring underground nuclear testing and discriminate signals from naturally occurring activity, chemical and nuclear explosions. One day, someone from the Acoustics and Seismics Lab invited Mumma:

'...to listen to "speeded up" tape recordings of seismic activities, i.e., speeded up to be in human-audible range. P-waves and S-waves, which come from the same source, travel different routes, and are received by distant seismograph stations at different times. In listening to their sounds, I could follow most of the polyphony, and brought my classical music "counterpoint" analysis skills to the process. Also, the "attack" characteristics of underground explosions, tending to be immediate, were very different from the aggregate slipping attacks of rumbling earthquakes and tectonic plate stress-releases. The "slipping" attacks were clearly of lower "fundamental" frequency than the short-duration explosion attacks. I identified the earthquakes as having a legato-articulation rather than the explosion's staccato cluster – my musical analysis.'<sup>23</sup>

He was able to secure seismological data from both naturally occurring and nuclear-induced seismic activity and used them to compose a series of pieces for piano called *Mographs*, short for seismographs. Mumma's *Mograph* series was a precursor to works by other composers that utilized actual sounds from a geophysical scale. And it may perhaps be the first underground music of the 1960s.

Perhaps not. Sheridan Speeth, just down the hall from the composer James Tenney's office at Bell Labs, was also investigating how to discriminate between natural seismic activity and underground nuclear explosions. Using the Hardtack series of underground tests at the Nevada Test Site, seismic readings of a 19-kiloton explosion were made at distances of 600, 900, 1000, 1200, 3000, and 4000 kilometres, and of a 5-kiloton explosion at 500, 700, and 4000 kilometres.<sup>24</sup> He eventually found that cello players were best at discerning the difference. Violinists were not good at the lower pitches, whereas bass players were not as accurate at pitch and event discrimination. Soon cellists were replaced by computers. In fact, Speeth's own contribution to an early computer music LP, *Music from Mathematics* (1962), one of his *Themes and Variations* was 'a computer-processed recording of a seismogram, sped up by a factor of 300'.

### Whistlers, Lucier

Alvin Lucier was the person who most explored long sounds. In 1965, his first mature composition *Music for Solo Performer*, known as 'the brainwave piece', used a spatial distribution of speakers that resonated and drove musical instruments and other sound-making objects. He started to think that this distribution could be deployed on a geographical scale. His 1966 composition *Whistlers* extended the distance further, using natural radio phenomena not dissimilar to those heard by Thomas Watson in 1876.

Whistlers are a type of ionospheric radio generated primarily by full spectrum electromagnetic bursts from lightning that reflect back and forth between the earth and ionosphere, i.e., the 'earth-ionosphere waveguide'. Those signals that are reflected and multiply-reflected from within a couple of thousand kilometres are called sferics (short for atmospheric) and produce a sharp crackling sound, whereas short sliding tones called tweeks are produced by reflections in the waveguide occurring over greater distances, up to 20,000 kilometres. At times a signal will pass through the ionosphere to travel out into the magnetosphere, spiralling along ephemeral magneto-ionic flux lines great distances from the surface of the earth, to return to the conjugate point in the opposite hemisphere, producing a delicate glissando called a whistler, or it can bounce back and forth forming two-hop whistlers and echo trains.

Some whistlers are produced over distances exceeding 100,000 kilometres. Lucier was fascinated with the enormous power and distances involved, in the huge amount of energy of lightning and the thousands and thousands of kilometres the waves travel before being heard as little sliding tones and glissandi. It is not merely a remarkable shift in magnitude, from global and larger-than-global expanses to little blips, but more the embodiment and foreshortening of such an expanse in a little blip. From another location along the electromagnetic spectrum, stars do it all the time, while the sun washes over us so slowly we think of it as a state of 'day'.

Lucier further consolidated his ideas about long sounds in *Quasimodo: The Great Lover* (1970). The composition is 'for any person who wishes to send sounds over long distances through the air, water, ice, metal, stone, or any other sound-carrying medium, using the sounds to capture and carry to listeners far away the acoustic characteristics of the environments through which they travel.'

The piece could take place on any scale and there is nothing preventing this piece from being performed on a global scale. The inspiration came from the long-distance communication by humpback whales using coldwater channels in the ocean as acoustical waveguides.

'What struck me more than the sounds, however, was the ability of whales within a species to communicate with one another over tremendously long distances, across ocean basins in some instances. They do this by echoing their sounds within a specific temperature layer in the sea so that the sound doesn't get absorbed into the bottom of the ocean or dissipated out through the surface. I was very impressed by that. So instead of imitating the sounds of the whales, or using Payne's recordings, I imitated the feature that struck me strongest, their amazing long-distance sound-sending ability.'<sup>25</sup>

Indeed, the longest sounds recorded appear to be oceanic. The earliest ocean basin-scale sound transmission test was also the loudest:

'In 1955, during a period when numerous nuclear explosions were being set off to measure various effects in different environments, a 30-kiloton bomb known as WIGWAM was detonated at a depth of 650 metres off the coast of California. The explosion produced acoustic echoes from many islands, seamounts, and other topographic features throughout the entire Pacific Ocean.'<sup>26</sup>

Echoes were registered from Amchitka in the Aleutian Islands in the north part of the Pacific basin, to Okinawa in the west, to Fiji in the south.

Very long oceanic sounds were used in the Heard Island Feasibility Tests in 1991. From a boat in the southern Indian Ocean near the aptly named Heard Island, underwater projectors transmitted sounds at around 220 dB into the deep sound channel (also known as the SOFAR – Sound Fixing and Ranging – channel) which were detected by hydrophones nearly halfway around the world (~17,500 kilometre range): from Newfoundland to the northwest, to Monterey on the coast of California and Whidbey Island in Puget Sound in Washington State to the northeast. The purpose of the test was to see if the method could be used to detect changes in ocean temperature, since changes in temperature would influence the speed of the sound. Thus, it would be particularly useful to test the effects of global warming. However, concern was raised about potential damage and disruption of such continuous loud sounds on a range of marine mammals, including the humpback whales that Lucier used as inspiration for his composition.

Notes

1. R.D.M. Verbeek, 'The Krakatoa Explosion', in *Nature* (1 May 1884), pp. 10–15. Another anecdotal report placed the sound as far away as nearly 3000 miles (4800 kilometres). Simon Winchester, *Krakatoa* (New York: HarperCollins, 2004), pp. 259–61. See also T. Simkin and R. Fiske (eds.), *Krakatau 1883 – The Volcanic Eruption and Its Effects* (Washington, D.C.: Smithsonian Institution Press, 1983); and G.J. Symons (ed.), *The Eruption of Krakatoa: Report of the Krakatoa Committee of the Royal Society* (London: Trübner & Co., 1888), pp. 78–88 (79–80).
2. G.J. Symons, op. cit., pp. 79–80.
3. Ibid., p. 81.
4. Ibid., p. 83.
5. Ibid.
6. R.D.M. Verbeek, op. cit., p. 11.
7. G.J. Symons, op. cit., p. 82.
8. 'The Java Earthquakes and the Telephone', in *Scientific American*, vol. 44, no. 19 (10 November 1883), p. 294.
9. W.H. Barlow, 'On the Spontaneous Electrical Currents Observed in the Wires of the Electric Telegraph', in *Philosophical Transactions of the Royal Society of London*, vol. 139 (1849), pp. 61–72.
10. W.H. Preece, 'Earth Currents, and the Aurora Borealis of 4th February', in *Journal of the Society of Telegraph Engineers*, vol. 1, no. 1 (1872), pp. 102–104ff.
11. Ibid., p. 103.
12. 'Magnetic Storms', in *Scientific American*, vol. 8, no. 23 (6 June 1863), p. 418.
13. 'Influence of Atmospheric Electricity and Induced Earth Currents in Telegraphy', in *Journal of the Telegraph*, vol. 10, no. 3 (1 February 1877), pp. 83–84.
14. Wm.H. Babcock, 'Do Telegraph-Wires Foretell Storms?', in *Science*, vol. 5, no. 119 (15 May 1885), pp. 396–97. The editors of the journal appended an explanation saying that the sounds were produced by 'simple transverse vibrations and longitudinal waves such as occur on every stretched cord that gives out a musical note. These vibrations are ultimately caused by the wind [...] Sometimes rapid alternations of sunshine and shade, by heating and cooling the wire, cause it to elongate and contract rapidly, and maintain an additional series of musical notes.'
15. Friedrich Kittler, 'Lightning and Series-Event and Thunder', in *Theory, Culture and Society*, vol. 23, no. 7–8 (2006) pp. 63–74.
16. Ibid., p. 66.
17. See Penelope Gouk, 'Acoustics in the Early Royal Society: 1660–1680', in *Notes and Records of the Royal Society of London*, vol. 36, no. 2 (February, 1982), pp. 155–75.
18. Ibid., p. 161.
19. Kittler, op. cit., p. 66.
20. Kittler, op. cit., p. 63.
21. Robert Jay Lifton, *Death in Life: Survivors of Hiroshima* (New York: Random House, 1967), p. 19.
22. Gene Ray, 'Reading the Lisbon Earthquake: Adorno, Lyotard, and the Contemporary Sublime', in *The Yale Journal of Criticism*, vol. 17, no. 1 (2004), pp. 1–18.
23. Gordon Mumma, correspondence with the author, 30 September 2008.
24. Sheridan Dauster Speeth, 'Seismometre Sounds', in *The Journal of the Acoustical Society of America*, vol. 33, no. 7 (July 1961), pp. 909–16.
25. Alvin Lucier, *Chambers* (Middletown: Wesleyan University Press), pp. 64–65.
26. Walter Munk, Peter Worcester, and Carl Wunsch, *Ocean Acoustic Tomography* (Cambridge: Cambridge University Press, 1995), p. 329.



# Extremities

## Maryanne Amacher in Conversation with Frank J. Oteri



As someone whose entry point into the vast world of musical repertoire has mostly been by collecting records and since the most unusual and unique things are usually the hardest ones to hear live, Maryanne Amacher has always been something of an enigma to me. A composer of vast, space-specific sonic panoramas at crushingly loud volumes, Amacher defies containment and commodification. When Tzadik finally released a CD of her music, I finally thought I was able to experience it. But actually, I hadn't. Two speakers can't really convey what she is doing in space and as an apartment dweller the kinds of volumes she demands would inevitably lead to an eviction. Yet through listening and reading her essays on various subjects, especially her fascinating contribution to a panel on Cage's influence where she spoke about creating a music that is somehow liberated from time, I felt compelled to talk to her. We spent only about an hour in conversation – the unfortunate time constraints of a reality based on schedules – but it felt like it could have gone on forever. And, in some ways, it will...

Frank J. Oteri - The work you do inhabits its own unique realm that is sometimes quite at odds with most of the presentational aspects we take for granted with most music: it's really not meant to be listened to the same way in time, in space or in volume... So, how you feel about describing your work as music? How does it fit in with the history of music of the past and how it points to the music of the future?

**Maryanne Amacher - Well that's a difficult question [laughs]. Are you thinking of concert music?**

I'm thinking of the role that music has had in society, the relationship people have to is as listeners, the context of concerts, recordings, how it's assimilated, how it's taught, how it's learned, how it's acculturated in different societies... What you're doing seems to be somehow beyond that. Obviously it uses sound, tone, and timbre, but it's doing something else.

I think I know how I can discuss that with you, but first I'm wondering if you're thinking more of concerts because occasionally people react and say, 'Oh, this is a *real* experience...' because of the staging and presentation. I guess it's also because of the music, but I'm interested in making a very different situation for people. From the very beginning, I wanted to do experiential work. I was working with electronic means, therefore I could sit and observe various things. I could try to understand more about what was happening to my ears, to my body, all over. I think I do music because I'm trying to understand. The ear-tones that I played for you are referred to as otoacoustic emissions. I heard those very early on when I was beginning to work, so I wanted to create a kind of music where the listener actually has vivid experiences of contributing this other sonic dimension to the music

that their ears are making. I've become very involved with situations like that. My approach is more like in science, although music is emotional and everything else. I sit and listen and I hear things, then I discover how I can expand them or increase them and try to understand them. I think of them as perceptual geographies actually. Ways of hearing – how we hear things far away; how we hear things close by. How suddenly in your head there almost is sound, continuing and continuing. It's particularly effective after very strong sections with enormously long fades, but it has to be done in such a way that the sonic shapes are lingering in your mind afterwards. I believe a lot of music, particularly as it developed from the past, was really a rearrangement of the figures of other men's music – I'm not talking about sampling – but it's just snatching little things and doing your own personalized sequence in time. Whereas, I think my tendency was to become much more involved in the so-called physics – I don't like the word psychoacoustics – both of music and how our perceptual experience changes when sounds are just travelling around here and it sounds like it's miles away, when it seems like it's only in your head...

You studied with Stockhausen and he was certainly a forerunner of the work you do. He was one of the pioneers of having multiple speakers and later, he did a work that was an entire house, every room had different music happening on it.

**I think I was fortunate in that the first electronic music I heard was in Cologne on multiple speakers. Being a fan of Varèse, I immediately connected to imagining the spacialization of sound, and then to have had the wonderful opportunity to study a little bit with Stockhausen, it was just incredible.**

But at the same time, there's something so human about the music that you're creating and how people's ears are responding. It's so fundamentally human in some ways even though it's all created with machines, with electronics. There's something wonderfully contradictory and beautiful about that. This is somehow a music that could only be created in our lifetime. Maybe you could get strings or the human voice to do this...

**Of course.**

But that's not what you do. Is that something you'd be interested in doing?

**Well, of course I could but the advantage for me is I don't care. It doesn't matter to me that they're machines or computers but I think what was of value was the possibility of being able to work this way, that you do sound explorantly – you could sit and listen and observe things, observe shapes. There is a situation when you have architecture as I'm describing it – physical architecture, these larger spaces. It is a very communal thing and because of the dimensions of the space itself connecting to the music in the way it does, it creates a very liberating experience. I mean, people dance. It's very different than if you're in a small place or particularly if you're keeping your seat.**

There's something sort of imprisoning about sitting in a concert hall and having to be quiet.

**Well it's not even that. I think it's known that you actually experience sound better when you move, which also connects to dancing.**

When you were playing your work for us you said make sure to move all around.

Yeah, and it's fun to move your head and to kind of dance.

### Aural Architecture

Some of the words you've used to describe your work are: architecture, choreography, and neurobiology. You're really using sound architecturally. That's sort of a different construction. Music historically and culturally seems to exist as a social behavior that occurs over time. What my ears are hearing seems more like a sonic architecture occurring in space rather than developing over time.

I actually do think of it more as an aural architecture. I think of it quite literally in terms of architecture itself. When I'm able to have the opportunity to make a large installation, I learn the acoustics of the place, and I can work in more than one room: I may have six, I may have four, I may have seven rooms, or the entire structure. All of that began not because I had a fixed notion. Really it began because I hated loudspeakers. I was working in electronic media, so it was quite a contradictory thing. I was always interested in the spatial aspects of sound. I discovered that maybe if I put the speaker in there [*points to the kitchen*] – the way that you heard it from another room became much more rewarding. I could make a virtual meta-space, so you wouldn't get the sense of these [*gestures to a nearby loudspeaker*] boxes.

In terms of the space that you're creating for a listener, to some extent the listener creates his or her own space because there's no predetermined path. If you have sound coming out of six rooms...

No, it's like a sonic choreography. I have to think of the scenario, otherwise everyone would just walk around and the experience would not be vivid. Usually on a large work, I work there for three weeks. It's like creating a narrative. I realized that there were sonic characters and they could appear and interact with each other. It's very interesting how people walk in a main space. How do they know something is part of the composition? Maybe you pass out something and half the people don't read it. I might have something in a distant room that draws them to it. I'm always performing between these rooms. I still maintain that I like the intensity of this directness of performing, even though the installation is all the work that went in beforehand.

So what constitutes a performance? What is a performance?

It's just me mixing. Of course there are visual elements, and the performance with the people, that's what I'm talking about. I'm mixing live and I'm connecting with an audience rather than just having this on a hard drive.

And the mixing that you're doing, you're responding to the audience as they are there, so there is an element of improvisation to it, if you would? How much of it is predetermined?

See that's when you get into this funny area. [*laughs*] Music is crazy... it's insane. Of course I'm improvising. But I'm not improvising the notes.

Right. The notes are there, prerecorded.

Yes, or else I might be making them with samplers or something, but I'm not having the notes come out of my head. What I'm doing is, again, dealing with these perceptual degrees, degrees of sensitivity, degrees of intensity, and things like that. Not the notes because you can play something a million different ways.

In a weird sort of way you're almost doing what a conductor does with an orchestra. Bringing out the woodwinds in a certain passage, et cetera...

Yes. I never thought of it that way, but it is like that because the basic music is in a way very raw. It's nothing without the oomph. I mean I've come back from these works to where we're sitting now and it takes me over a month to be able to even hear. I have learned what I've been able to learn because I have worked in these situations.

### Perception

You formulate ideas in your studio before they ever have a life as a work in the space they are intended for. What sort of process generates the decisions that you make here about the pitch content, let's say? We talked about pitches and they're all done beforehand. Are there systems at play that generate the pitch content?

Well, I'm concerned with various tunings. That's one thing.

Microtonal scales?

Sure. And I'm very interested in what are called second order effects in psychoacoustics, which are not the ear phenomena when you tune very close – when you do it with unison it has to be binaural or else you just get beats – but when the beats disappear and you get closer and closer to the 3rd or the 5th or whatever interval and it turns into a shape. I've always been very preoccupied with these different shapes, and of course I have particular frequencies I like, too. But it's the shapes, when it gets really slow and huge, and you're not hearing the beats but it is a beat frequency that's producing the shape. It's something that I've experienced, again, only because I work experientially. I used to move from studio to studio always trying to tune these oscillators to get these things. [*Sigh*] They would drift and it was making me crazy. Once I got locked into the Queens studio all weekend and it was 98 degrees. After that I thought I was never going to do this kind of work again until I had my own setup. Shortly after that it was great to read this article in *Scientific American* called 'Auditory Beats in the Brain' [October 1973]. The author, biophysicist Gerald Oster, did many experiments and people experienced these different shapes as spirals... They perceived them in the experiments he made. It was really helpful to me. I later met him in New York.

Now, in terms of perception, most of the music around us these days – whether it's commercial popular music or classical music, jazz, or even most experimental music – is created within a pitch grid of twelve-tone equal temperament and anything else is somehow alien. The ear can hear so much more than that, yet if you're not acclimated to it, you might perceive anything else as indistinguishable or as being out of tune. Anyone should be able to hear a just interval like a pure 5th, a pure 3rd, or a natural 7th,

an extraordinarily beautiful interval which hadn't existed in most music until contemporary composers started using it again. How important for you is audience perception? Is it important to you that they hear what you're hearing?

I'm not sure we always hear the same things, but I think what I was just talking about with pattern modulation, when you get these shapes, I think everyone experiences that. I don't know if it's so much a matter of everyone experiencing what I'm experiencing. But I would like it, whatever it is, to be vivid and have a kind of reality to it. It's not based on some kind of habit. These are vivid experiences. Yours might be different from mine... I don't think I could do it with two speakers. I don't even like to do it with multi-speakers, with 15 speakers all around because all this direct sound loses a kind of magic.

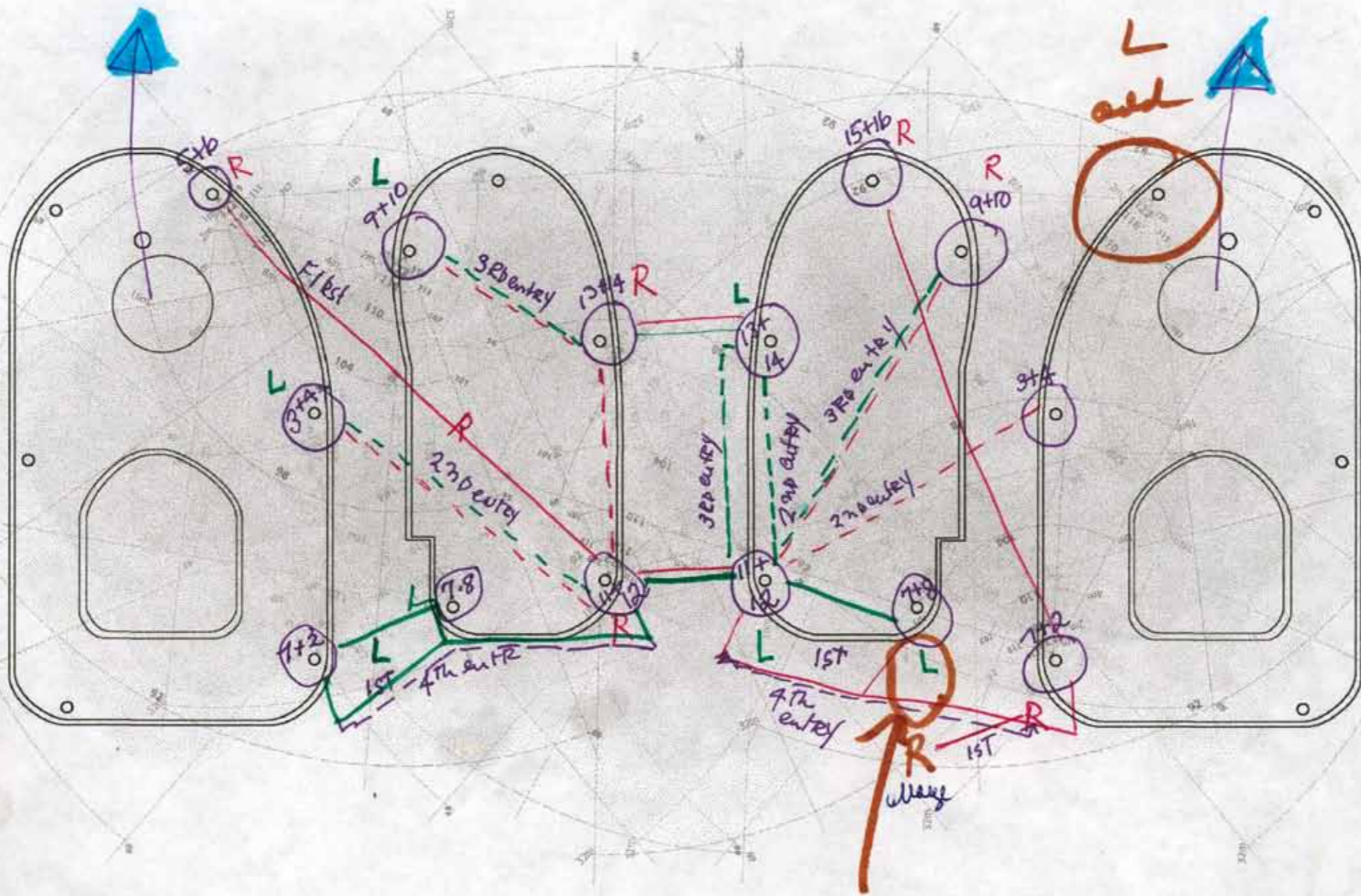
In a book about John Cage that you contributed an essay to, you brought up something that I thought was so interesting about how music is packaged. We have this notion that everybody has to have the same experience of a pop song or a Mozart recording. You have a big audience that comes to hear a performance and they all should be hearing the same thing, but in fact no one hears the exact same thing. Each person is different and does not hear things the same way. As you said, a work of art, a painting, or a sculpture, is a singularity, only one of it exists. You might reproduce it in a book, but it's not the work. Whereas with music, we have a notion that it's reproducible. There can be 1000 copies of a recording of Mozart's *Jupiter Symphony* or the latest Ricky Martin pop single, and they're exactly the same. But the reality is much subtler than that. Each person has his or her own music and that is something that hasn't really been addressed in the history of music.

I have no doubt that will be one part of music in the future. Today with all the customization and tailoring, you no longer have to necessarily think about music for millions. Music can be for millions, but it can actually be tailored for a specific individual. Just yesterday a chemist at UCLA who used techniques from nanotechnology took yeast cells and made a nanodevice which he used to discover that the cells produce sounds. It's not proven yet. These were just yeast cells, which were supposedly emitting a frequency that could be heard. The frequency was about a C-sharp or D one octave about middle C. They're very hopeful that if it's proven, it could be very beneficial for health purposes. This connection of music to certain cells is basically what I talked about in the article about Cage. The person creating the music may eventually be able to create certain movements in the cells themselves. *Living Sound, Patent Pending*, which I made in 1980, was one of the projections. Not too long ago there was a microbiologist in San Diego and he spilled this sample on a CD, a music CD. He didn't realize it right away and he tried to put it in the player and of course it didn't play. Because he was very clever he worked out this whole idea – which I can't explain well right now – of the genetic detecting of the protein molecules, which is an expensive operation. These machines are like \$300,000 in each lab. He was able to do that, maybe not quite as exact, but using this crazy technique and an ink jet printer that he got at a garage sale for \$20. He wasn't talking about it producing sounds, see that's the catch. I just made my first work in this futurist projection, which is really just quite fun. I didn't have anything else, so I put my blood on the CD, and of course I put some sound. I called it *Interactive Precursor, First Protein Modulation*; I can show it to you.

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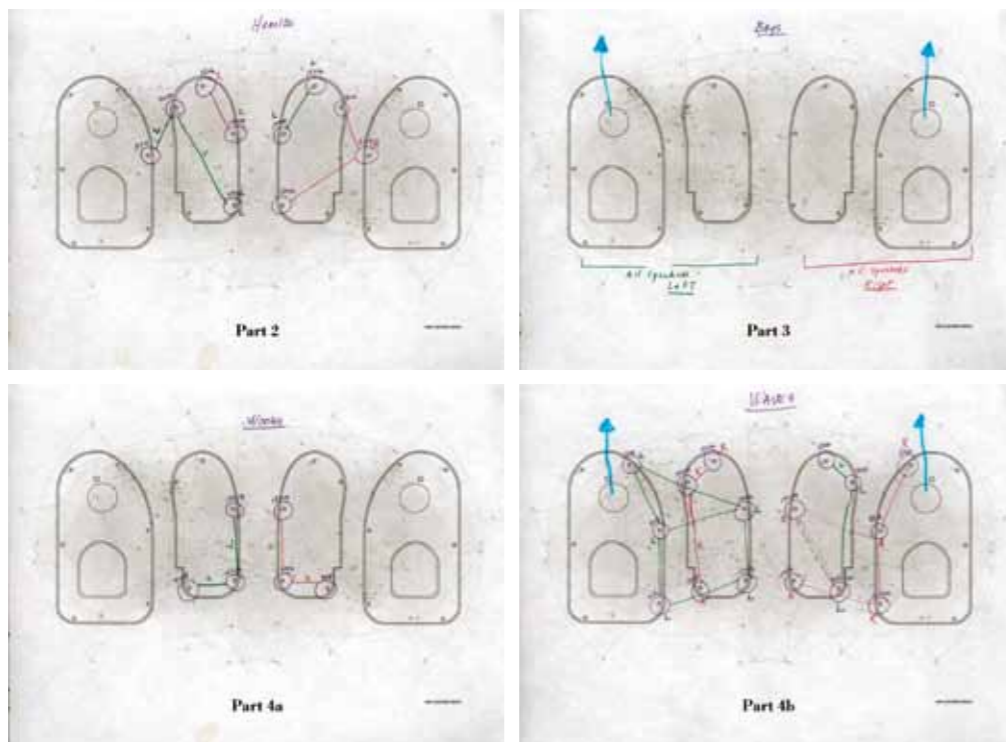
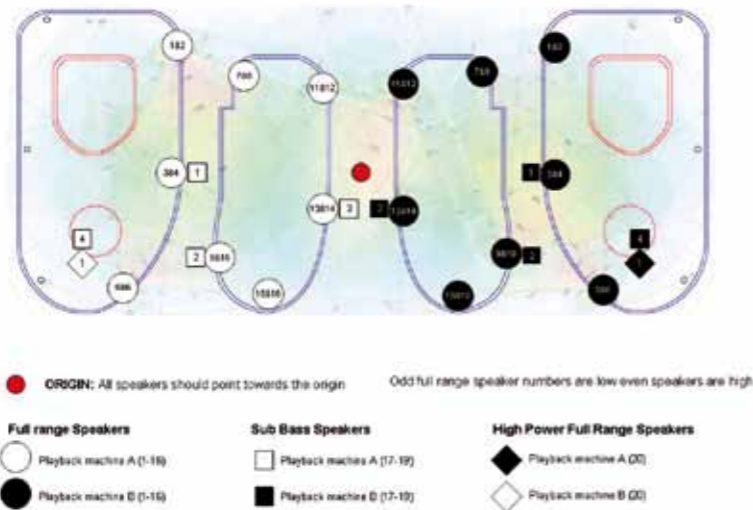


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Part 1

SOUND PRESSURE IN DBA



Maryanne Amacher, **TEO!** diagrams of sonic spatial designs, 2005

Yeah, at some point maybe.

But then I thought more and more about it. Won't it be fantastic because everyone says, 'Oh, CDs. We're just going to get everything from streaming live.' So this will be a great use for a CD. Then, you know, you can mix different things like our bloods and so on and see how that interacts with the music [laughs].

When we first came over and you were playing us your work, we heard it in a whole different way. In terms of the physical nature of different people responding to sound in different ways and it being a personalized experience for everybody, you discovered something very early on that's been a very key part of your vocabulary, and this is this music for the 'third ear'. As I listened I actually felt something. I felt my ear vibrating. It was startling. I felt it listening to the disc before, but I never felt it as strongly as I did this afternoon. It was a very intense physical experience. I think the only other time I'd ever felt it was when music had been too loud and it was painful. It's something we're actually taught to avoid. But this wasn't painful. This was something else. It was actually rather the opposite of painful. It felt like my ears were being tickled. It is a very, very interesting phenomenon. How did you first stumble upon these sounds? How do you use them? Why do they do that? How did you get my ears to do that?

First of all it's another one of those things that I observed very early. It was all part of this notion of perceptual geographies. In 1977, the theory was proven – even though this was postulated by Thomas Gold in 1948 – that the ear actually emits sound as well as receives it. So there are laboratories all over the world dedicated to this. Now see, this is what I think is funny about music – none of us know this. What in the world are we doing? I mean really to compose consciously. I've been trying half of my life to get this program where I can really know that if I choose a second combination of tones that this low D-sharp is going to have a certain kind of timbre that my ear is making, a certain quality, rather than if I choose another one. I really want to know this, because this same low D-sharp of 77Hz will sound from many different intervals. You know it's a bit obscured by the timbres, right? But our ears are doing this all the time. So these things can be reinforced or they can be enhanced for a more vivid experience in the music you create.

You played us a QuickTime file of an organist playing the famous *Bach Toccata and Fugue in D minor*, with video of what it was doing to someone's ear. The more voices that were added to that famous chord in the beginning, the more things started appearing in the ear as a response. So if this has been a part of all the music we hear, why is it that until I heard your music this afternoon, I wasn't aware of it?

It's just so strange about music. [laughs] I don't know. I guess that's what fascinates me about it because this is a very fundamental thing. And, not only that, in laboratories they test hearing this way and they test babies and you can actually listen to another person's ear, even. These are called otoacoustic emissions or SOAEs. If you're in a quiet enough place some people actually are able to hear the sound that's coming out of another person and this is not stimulated by sound.

But this has never been part of the vocabulary. This is not part of the vocabulary of music in any culture, or at least not the conscious vocabulary as far as I know...



Not so true, I mean look at all the Tibetan and Mongolian people singing to make those results. I'm sure they know what they want to make and they have conscious effects. Maybe they don't think about it the same way. It's even speculated that in really vivid performances of, you know, concertos or what have you, people are bringing out some of these qualities. What's exciting for me is because all this has sort of been subliminally experienced in our music, because of the complexity of the overtones and everything, it's exciting to think of the kind of energy that could be released when it's not suppressed anymore. Imagine an audience in a concert hall just creating this music that's a part of the string quartet at the same time.

So there are certain combinations of frequencies and timbres that will do this?

Well, what I just played for you, for example, is something that I just make intuitively. I don't know actually what's going on because you could listen to that, not that you'd want to, but you could listen to it for 24 hours or something and you'd still get the effect. The other kind of choice is what are called first, second, and third order difference tones. Now, we're getting these all the time in electronic music and sometimes it sounds like you know a funny modulation or funny garble and you think it's timbre. It's not – your ear is doing that. Your ear is making a lot of these funny sounds. It's not necessarily the electronics at all. But you know it's quite a challenge because you would habituate. You would get the experience and then suddenly, you would become desensitized to it. You would know it. Part of the craft is how you would remove this if you chose to do that.

### All-Time Music

I'd like to get back to your essay in the book about Cage after what you just said about listening to something for 24 hours. This is one of the things that really got me very excited about talking to you and there's this quote that appears in that same essay that reinforced it. You wrote: 'As the possibilities of all-sound music of the future were to Cage, the possibilities of all-time music are to me. In theory, years, weeks, days, minutes, seconds will be possible.' So there no longer needs to be this notion of a piece of music, a string quartet that's half an hour long, or a three-minute pop song, or a two or three-hour opera. Your music seems to exist beyond time; it's not really about time, at least not in a metrical sense...

Not that kind of time, it's more like the time in life when something appears and disappears and maybe you don't hear it again for a half hour, you may not hear it for an hour. Suddenly a boat appears after five hours and it gets closer and closer, you know, and makes an approach. It's time like that because we have the means now to do that.

But when you create a work you don't think about whether something is going to last twenty minutes or two hours? Or do you?

Well, as a composer I am fascinated by this. I see what I wrote about in that article as really an expansion of even classical music, of phrase structure. We used to call it the elemental line. It's like you're trapped, one thing has to come after another. It was always my obsession to get out of the elemental line. I studied medieval metaphysics and I used to try to think of ways of making a macrostructure.

Particularly, if you're trained as a musician you do this or that because this is the right note to play and it's all based on habit. I did a psycho-analysis of all my musical habits in order to try to stretch them. How you decide what comes after which is another arbitrary thing. It's more effective with these after-sounds if you let the sound go completely out of the head, which could last eight minutes or longer. You know I once did that in a work with Merce Cunningham. It was such a glorious kind of experience...

Last season, as part of the all-David Lang concert at Columbia University's Miller Theatre, Alarm Will Sound performed *The Passing Measures* which lasts for about an hour or so. At the end of the piece, the conductor stopped and didn't signal it was over, and there was this silence for maybe two minutes.

...Oh, that's beautiful...

After about two minutes somebody finally broke it by starting to clap. But for those two minutes, time stood still. That silence at the end I thought was the most stunning music I had ever heard live in a concert hall. And it was incredible because it wasn't silence, it was a lingering uncertainty... I love David's piece but for me the silence was even better than the piece.

Because you had time, and it is true. There is a part of timing when one thing ends and another thing begins that actually is another thing that as composers we should be probably more conscious of manipulating and controlling.

### The Problem with Recordings

You played us some excerpts and they were these cyclical things that happened and we didn't hear it in its entirety. Is it important to hear the entire thing?

Well I don't know if it is on the CD. It certainly is in the actual hall. Some people relate to CDs better than me. I have a little problem with them.

Let's talk then about live performances where people will go and hear this work that exists in four rooms. Does this work then have a beginning, middle, and end? Do people show up at a certain time?

No, they show up at the beginning. For a while I did another series called the *Mini-Sound Series*. It got more and more interesting the more I did it in different places because the idea was like television where the story continues the next week, and it was a fascinating involvement with the audience. It was not continuous music. We can make sounds go on for as long as we want. I'm more interested in making appearances and things like that. The end you spoke of with David's piece, I've experienced that a number of times, I mean with my own work.

So there is an ending, there's an actual ending?

Oh, yes. My first work was doing more or less pure installation work with these *City Links* pieces in which I brought in remote sounds. I had microphones in different remote environments and brought up those sounds in the gallery or museum or wherever. It also involved performance. The sound was alive and it came through high quality telephone lines – people always thought I was playing

a cassette. It was just hard for them to realize at that time that this was actually live sound. It was also very interesting to have more than one location and the kind of simultaneous synchronic things that would happen. You know, there are no laws.

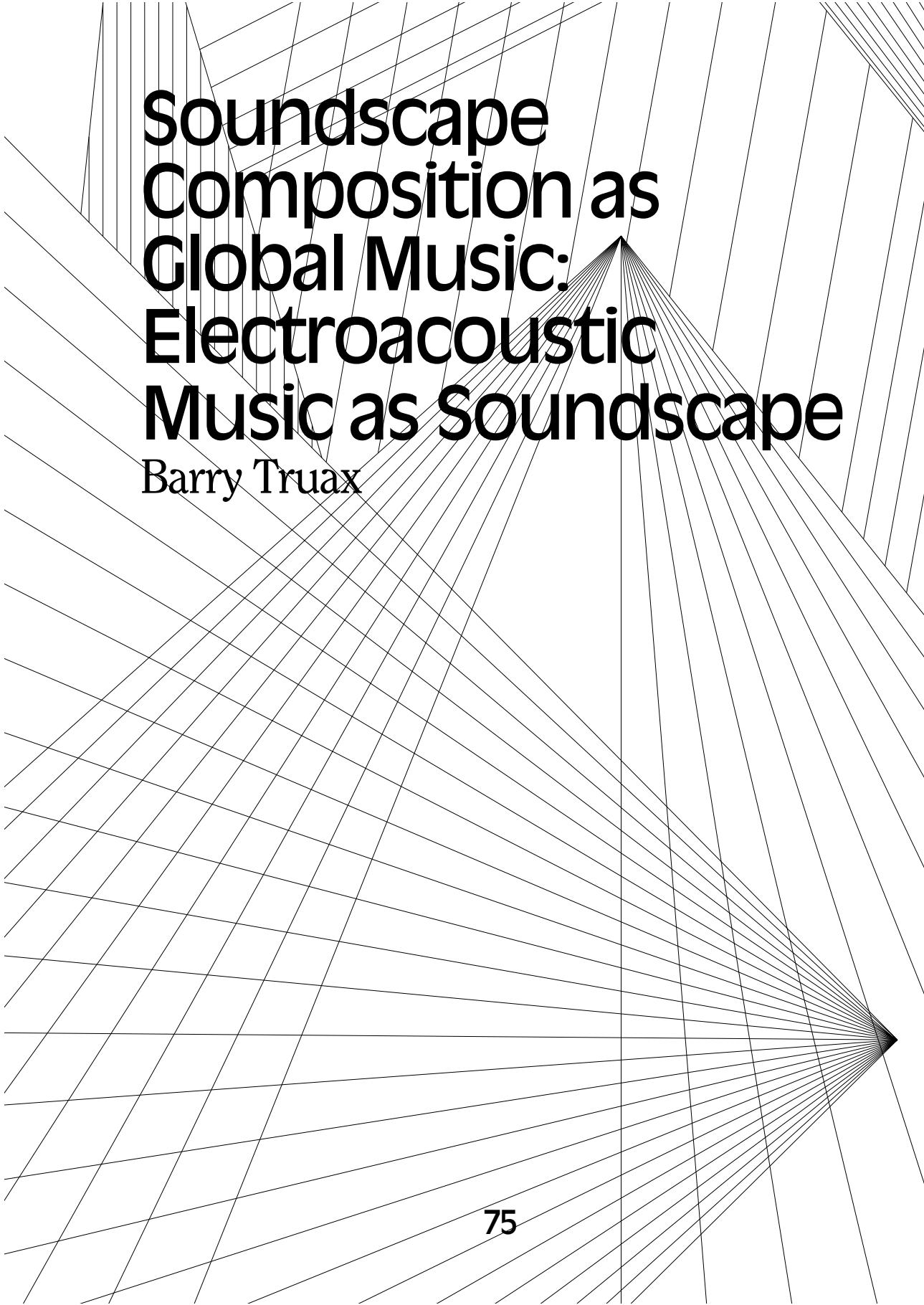
Well, let's talk about connecting to the music world. There is this CD out on Tzadik which is fantastic and it's gotten rave reviews all over the place, yet somehow it doesn't represent your work. To use a visual analogy, it's only a photograph of it. We're living in a society where recordings are the way people's work gets transmitted. I've been to a lot of concerts, yet most of the music I have heard I have not heard live. I've heard it because of an LP or a CD or a radio broadcast or from the Web. It's a blessing and a curse. It means that we can hear more music now than we've ever been able to hear anywhere. We have a wider vocabulary, but it's also limiting because we only get these 'photographs' of music...

Well, I think a lot of music is much more thrilling live. But it doesn't bother other people making music. It's just my thing because as I say I can't even listen to my own studio when I come back from having wonderful architecture where I'm able to make my music. If I were doing just purely beat music, or even those ear effects, that's only a question of playing them. But my music is so dense and has so many parts that to me it sounds like all these spirits are trapped in these boxes [*gestures to a speaker*] trying to get out and it sounds very harsh. Right now I'm very excited because I've never heard any of my music at the higher sampling rates and I think that will make a difference. It's never going to be the same as architecture but at least maybe these parts won't be so trapped and you'll be hearing some of the dimension. We were talking earlier about what I'm doing when I'm actually creating and of course I talked about the perceptual things, but it's a mystery because when I go somewhere, like the Maastunnel in Rotterdam, the Netherlands, I had this music that I didn't understand half of until I worked with it in the place. But why did I make it here? It's a mystery, so what am I doing? It's so dense because it has a lot of parts. Maybe my brain just can't deal with it and I'm imagining the sound that I get when it's in one of these architectures. I think that's also what people do that enjoy some of this dense music on CD because they're imagining, which in itself is very interesting because I would like to dream that I could make music that triggered another music in the listener's mind. I think to me it's almost more interesting than the music itself really.

A few years ago everybody thought the hot thing was going to be 5.1 surround sound. Starkland asked a bunch of composers to write new pieces for 5.1 surround sound and they put them out on a CD. Pamela Z did a piece; Meredith Monk did a piece... But, in a way, if two speakers trap ghosts of your sounds in a box, 5.1 gives you three more speakers...

But still you get the dregs. A lot of people say you need over 20 or something like that. I don't think I would like that. I wish you could just spray it. Just get into the ions, excite the ions.

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# Soundscape Composition as Global Music: Electroacoustic Music as Soundscape

Barry Truax

I grew up hearing the old cliché about music being ‘the universal language’. After the failure to establish a universal written or spoken language, such as Esperanto, I suppose it seemed, at least to the Western mind, to be a plausible alternative. However, as I gradually became aware of the music of other cultures and started being deeply affected by some of them, it also became clear that even though music as a social practice seems to be found everywhere in the world, musical thinking – and the concepts and social practice it leads to – is far from uniform. In fact, the more I learned about music that comes from other cultural traditions, the more aware I became of listening to it (particularly through recordings) with very different ears. At best, one can hope there is some analogy between what we may call listening from inside and listening from outside.

On the other hand, there are two terms in common usage today: world music (or world musics) and economic globalization,<sup>1</sup> both of which seem linked to McLuhan’s ‘global village’ concept. First we have the diaspora of various cultures which often extends worldwide and which inevitably brings about musical cross-fertilization and evolution – one only has to think of the history of black African music and its transition to North America and popular culture to find a dramatic example. Cultural critics, however, point to a more disturbing facet of this globalization: the increasing hegemony of American popular music worldwide and the resultant homogenization of culture that threatens its local manifestations. As Attali reminds us, music is not only a reflection of the social order but is tightly allied to economic power and its interests.<sup>2</sup> We are in danger of coming full circle to a new version of the old cliché: Muzak as the universal language!

### The Soundscape Concept

In the late 1960s, R. Murray Schafer suggested a radically different concept: the soundscape as the ‘universal’ composition of which we are all composers.<sup>3</sup> This bold concept, intended as an alternative not to music but to the problems of noise, led to the formation of the *World Soundscape Project* (WSP) at Simon Fraser University in the early 1970s. Although in common usage the WSP often got abbreviated to ‘the soundscape project’, Schafer clung to the idea of its global basis, and in 1975 conducted a tour through Europe to make recordings and study five villages in each of five different countries.

The main purpose of the WSP’s work was to document acoustic environments, both functional and dysfunctional, and to increase public awareness of the importance of the soundscape, particularly through individual listening sensitivity. In current terminology, the goal is to put ‘acoustic ecology’ on the environmental agenda. However, given the importance of local action, one of the WSP’s first major publications was *The Vancouver Soundscape*, a booklet plus two records which appeared in 1973.<sup>4</sup> Twenty years later, most of the recordings were re-issued on a double CD, where the second CD consists of documentary recordings and soundscape compositions derived from digital recordings made in Vancouver in the 1990s.<sup>5</sup> Not only was the Vancouver project probably the first systematic study of the soundscape of a city, but the 20-year span with the follow-up project gave a unique aural portrait of the rapid evolution of the city and its soundscape. Such longitudinal work is rare in acoustics and noise studies, and should be encouraged

in soundscape documentation, since both personal and cultural memory lacks the ability to track such aural changes in the environment.

The Vancouver study also set the frame of the city for other work to follow. In the last decade, city ‘portraits’ on CD, varying in the degree to which they mingle documentation and composition, have appeared for Madrid, Amsterdam, Lisbon, Brasilia, and others. Many other unpublished compilations and individual research results have also been carried out. In other words, it can be argued that the WSP’s influence has spread worldwide as a concept practiced by locals, rather than by outside experts. In fact, following the 1993 Tuning of the World conference in Banff, Alberta, the international organization known as the World Forum for Acoustic Ecology (WFAE) was formed, which maintains an extensive website and soundscape newsletter and journal, as well as an on-line discussion group. In 1998, a Swedish group organized an international conference in Stockholm on the theme of acoustic ecology, and an administrative structure was set up during the conference for the WFAE consisting of both national or regional groups and individual members. In other words, the type of system that has emerged from this evolution can be described as an international network with local nodes.

So does this mean that the soundscape is a shared global experience? Although it is clearly the concern of a dedicated group of individuals who are networked worldwide, soundscapes are inherently local and particularized. To be sure, there is a disturbing analogy to economic and cultural globalization which is a force for homogenization, and that is the pervasive and invasive influence of technological sounds and noise. Almost everything about technology promotes standardization and uniformity, right from the micro level of hums and broad-band noise, through to the influences that produce ‘lo-fi’ soundscapes in every urban centre, as well as their surroundings.<sup>6</sup>

It is a simplification, but one which is suggestive: hi-fi soundscapes are varied and uniquely local; lo-fi soundscapes are uniform and about the same everywhere. From an ecological standpoint, the hi-fi soundscape is populated by many individual ‘species’ which are the result of local conditions. They are information rich, and most importantly, are most richly interpreted by locals who understand their contextual meanings. The lo-fi soundscape is created by the hegemony of only the most powerful sounds which eradicate, or at least mask, all local varieties. Even more seriously, the lo-fi soundscape seems to create a common habit of non-listening, one which soundscape theory argues is detrimental both to the individual and to the soundscape as a whole since it can deteriorate unchecked.<sup>7</sup>

### Soundscape Composition and the Electroacoustic Community

Today, the electroacoustic community is becoming increasingly global. Here I refer both to the group of student and professional practitioners, and to the common experience of people in industrialized countries to hear more sound via electroacoustic reproduction.<sup>8</sup> Schafer originally described the electroacoustic listening experience as ‘schizophonic’, suggesting it was an aberration.<sup>9</sup> Today, such ‘aberration’ is increasingly the norm. I have described one aspect of this trend as the creation of surrogate environments through the use of background music, radio, television and recordings. Foreground information comes as often as not from



national and international media sources, rather than from one's neighbourhood, perhaps even more readily in most cases. So-called virtual reality is increasingly becoming an aspect of 'normal reality' and one wonders whether the younger generation is capable of distinguishing the difference, or even if they care to.

At the professional level, the electroacoustic community, like many other sectors of society, is becoming increasingly global in its communication practices, mainly through the Internet. What started out as a national communication medium for electroacoustic composers in Canada sponsored by the Canadian Electroacoustic Community (CEC), originally called 'cecdiscuss', has quickly become an international discussion forum now called 'cec-conference'. Whereas the local studio used to be the centre of electroacoustic music, private studios and workstations using some variant of standard commercial hardware and software is now the norm. It is as yet unclear as to what the personal and artistic ramifications will be of this global network of individuals working separately with similar tools. Will it inspire uniformity or diversity?

A subset of the professional electroacoustic community overlaps with its sister organization, namely the acoustic ecology discussion group. That is, artists coming from the electroacoustic music community join with those coming from other acoustic-based backgrounds, such as field recordists, sound artists, and those involved with acoustic design in a variety of contexts, around a common interest in what I have called 'soundscape composition'.<sup>10</sup> At SFU, this activity evolved spontaneously from the documentation or 'found' soundscapes of the WSP. Since most of the participants were composers, they began applying electroacoustic techniques towards processing the recorded sounds, creating compositions that range from those whose sounds are transparently manipulated to those that are much more transformed. However, to distinguish this latter approach from *musique concrète* and acousmatic music, I have argued that the original sounds must stay recognizable and the listener's contextual and symbolic associations should be invoked for a piece to be a soundscape composition. Music created through soundscape composition cannot be organized with much similarity to instrumental music; in fact, a broader definition of music such as 'organised sound' must be invoked if soundscape composition is to be included.

A particularly interesting trend in soundscape composition is the use of multiple loudspeakers for reproducing the work, the performance practice called sound diffusion in electroacoustic circles, originally pioneered in France and now increasingly practiced worldwide. So-called classical diffusion takes a stereo image and projects it during the performance into the performance space via multiple loudspeakers, guided by a performer at a mixing console, usually centrally placed. Given the visual and directional bias of most musical performance in theatres – audiences staring at a stage area – this experience is inherently more immersive. However, the stereo source, as developed as it has become, presents a 'bottleneck' because of the limitation of two discrete channels.

At SFU we have been creating a multi-channel computer-controlled diffusion system through a collaboration with a local engineer, Tim Bartoo, whose company called Harmonic Functions created an 8-channel prototype unit (the DM-8) and the more recently commercially available 16-channel and 64-channel units



Bruce Davis & Peter Huse recording at SFU, ca. 1972.





The World Soundscape Project group at SFU, 1973; left to right:  
R. M. Schafer, Bruce Davis, Peter Huse, Barry Truax, Howard Broomfield.

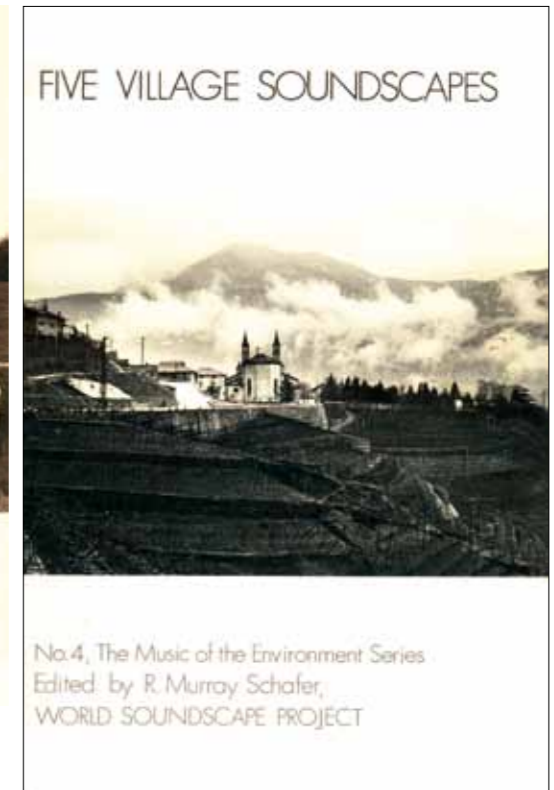








Top – Bruce Davis recording with the stereo Nagra machine, June 1974.  
 Bottom – Howard Broomfield at SFU, ca. 1972.



Top – World Soundscape Project recording setup at Westminster Abbey, Mission, B.C., Canada, Summer solstice, June 1974.  
 Bottom – Covers of publications by the World Soundscape Project.

Thus, the real goal of the soundscape composition is the re-integration of the listener with the environment in a balanced ecological relationship.

(the AudioBox) marketed through Richmond Sound Design.<sup>11</sup> The central idea is that a number of discrete source channels of sound can be projected either statically or dynamically onto a number of output channels connected to speakers. Despite the complexity of the signal routing involved, the result can be remarkably similar to situations found in the acoustic environment – discrete sources come from independent directions. There is no natural analogy to the stereo image created through panning where the same sound comes simultaneously from two different sources with varying loudness levels. Even echoes involve a delayed version of the source. The auditory system, presented with this paradoxical effect, resolves the ambiguity by creating the illusion called a ‘phantom image’ which appears to emanate from somewhere between the two speakers (which in the case of headphones means inside one’s head!). However, phantom images are very unstable and even a slight movement off-centre from the two speakers shifts the image towards the louder source. In contrast, even just 8 channels of discrete source material (what is technically called ‘uncorrelated’ signals) creates a convincing soundscape where component sounds can be localized in the manner experienced in acoustic environments.

In my 1997 composition using this approach, called *Pendlerdrøm (The Commuter’s Dream)*, I created the experience of being inside the Copenhagen train station using four separate stereo recordings, unprocessed but played simultaneously so that individual sounds came from different directions, as is typical in a busy station.<sup>12</sup> A local train arrives, and the listener appears to get on it as the scene shifts to the inside of the enclosed train compartment. After a short ride, the doors open and the person (modelled as a commuter) gets off and leaves the station. However, at two points in this scenario (inside the station and inside the train) the sounds gradually become musically transformed, suggesting that the commuter through tiredness and familiarity goes into an inner world or daydream. Sounds that were previously heard in a more natural context in the station come back in loops or time-stretched, emulating the processes of memory and dreams.<sup>13</sup> A loud percussive event (a digitally enhanced train compartment door slam) triggers the return to reality just as it might in everyday life. Thus both the sound materials and the form of the piece are derived from soundscape experience. Moreover, through listening to a simulated soundscape in this manner, the listener may perceive it differently in the real world when it is next encountered. By combining a very specific environment with an experience analogously shared by many people in industrialized countries, this piece shows the unique blend of local and global that soundscape composition can achieve. It also shows that soundscape composition can deal with urban soundscapes and the totality of soundscape experience, not just natural soundscapes.

The soundscape composition, with the interdisciplinary conceptual background of soundscape studies and acoustic communication, and the technical means of granular time-stretching<sup>14</sup> and multi-channel diffusion,<sup>15</sup> all of which have been developed at Simon Fraser University over the past 35 years, provides a well developed model for the musical use of environmental sound. The characteristic principles of the soundscape composition as derived from its evolved practice are: (a) listener recognizability of the source material is maintained, even if it subsequently undergoes transformation; (b) the listener’s knowledge of the environmental and psychological context of the soundscape material is invoked



and encouraged to complete the network of meanings ascribed to the music; (c) the composer's knowledge of the environmental and psychological context of the soundscape material is allowed to influence the shape of the composition at every level, and ultimately the composition is inseparable from some or all of those aspects of reality; and ideally, (d) the work enhances our understanding of the world, and its influence carries over into everyday perceptual habits. Elsewhere I have described the ideal balance that should be achieved in such work as matching the inner complexity of the sonic organization to the outer complexity of relationships in the real world, without one being subordinate to the other.<sup>16</sup> Thus, the real goal of the soundscape composition is the re-integration of the listener with the environment in a balanced ecological relationship.

Given its by now lengthy history, the idea of listening to environmental soundscapes as if they were music can now be regarded as a tradition. What appeared radical to John Cage's musical world and to R. Murray Schafer's more environmentally concerned audiences has now established itself as a useful, if not absolutely necessary condition for living in a sonically imbalanced environment. The genre of the soundscape composition emerged from this basic idea, largely inspired by the work of Schafer's *World Soundscape Project* at Simon Fraser University, but with a European detour via Luc Ferrari. At one end of the continuum of soundscape composition practice is the 'found soundscape', or what is referred to as phonography, that is, recorded soundscapes with minimal or no alteration that can be listened to as if they were music, in the sense of an organised sound structure with differing levels of meaning.<sup>17</sup> At the other end of the continuum I have proposed is the abstracted soundscape which remains clearly identifiable as to subject matter, but which incorporates sonic elements that have been abstracted to varying extents from their original source.

I would now like to suggest inverting this increasingly familiar concept to suggest that we listen to electroacoustic music as if it were a soundscape. What analytical insights would result and which analytical techniques would be the most useful for obtaining those insights? In fact this idea is not entirely unprecedented in the sense that various forms of audio-based communication, beginning with radio and background music, evolved to create extended artificial environments of sound over the last century. Even the early Telharmonium<sup>18</sup> was piped into upscale restaurants in New York to create a pleasant musical ambience – and coincidentally to increase liquor consumption, a side-effect that has been observed in modern times as well,<sup>19</sup> and no doubt accounts for its longevity as a popular practice! George Orwell, among others, noted the use of radio as what we now call an 'accompaniment medium' in middle-class households in England before and after the Second World War, and by the 1960s in North America with radio targeting particular demographic subgroups, the use of radio (and even television) as a surrogate environment was widespread.<sup>20</sup> The contemporary forms of personal portable audio formats extend this idea with mobility and greater user selectivity.<sup>21</sup> Film soundtracks are designed to create sonic environments according to a set of conventions understood by the audience (and only loosely related to the real world), but arguably the largest amount of capital for auditory environment design today is invested in the digital game industry where complex and detailed soundscapes are

the norm, both for realistic and fantasy worlds. Since surrogate electroacoustically designed environments are a familiar feature of most listeners' daily experience, certain types of electroacoustic music may seem to be simply a more concentrated or specialized type of soundscape to be listened to in a similar manner.

### Basic Soundscape Concepts

I find it striking how easily applicable the basic, and rather simplistic, soundscape categories still are for the analysis of all such electroacoustic soundscapes. It is significant that those categories are strongly related to perceptual habits, such as 'keynote' sounds for background listening, sound signals for foreground perception, and 'soundmarks' for those sounds recognized as having cultural and symbolic importance within a community. These concepts rely heavily on the listener's understanding of and ability to interpret such sounds, as well as pointing to the shifting levels of listening awareness and the importance of social, cultural and psychological context for soundscape perception. With a typical radio music format, the recorded music often functions as a background ambience, with recurring elements such as the station call functioning as keynote sounds. The station attempts to attract foreground attention to the advertisements through a variety of strategies, and within the advertisements highly symbolic and culturally interpretable sounds are used to provide associations and reinforce a product image, often in the manner of the soundmark.

In terms of their structural function, keynotes provide background continuity, signals provide foreground encoded and interpretable information (which can become a keynote if heard frequently enough) and can become soundmarks if given uniqueness by cultural and social associations that transcend an immediate situation. Unlike the arbitrariness of the linguistic sign, the specific aural qualities of environmental sounds become tied to their interpretation, and such sounds cannot be changed arbitrarily without cognitive disruption. It can be noted that electroacoustic music as a form of intensely designed communication may also provoke these basic kinds of listening and interpretation strategies even if the sound material doesn't particularly resemble environmental sound.

The theory of acoustic communication<sup>22</sup> expands on these concepts to include how information is extracted from sounds (i.e., listening) and exchanged, both acoustically and in the modern mediated forms of electroacoustic discourse which among many of its effects includes extensions of the sonic repertoire and their arbitrary sequencing and embedding, whether through amplified sounds imposed on an environment or the personal layering of sounds such as with the Walkman and iPod. Historically, this technological development involves not only the expansion of the language of electroacoustic sound, but also the expansion of the electroacoustic listener's listening strategies in both directions of attentiveness along a continuum from what I've termed distracted listening (e.g., habituation to media and music as environment) to analytical listening (e.g., the discernment of sound qualities, good and bad reproduction, separable parameters of sound, and on to spectromorphology). Denis Smalley has similarly classified different levels of surrogacy related to different listening strategies provoked by the distance between the sound and any real-world references.<sup>23</sup>



What acousmatic music and soundscape composition share is the primacy of listening, the ability to extract information at different simultaneous levels, and a recognition of the ability of sound to shape space and time, including the creation of sound spaces through diffusion practices. Where they diverge is more of a matter of emphasis regarding the role of context. Electroacoustic music recognizes the abstracted aspects of its language while acknowledging its movement towards some point of absolute abstractness, whereas soundscape composition begins in complete contextual immersion and moves towards the abstracted middle ground. In terms of the balance between inner and outer complexity, phonography resides largely in outer complexity, abstract composition in inner complexity, with soundscape composition and some of the more abstracted forms of acousmatic music based on the interplay between the two.

### Electroacoustic Music Analysis as Soundscape

Returning to my theme of listening to electroacoustic music as if it were a soundscape, perhaps the first point to emphasize is that in terms of the intention/reception dialectic,<sup>24</sup> I am mainly referring to the listener's perceptual strategies, whether or not they correspond to the composer's intentions. Electroacoustic music analysis as informed by soundscape concepts would seem to apply best to works that range from 'realistic' to 'abstracted', and less so to works that tend towards abstraction either in sound or syntax. However, even with more abstract works where sounds have little resemblance to the real world or to its syntactical structures, those works may still be listened to 'as if' they were soundscapes, i.e., at the level of metaphor. Also keep in mind that the soundscape of the real world is not static and that it increasingly includes electronic additions (both as sounds and gestures) that listeners become familiar with in everyday life. The jump-cut that is so foreign to the acoustic world of connected transitions was introduced in visual form in the film montage, then in the auditory domain with the tape edit, the cueing of dissimilar segments in radio broadcasts, and today the even faster digital edits and sequences, such that it is now commonplace in the everyday soundscape (e.g., the rapid switching between sounds in digital alarms). Likewise, the layering and cross-fading of the mixing studio finds expression in iPod listening, cell phones, and background music soundscapes. One can ask: is the acoustic environment becoming more abstract and is the abstract becoming more environmental?

Two of the structural strategies I have observed in the practice of soundscape composition<sup>25</sup> are works which rely on a fixed spatial perspective (or series of such perspectives), and those which rely on moving perspective. Denis Smalley provides an extensive catalogue of what he terms 'space-forms' found in both the soundscape and acousmatic music.<sup>26</sup> Fixed perspective works imply a continuity of space, with temporal flow created by sonic events. Wishart's landscape with real and unreal elements, or Emmerson's mimetic sounds or abstracted syntax come to mind here as electroacoustic equivalents.<sup>27</sup> Denis Smalley's *Valley Flow*, Natasha Barrett's *Little Animals*, Wishart's own *Red Bird* (with its inner and outer soundscape in conflict), Simon Atkinson's *Nocturne*, and Bernard Parmegiani's *Dedans/Dehors* seem to work well as examples of this fixed perspective, at least in some extended sections. Likewise, text-based works<sup>28</sup> may be based in a fixed perspective or else involve a

moving, narrative path. Works with moving perspective rely on spatial transitions, usually simulated or evoked, such as the classic use of doors as transitional spaces in acousmatic music. These works create a sense of travel and narrative. Francis Dhomont's *Espace/Escape* and Novars seem to juxtapose the fixed and moving perspective as their main structural concept, whereas Justice Olsson's *Up!* takes us on an incredible Freudian journey through sexuality and the subconscious world, showing that such journeys need not occur only in physical space. I would argue that the 'outer world' of such pieces may include the inner world of memory, dreams, and metaphor as fluid imagery unconstrained by the acoustics of real spaces; hence the variable perspective offers an unlimited range of approaches.

Soundscape composition has yet to be mentioned in any standard textbook (though with the publication of Leigh Landy's new book, *Understanding The Art of Sound Organization*, that gap has started to be filled<sup>29</sup>). However, it risks being treated by future commentators, analysts and historians as merely another style or subgenre of electroacoustic music, rather than as an organizing principle, a set of listening strategies and therefore a reference point for all electroacoustic music with real-world references. This paper therefore concludes with a call for electroacoustic music studies to integrate soundscape concepts within its standard analytic practices.

### Conclusion

The concepts of 'local' and 'global' provide an easy dichotomy for many issues that extend across the cultural and social realms. It is commonplace to think of an ongoing struggle between them at various economic, social and political levels, with environmental and cultural concerns often being at the forefront. Therefore it is not surprising that both music and the soundscape can be understood as reflecting those tensions – the hegemony of monolithic global capitalism pitted against the infinite variety of local cultures. Homogenization and standardization battle with individual uniqueness. Even within the world of electroacoustic music, one might characterize its more abstract, acousmatic forms as being 'universal', in the sense of transcending any specific cultural reference, as distinct from soundscape composition that is always rooted in a specific context. However, such polarization is not useful, in my opinion. A nuanced interplay between the global and the local, between the abstract and the contextual, the shared and the specific, can be much more satisfying to the listener. At the level of everyday listening, I have argued that both acoustic and electroacoustic soundscapes are frequently intertwined and experienced with familiarity. And just as the soundscape can be listened to as if it were music, or at least organised sound, so too can electroacoustic music be listened to as if it were a soundscape, even if an imaginary one. This is not to say that we shouldn't be constantly aware of the dangers of cultural hegemony and homogenization at all levels of social experience. However, electroacoustic music by its very nature offers an exemplary forum for the alternative use of mass-produced technology to give voice to individual forms of expression that can reference both the local and the global.

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# Space is Something that Arrives with the Sound

Interview with Takuro Mizuta Lippit  
Arie Altena

Takuro Mizuta Lippit, who performs as a turntablist under the name dj sniff, is the artistic director of STEIM in Amsterdam. STEIM (Studio for Electro-Instrumental Music) is a centre for researching and developing instruments and tools for performers in the electronic performance arts. It is also a laboratory, studio, workshop, and international meeting place, and it regularly programs live electroacoustic music concerts. From its founding years – STEIM was set up in 1969 – the emphasis has been on developing instruments and tools for performing electroacoustic music, though various projects at STEIM have dealt with spatial multi-channel sound too. The emphasis on performance and on building instruments for live improvisation, is a conscious strategy to get away from a situation where electroacoustic music is defined as listening to sounds coming from speakers without anyone being present on stage. As spatialization of sound has developed mostly from within a paradigm of multi-channel sound installations, I thought it might be interesting to ask Taku about his views on *The Poetics of Space*. I interviewed him at STEIM in October 2009.

What is your opinion on multi-channel sound and spatialization?

My experience of listening to multi-channel installations and multi-channel sound compositions is that I never find them truly convincing. Focusing on where the sounds actually are often distracts me from what I want to listen to. The spatial aspect confuses the compositional aspect as well as the performance aspect. You are suddenly and unnecessarily distracted if a sound is placed behind you in a surround sound cinema. It takes you out of the narrative, because you are not sure if it is inside or outside the narrative. I always had an ambiguous feeling about the spatialization of sound. That feeling was confirmed when I met Joel Ryan, a composer and performer of computer music who also works at STEIM. He only works with stereo and says he is not interested in spatialization of sound. Instead he wants to add air to the sound – I think that is how he formulates it – he works with what is in between the sounds. I think all musicians work with space, but placing sounds in space is not the way I approach it. For me space is something that arrives with the sound: with the sound the space also comes together. While the composition or performance unravels, spatial aspects arrive too. For me this is a much more powerful experience of space. It is not just about physical space, but also about internal space, compositional space, and it is always time-stamped. As a performer I would always deal with space starting from time. Each moment opens up a different space. Sachiko M, who plays pure sine-tones, actually plays space. She lets the space emerge by sending out a pure signal, rather than placing sound in space. The space comes together through the sound. I don't think this approach would work as an installation, it works because she is there on the stage, and you go to hear her do it at that moment, as a concert.

What, then, do you think of Edwin van der Heide's approach to spatial sound?

Edwin is actually working with the medium in a very strict sense. The digital and the analogue technology that he uses and the space in which he performs are all judged at the same level of rigorousness. He has a very strict and perfectionist approach. If he has a speaker moving through space, each element of the installation is used to enhance the core idea to the maximum. The result of that sort of precision reveals the medium. My favourite piece of his is the spinning speaker, *Spatial Sound*, which he made together with Marnix de Nijs. That one is frightening! You think there is no way somebody is able to control that thing and it goes so fast! It is so carefully and precisely made, and that is why it is such a powerful piece. I do not see him primarily as a spatial composer: rather as a result of how he works, his pieces bring out the space.

Can you explain the programme you proposed for the Sonic Acts Festival? I suppose it builds on the ideas you just put forward.

I proposed a residency of Yutaka Makino and Hans W. Koch. Yutaka works in a more traditional electroacoustic sense with spatialization. His dissertation is about making a spatial sound system that is scalable to any space and any number of speakers. His compositions on the other hand are almost site-specific. He tunes them to the resonant frequency of the room and to the resonant frequency of the body. In his piece for the Wave Field Synthesis installation he build fields of sounds that cause phase cancellations in different parts of the room. So when you stay still, almost nothing happens, but when you walk around you hear the multiple different ways in which the sounds emerge. What I like about his work is that he is also a performer with a strong presence. This connects to what STEIM is about: you do not hide behind your compositions. Hans W. Koch works on smaller spaces. My favourite piece by him is a self-multiplying FM-synthesis patch. It keeps multiplying until it crashes. He has an ensemble of people who play this patch on their computers, and they all sound more or less the same, until the computers crash. Every computer has a unique sound when it crashes, so you get this wonderful noise. He is dealing with the notion of the internal space of the computer, but he also has pieces for cell phones that use feedback, with people calling in. I was trying to find artists that were not focusing on space itself, but somehow their work as performers suggest an internal space.

What is your thought on the current rise of interest in dealing with space and spatialization in music? More than ever I hear concerts using multi-channel sound installations, or ensembles playing in different parts of the room.

Otomo Yoshihide is also performing concerts now where he places musicians in different places in the room. I don't know if it is a bigger movement than before; it just is another method or inspiration. It might have to do with working against standards and conventions; the standard is still two channels, and facing an audience. There is lot of talk about dissolving the stage and the performer–audience boundary – it connects to that. It also has to do with technology, with laptop music, and with the fact that it is much easier now to route sound to different speakers. And there is of course an academic research agenda. There are a lot of institutions



that have unique multi-channel setups. If you are a student or resident at one of these institutions, you will obviously compose for these setups, because they are amazing. I also think that for laptop musicians, most of whom are not physical performers, spatialization is an obvious direction to take: to have an external focus. Improvisers on the other hand are often very aware of where sounds are placed. Someone like Evan Parker, the English saxophonist, often plays in churches; he is very conscious of space, also of the internal space of his instrument and of his lungs. As a performer you learn to play the space, you adapt to it, you discover little things and you play with it, as opposed to trying to control or define the space and then let people experience it. Spatialization does not play an important role in DJ culture. Even though there were some experiments with spatialization, it has always been about the DJ facing the crowd. It is important that the sound comes from the direction of the DJ, that it is one-directional. The same is true for the Jamaican sound systems with its stacks of speakers: the *selektor* and the DJ are always in the middle facing the crowd. So, coming, as I do, from both DJ culture and improvised music, spatialization is not really a path that I, as a performer, put my energy into.

Yet you say also that sound is always already spatial.

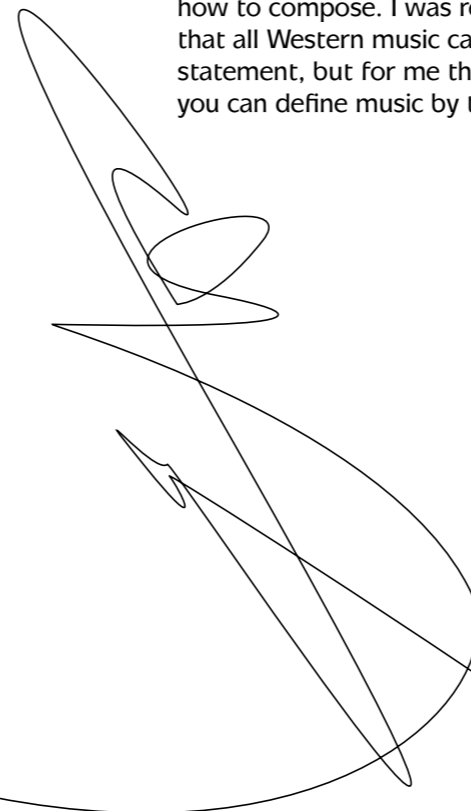
If you make a sound, it opens up so many possibilities, it comes with so many references, especially in a concert situation. You are throwing the audience not just one sound, you throw them a bundle of things: the reference, the sound, the texture and the space. There are better ways of dealing with space in sound than having an array of speakers. What is important is thinking of sound and space not as physical properties – as sound that comes from there – but from a compositional perspective. It is simplistic to say that eight speakers are equal to eight sound sources. Maybe there needs to be more technical development together with compositional development. Probably what is still lacking for the Wave Field Synthesis systems with multiple arrays of speakers, are toolkits or environments that allow you to intuitively compose for the system. There is also a fundamental difference between sound art and music: what works well in a sound art context, one where you walk in and out, does not necessarily translate well to a concert situation, with its specific mode of listening and defined time frame. Many people who are engaged in multi-channel work play with the idea of sound art. As a performer I set boundaries for myself to make easier decisions, so I do not deal with sound spatialization. If you set off intending to break the boundaries of musical performance, you are opening a whole new can of worms.... [Laughs] I have enough to deal with already. The better ways to deal with space in music probably have to do with focusing on how we listen. Rather than bundling up spatialization in technical issues of how to spatialize sound, it's more interesting to look at how we can listen.

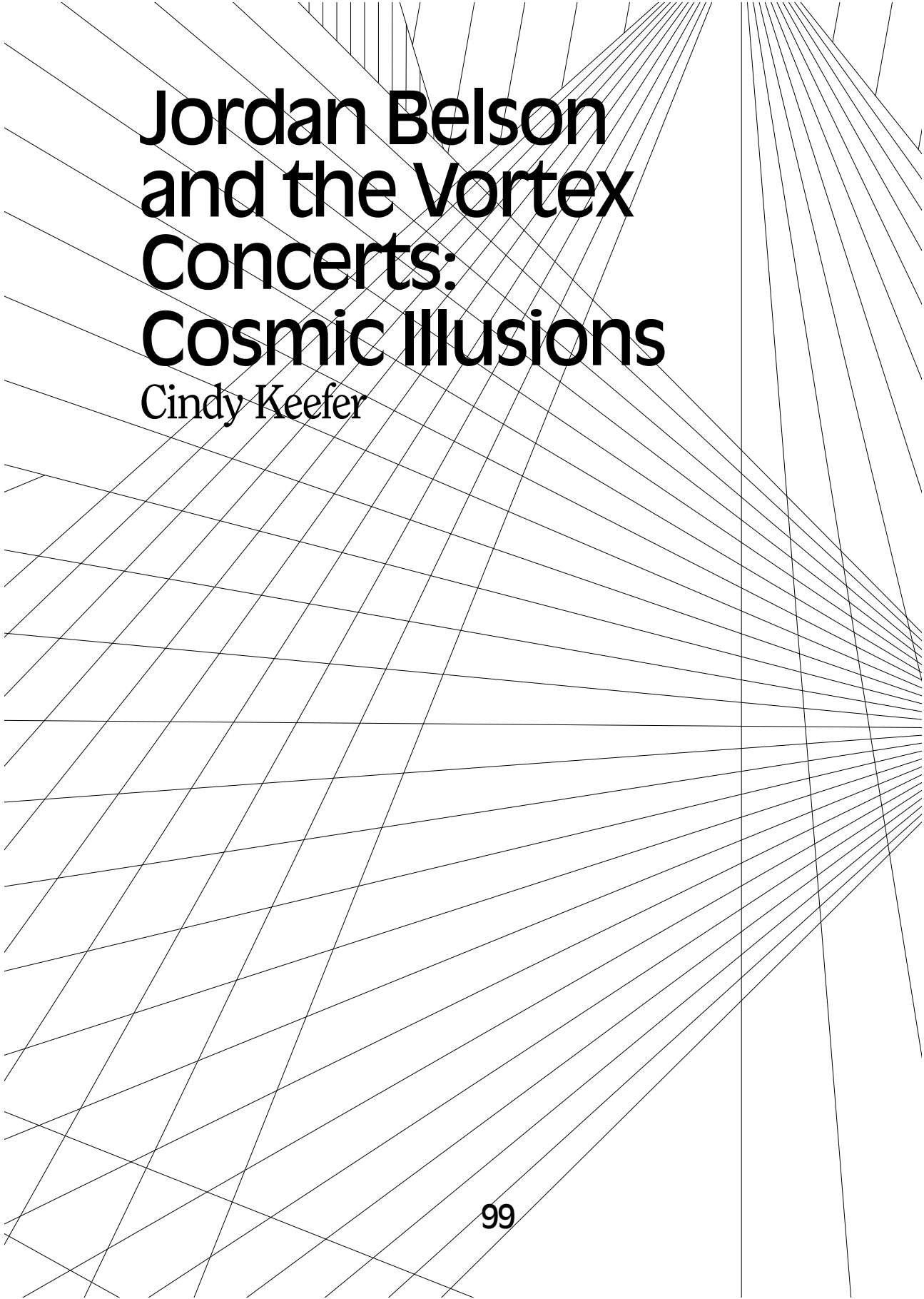
Isn't that exactly what quite a few of the people who are working with space are doing – focusing on listening behaviour?

The people working in computer music and electroacoustic music are usually not really doing that; most of them are dealing with models of spatialization on a technical level.

Yet the works of Alvin Lucier seem to be a major source of inspiration for many musicians at this time? What do you think of Lucier's work?

Lucier's work is amazing. And it is amazing that he did it all so early. His works are not about technology at all; most of his pieces can be reproduced with simple, available technology. He selects a process, not a technology or a material, and that becomes the motif of the composition. I don't know how important the spatial aspect is in his works. Listening to them certainly makes you aware of the space, of the room. But I'm not sure that was his intention, he starts with a phenomenon or a method to build a composition, and that brings out the space. That is a much stronger statement about space. I always think his pieces should be in any curriculum: they are great exercises. They don't deal with technology; they can be adapted to whatever you have. They are good exercises in how to listen and how to compose. I was reading Steven Connor who quotes R. Murray Schafer saying that all Western music can be defined by its walls, which is a very insightful and true statement, but for me that is not really about how you listen to music. Of course you can define music by the walls, but you do not listen to the walls.





**Jordan Belson  
and the Vortex  
Concerts:  
Cosmic Illusions**  
Cindy Keefer

On 28 May 1957, the first of the legendary Vortex concerts was held at The California Academy of Science's Morrison Planetarium in San Francisco, California, co-sponsored by Berkeley radio station KPFA and billed as 'an evening of sound experiments'. Featuring new electronic music from avant-garde composers and curated by composer/VJ Henry Jacobs, Vortex initially began as 'a series of electronic music concerts illuminated by various visual effects', recalls film artist Jordan Belson, Vortex's Visual Director. Five different Vortex series were performed through 1959, comprising approximately 40 concerts. Various accounts of 'over 100' concerts are incorrect; Belson and existing documentation confirm less than 50.

Vortex was the first use of experimental programs of music and visuals in a planetarium, although in 1944 filmmaker Oskar Fischinger had proposed screening abstract films on the dome of a planetarium-style theatre. Vortex program notes described 'a live creation of sound and image, being performed for a specific audience'. This type of immersive media environment had never been created before and immediately became popular.

Jacobs played *musique concrète* from composers including Stockhausen, Ussachevsky, Schaeffer, Talcott, Badings, Loughborough, Longfellow and others from his extensive tape collection, as well as his own compositions. The planetarium's sophisticated multidirectional sound system featured 38 speakers in a circular configuration, and a rotary mechanism with a handle was constructed to 'whirl' the sound around the room to achieve 'The Vortex Effect'.

In the beginning of Vortex the visual effects were very slight, but soon increased in sophistication. Belson created spectacular illusions layering abstract patterns and cosmic imagery on the dome, using up to 30 projection devices. A 1961 *Film Quarterly* article described some of the visuals: '...they consist of non-objective symmetrical patterns which move and change, expand and contract; of color effects and black-and-white effects; of fade-ins and fade-outs; occasionally of the planetarium effects themselves – stars and comets; and of combinations of all these... areas of light and color expand or contract.... The combination of space, light, color, and sound creates an enveloping audio-visual experience in a completely controlled environment.'<sup>1</sup>

The Vortex III program notes claimed 'Vortex, as a completely new conception of the relations between the listener and space, makes its bid for a place in the Bay Area cultural scene' – and this goal was quickly achieved. The press loved Vortex. Various descriptions included living theatre, audiovisual experiences, live performance, theatre of the future, multi-projection and multi-speaker performance, and most frequently, 'experimental concerts combining electronic music and visual projections', no one had ever experienced anything like it. Two or three performances a night soon became necessary, with long queues outside the planetarium waiting over an hour for the next performance. Jacobs also supervised public relations and advertising; the first three Vortex series drew audiences of over five thousand.

A few years before Vortex, Belson had attended a performance of Fischinger's Lumigraph (a mechanical colour-light performance instrument) in San Francisco. He recalled how Fischinger 'could turn even the simplest things into a luxurious, magical illusion of cosmic elegance. That was very inspirational to me.'<sup>2</sup> Four years later, he would create his own cosmically elegant illusions at the Vortex Concerts.

In this huge dome, Belson created illusions of floating in space. No images touched the edges, no frame lines were ever visible, and there were never frames of reference. His objective was not simply to perform a show of abstract imagery, but to create illusions. He operated up to 30 projection devices including the planetarium's custom-built thirteen-foot starfield projector, plus kaleidoscope, rotating and 'zoomer' projectors, strobes, slide projectors, rotating prisms, 16 mm film projectors, a flicker machine, a spiral generator, and four interference pattern projectors, all remote-controlled, projecting from the centre platform onto the blackness of the 65-foot dome.

Images pouring down the sides of the dome made the audience experience motion sensations. Other spatial manipulation by imagery was achieved, such as '...the pronounced audience reaction to certain Vortex devices: the production of vertigo, for example, or the inducement of anxiety and apprehension by use of the flicker device... many of the effects, though almost subliminal, were still most impressive. The well-known influence of color on feelings of heat and cold... was demonstrated when on one occasion the underheated planetarium was made comfortable for the audience by a simple change of color from gray to orange.'<sup>3</sup>

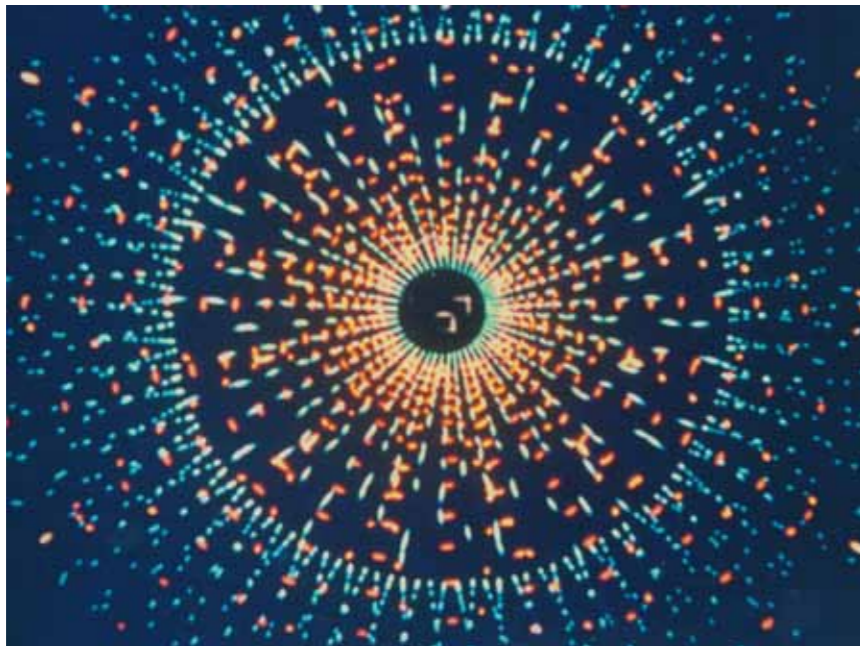
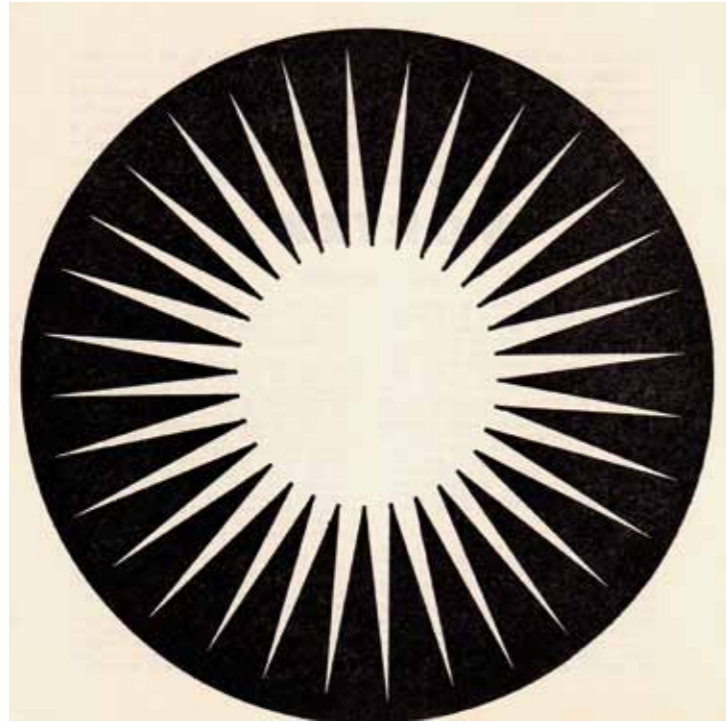
Far from being a 'psychedelic' light show, Belson's Vortex compositions consisted of carefully layered images, often geometric and circular, including images from Duchamp and Japanese *mon* designs. In a 1958 newspaper article Belson explained, 'In the planetarium dome I saw stroboscopic possibilities, the chance to work on [...] interference patterns, rotational designs, kaleidoscopic imagery.' In a *High Fidelity & Audiocraft* article, music critic Alfred Frankenstein described 'geometrically abstract forms, painted on slides and projected through slowly twirling prisms onto the apex of the dome, go through various spatial evolutions'.<sup>4</sup> For Vortex V, Belson asked John Whitney, Sr. for some of the pendulum patterns which he had developed for the film *Vertigo* (John didn't provide images, but his brother James did).

Belson's use of 16 mm film at Vortex was limited, complete films weren't screened. Only a few film tests and fragments were incorporated, mixed with other imagery. Though several abstract films including *Allures* and *Séance* were born out of Vortex and completed shortly after, they weren't shown in their entirety there. Nor, contrary to popular myth, were James Whitney's *Yantra* or Hy Hirsh's *Eneri*. Belson has also confirmed that he didn't use film loops or overhead projector liquids.

James Whitney sent some footage from *Yantra* for Vortex V. Belson cut out a few segments from the reel to make a high contrast black-and-white print. Only these black-and-white manipulated excerpts from *Yantra* were used. Belson also included some black-and-white oscilloscope footage from Hy Hirsh (billed along with James Whitney's as 'Special Visual Effects'). The Hirsh footage contained only simple, thin lines, and was not multi-layered as in Hirsh's completed films.

In 1958 Jacobs and Belson formed the Audio-Visual Research Foundation, whose letterhead read: 'Audio Director: Henry Jacobs, Visual Director: Jordan Belson. Project 1: Vortex'. The Foundation, according to Vortex 4 program notes, was 'a basis for interchange of information and to gather support from composers, artists and scientists throughout the world who are working with the experimental aspects of audio-visual phenomena.' They performed Vortex in Brussels in 1958, and the





Top – Cover of Vortex V programme notes. Courtesy Jordan Belson and Center for Visual Music.  
 Bottom – Image from Belson's film *Allures* (1961), showing the effect of interference pattern projectors.  
 © Jordan Belson, courtesy Center for Visual Music.

Vortex V notes stated 'the Foundation hopes to give demonstrations in Tokyo and Moscow in 1959'.

Unfortunately, friction with Morrison planetarium management had existed since the beginning, increasing each season. Cal Academy management objected to their intrusion into normal operations and the 'bohemian' element of the audiences. Despite increasing ticket sales and popularity, Cal Academy cancelled Vortex. The final series was performed in early 1959.

Belson and Jacobs discussed the possibility of raising funds to obtain their own dome theatre to continue Vortex. A *Time* magazine article in February 1959 praised the Concerts and discussed their popularity. Meanwhile Jacobs was working on a *Highlights of Vortex* LP for Folkways Records. Its liner notes called Vortex 'Entertainment for the Space Age'.

A further performance of Vortex by Belson and Jacobs in a planetarium never occurred. Despite its popularity, it was not to be reincarnated. A single-projector film screening in October 1959 called *Vortex Presents* was not well received and a planned series was cancelled. Over four decades later, in a conversation with the author, Belson referred to the Vortex Concerts as 'a sacred memory', not possible or desirable to be re-created. Indeed, he has rejected recent offers for such an undertaking. No scripts or cue sheets exist for the visuals, nor are there any photographs or recordings of the visual performances. Over subsequent decades, the legends have multiplied to create illusions about Vortex. It is mistakenly described today as film screenings or light shows, or as a series of over 100 events. Though we now refer to the Vortex 'concerts', at the time program notes and press simply used 'Vortex', or Vortex followed by its number (e.g. Vortex III).

Belson continued making abstract films, and throughout his career has produced an extraordinary body of over 30 non-objective films. His films are richly woven with cosmological imagery, exploring consciousness, transcendence, and the nature of light itself. Some of his films are featured in international art museum exhibitions today, and his recent film *Epilogue* (2005) was funded by the NASA Art Program.<sup>5</sup>

Vortex's influence has been far-reaching, not only on the 1960s San Francisco light shows but on generations of media artists thereafter. Today abstract visuals are composed and often performed in planetarium theatres, immersive media environments are common, and live, multiple projector 'expanded cinema' performances are popular again.

In 1959, the *Vortex Presents* program notes stated 'The future seems to hold great promise for this new combined art form with the advent of further developments of the cathode-ray tube and video-tape. There have already been musical scores composed by analogue computers and oscilloscope [sic] visualizations of thought patterns. The separated worlds of Science and Art are ever reaching closer together.'

Notes

1. Harriet R. Polt and Roger Sandall, 'Outside the Frame', in *Film Quarterly*, vol. 14, no. 3 (Spring, 1961), pp. 35–36.
2. Both quotes are from 1971 testimonial statement about Oskar Fischinger, provided to the William Moritz/Fischinger Archive. Published in William Moritz, *Optical Poetry: The Life and Work of Oskar Fischinger* (Eastleigh, UK: John Libbey Publishing, 2004), p. 169.
3. Harriet R. Polt and Roger Sandall, op. cit., p. 36.
4. Alfred Frankenstein, 'Vortex: The Music of the Hemispheres', in *High Fidelity & Audiocraft*, vol. 9, no. 5 (May 1959).
5. *Epilogue* (2005) can be seen on the Jordan Belson: *5 Essential Films* DVD, released by the Center for Visual Music ([www.centerforvisualmusic.org](http://www.centerforvisualmusic.org)).

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For more information about Jordan Belson:  
[www.centerforvisualmusic.org/Belson](http://www.centerforvisualmusic.org/Belson)



# E.A.T. Pepsi Pavilion Osaka 1970

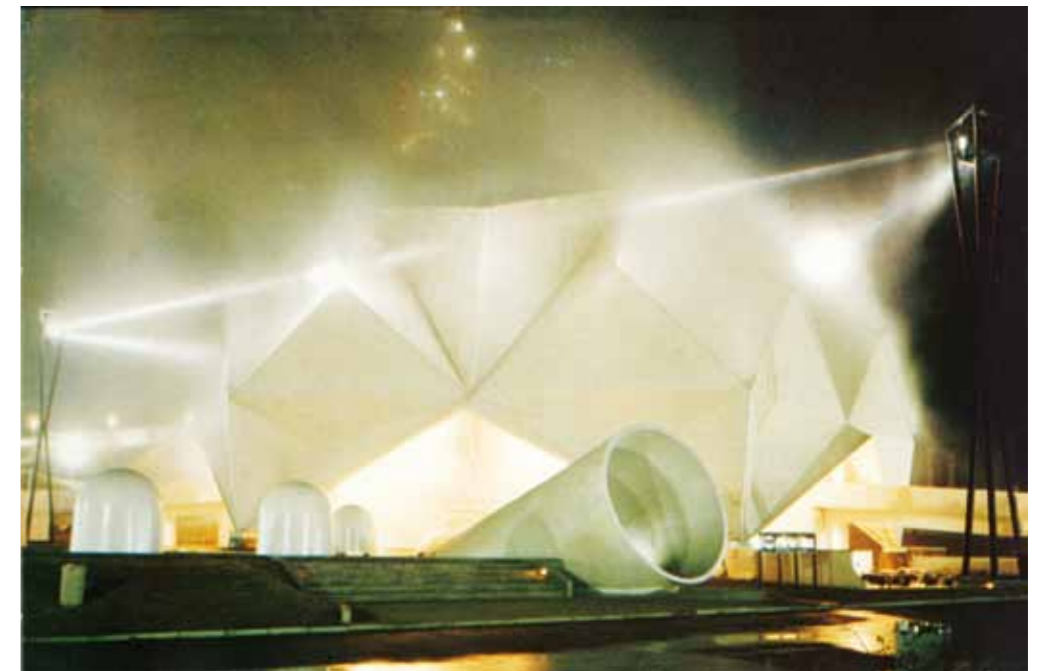


The *Pepsi Pavilion* was a large-scale, collaborative public sculpture, multimedia performance space and responsive environment commissioned by Pepsi-Cola for the Expo 1970 in Osaka, Japan. Organized by Billy Klüver and Robert Whitman, the founders of E.A.T. (Experiments in Art and Technology), the project was led by a core design team that included Robert Breer, Frosty Myers and David Tudor. In all, 63 engineers, artists and scientists contributed to the design.

The original structure consisted of a Buckminster Fuller-style geodesic dome covered with a water-vapour cloud sculpture designed by Fujiko Nakaya. On the terrace surrounding the *Pepsi Pavilion* were seven of Robert Breer's *Floats*, kinetic sculptures that moved around while emitting sounds. Four tall triangular towers held the lights for Frosty Myers' *Light Frame* sculpture. Visitors entered the *Pepsi Pavilion* through a tunnel and descended into a dark clam-shaped room, where a sound-activated laser deflection system showered the floor and visitors with moving patterns of laser light. Climbing the stairs, they entered the Mirror Dome, 210-degree spherical mirror with a 90-foot diameter made of aluminized mylar. The reflected image of the floor and the visitors standing on it appeared to float upside down in space above the visitors' heads. David Tudor, Gordon Mumma and Lowell Cross designed the sound system as a real-time electronic music instrument with 32 inputs, 8 audio channels, and 37 speakers that were arranged on the cupola behind the mirror. Sound could be moved at varying speeds linearly across the dome and in circles around it. The lighting system, designed by Tony Martin, and the sound system could be pre-programmed or controlled in real time. Through handsets, visitors could hear specific sounds on each of the ten floor sections of the dome, transmitted by wire loops embedded in the floor.

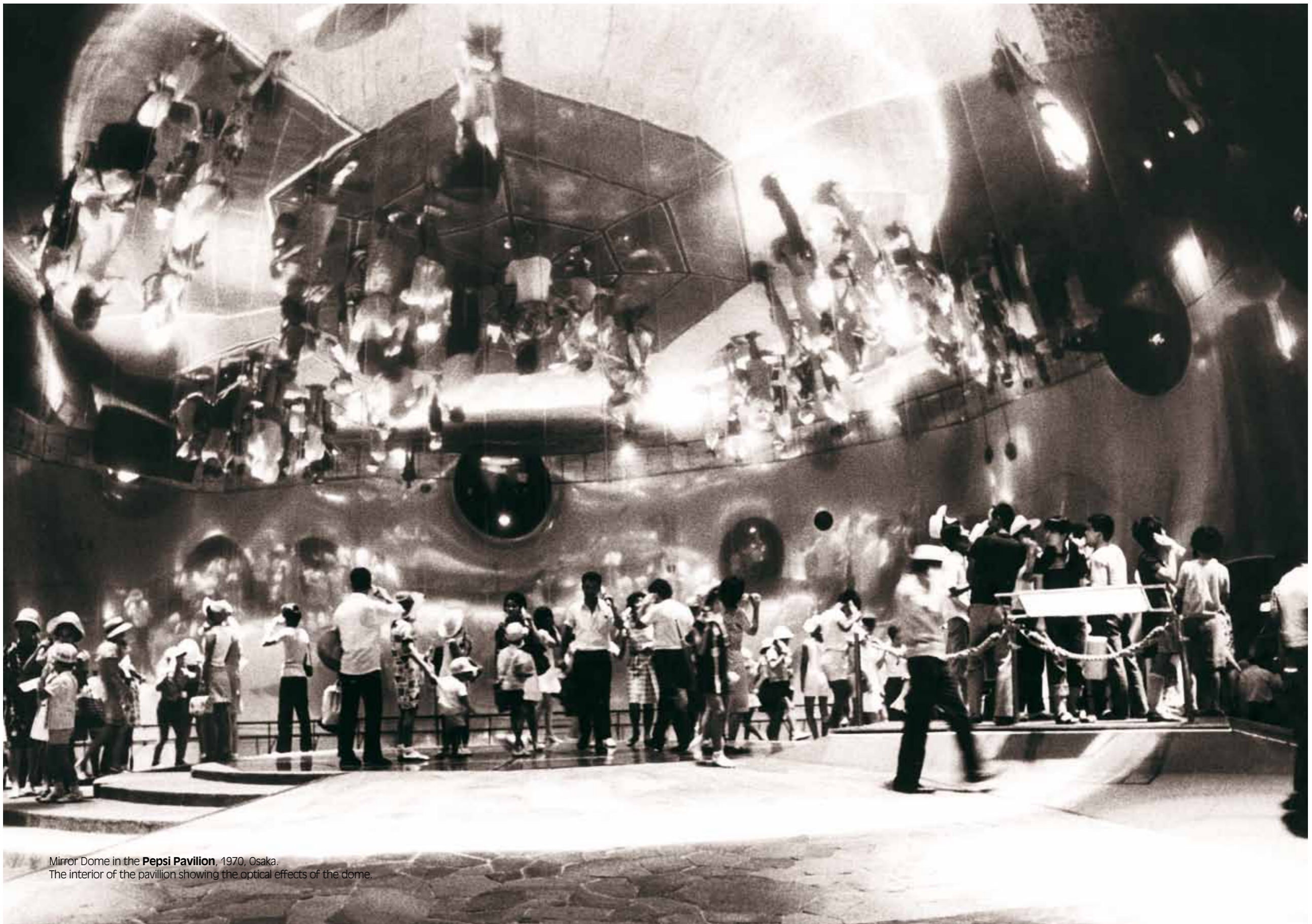
Almost everything that was tried in the Pavilion was new, and there were a large number of technical breakthroughs. The *Pepsi Pavilion* was a living, responsive environment that created a fluid experience of light, sound, and movement, and constantly changed in response to natural forces and human presence. It was one of the first immersive artworks and performance spaces to engage the viewer through interaction with electronic media. It was a precursor to, and an inspiration for, later developments in virtual reality, interactive installations, multimedia theatre, and 3D simulations.

Text based on descriptions by Randall at [www.zakros.com/projects/pavilion/original\\_new.html](http://www.zakros.com/projects/pavilion/original_new.html) and at Media Art Net, [www.medienkunstnetz.de/works/pepsi-pavillon](http://www.medienkunstnetz.de/works/pepsi-pavillon)



Top – Exterior view of the **Pepsi Pavilion**, 1970, Osaka, Japan.  
Bottom – The **Pepsi Pavilion** at night showing Breer Floats, Myers' Light Frame and Nakaya Cloud on the roof, 1970, Osaka.





Mirror Dome in the **Pepsi Pavilion**, 1970, Osaka.  
The interior of the pavillion showing the optical effects of the dome.



# Immersive Works for Complete Experiences

Interview with TeZ

Arie Altena



The installations and audiovisual performances by TeZ, an Italian artist who lives and works in Amsterdam, are truly immersive. Using *flicker*, spatial sound and other techniques he creates an experience for the audience that can change their perception of space. I interviewed him in September 2009 in the large studio space that he shares with Evelina Domnitch, Dmitry Gelfand and others. He has just returned from the exhibition *See the Sound* in Linz, in which his work was featured in the *New Modes of Perception*. The DVD of his *Optofonica* project, which dealt with synesthesia and spatial sound, has just been released. He intends to focus on psychophysics for the next few years. He is working on a photosonic environment in which he hopes to use a magnetic liquid to modulate light.

I am specifically interested in how you deal with space and spatialization in your work. How did you get involved in those issues?

The *Optofonica* project has been my main focus for the last four years. It started as a platform for synesthetic media and sound spatialization. The idea was to investigate synesthesia and sound spatialization together, the connection between both, and why that connection is interesting. I had been creating audiovisual art before *Optofonica*, mostly performances with generative sound and visuals. The more I worked with that, the more I discovered how to actually connect image and sound. I was also researching *why* the image–sound connection is interesting. What exactly is it that makes generating image and sound together different from playing images with sound, or sound with images? To answer that I looked into the idea of synesthesia, not in a speculative way, as has often been done in the arts, but from a scientific standpoint. Synesthesia is a condition that certain people have. In their brains the perception of a stimulus is wired to different senses. Recent research has shown that this is a physical condition: there is a physical connection in the brain that allows a spreading out from the receptive area of the brain to other areas. This condition is natural in newborn babies, for whom the senses are not yet separated. The more the brain specializes, the more the senses are separated. But they potentially stay a little bit connected. This intrigued me.

And then you started *Optofonica*...

I was interested in how other artists were dealing with the connection between sound and image. An artist who works with sound and image unconsciously dreams about creating a kind of third element – or maybe a fourth or even a fifth. If you connect sound and image, you want to extend the sensation of a piece. For me there is an unconscious drive towards achieving that effect. I think artists want to discover things; they are looking for wonder and surprise and present that to an audience so that they can experience this wonder and surprise as well. The idea behind the *Optofonica* project was to invite artists to seriously reflect on the relationship between image and sound, and create a new piece where this

connection would be enhanced by means of spatialized sound. I've been more interested in sound spatialization since the early 1990s when I first heard pieces, mostly by academic contemporary composers, for quadraphonic systems and other less conventional setups. I did not seriously engage with this practice until 2003 when I started experimenting with generative multi-channel compositions related to the *Protoquadro* project. The breakthrough was when I did a performance with Wim Jongedijk in 2004 at the Mercatorplein in Amsterdam. I truly wanted to recreate an impression of space because I was interested in how people would react to it. I used ambisonics, a sound spatialization technique, and we performed a six-hour sound piece in the square, using four speakers in the four corners. We were playing sounds of thunderstorms, rain and other aquatic sounds, and it truly felt as if these were real. People kept looking up to see if it was raining, whereas it was obviously not. With spatial sounds you can penetrate certain perceptual modes that are deeper and different from the habitual listening to stereo sound. For me this totally connects to the idea of synesthetic media. I wonder why it is so often ignored, despite there being a history of sound spatialization that is relevant to contemporary artistic practice.

You have the acousmatic approach for instance...

Acousmatics is not merely a technique of sound spatialization but a more specific approach, and I truly admire it. It. The Groupe de Recherches Musicales (GRM, the studio and laboratory originally set-up by Pierre Schaeffer in 1951), where the acousmatic approach was developed, has recently been more open to artists wanting to work with their system. I performed with Kim Cascone and Taylor Deupree using the Acousmonium, their phenomenal spatial multi-channel speaker set-up. The people at GRM were spatializing a stereo input over their system – it was amazing. Many other academic institutes conduct a lot of research into sound spatialization, but as they are usually not very open to artists, it is difficult to finally collaborate or show things there.

Which is why you initiated *Optofonica*?

I was basically curious about who was doing what in sound spatialization and how they were implementing it in audiovisual works. That is why for the past four years I have been encouraging artists to work with it. In *Optofonica* I am more a producer than an artist. I now also have a medium for displaying the *Optofonica* works: the capsule. The one that I made and currently use is really a prototype. I do not see it merely as an artwork, it is rather meant as an example of a different way to present an audiovisual artwork, to make it more immersive and more synesthetic. I consider this experiment a success. It was nice to create an object that creates a real space.

Can you explain the capsule? How is the sound created in the capsule?

There are no speakers. The sound is produced by special transducers that are fixed to the structure of the capsule. There are five transducers in the panels of the helmet-like object on top, and one transducer below your feet that transmits the low frequencies. This arrangement produces a tactile, haptic sound. You do not really



We still know very little of the senses. We always think of the five senses, but scientifically you could say there are at least twenty different senses.

hear the low frequencies; instead you feel them in your body. The aim was to create a way to transmit sound to your bones in a direct way. The sound spatialization is actually more or less comparable to normal surround sound. But because the capsule has a dome structure, it comes out really differently: for example, rotating standing waves are generated inside the capsule. That makes being inside the capsule a more interesting and more enveloping experience. I also wanted to have spatial video inside the capsule, so a viewer could have a panoramic view of projected or generated images, but that turned out to be too complicated. To achieve that I would have had to transform the original capsule idea into something that could be projected on from the outside, and I did not want to do that. Projecting from the inside was impossible, as there are not yet large enough flexible screens that can cover the inside of the capsule in such a way that your entire field of vision is covered. But I discovered that you can also achieve quite interesting effects if a screen is very close to your field of vision. You never stand that close to a screen normally. The capsule now has such a screen on the inside. It is still a simple solution, but it works fine. I am not doing any sort of far-out SF-like video spatialization that some people sometimes expect me to do.

Five panels plus one transducer under your feet, that sounds like normal 5.1 surround sound?

Yes. I wanted to create a platform that artists would be able to work with fairly easily. Many of them are not familiar with any other sound spatialization technique than 5.1; quite a few had never worked with multi-channel sound. Ambisonics could have been another possibility, as it is fairly easy to re-encode ambisonics – which is made for 4 speakers – into a 5.1-sound source. In the capsule you have uncompressed surround sound that is different from most surround sound DVDs. The capsule has also been improved since last year by working again on the amplifiers and the tactile platform. There is now a DVD with the works that I commissioned for Optofonica. That is, in a sense, the end of the Optofonica project as my solitary initiative. Optofonica has now changed into a laboratory for immersive art-science and psychophysics, and the contributions of Evelina and Dmitry are as relevant as mine... we are the core group of the laboratory and many former Optofonica fellow artists are still associated and collaborate with us.

Central to your approach is that you try to completely immerse the audience in sound and images. One could call it experiential art because you set out to create an experience for the audience. There might be even a Wow! effect. It begs the question: what does that experience mean? Is there a meaning beyond the experience? Or is it the experience itself that matters?

That's the most important question one could ask. First of all, I always try to make work that really interests *me*. I am not interested in aesthetic seduction. I don't think that is a real function of art – it has nothing to do with what drives an artist. What motivates an artist like me, are experiences. An experience is something that first passes through a physical mode, through the senses. We still know very little of the senses. We always think of the five senses, but scientifically you could say there are at least twenty different senses. There might be even more. A great book

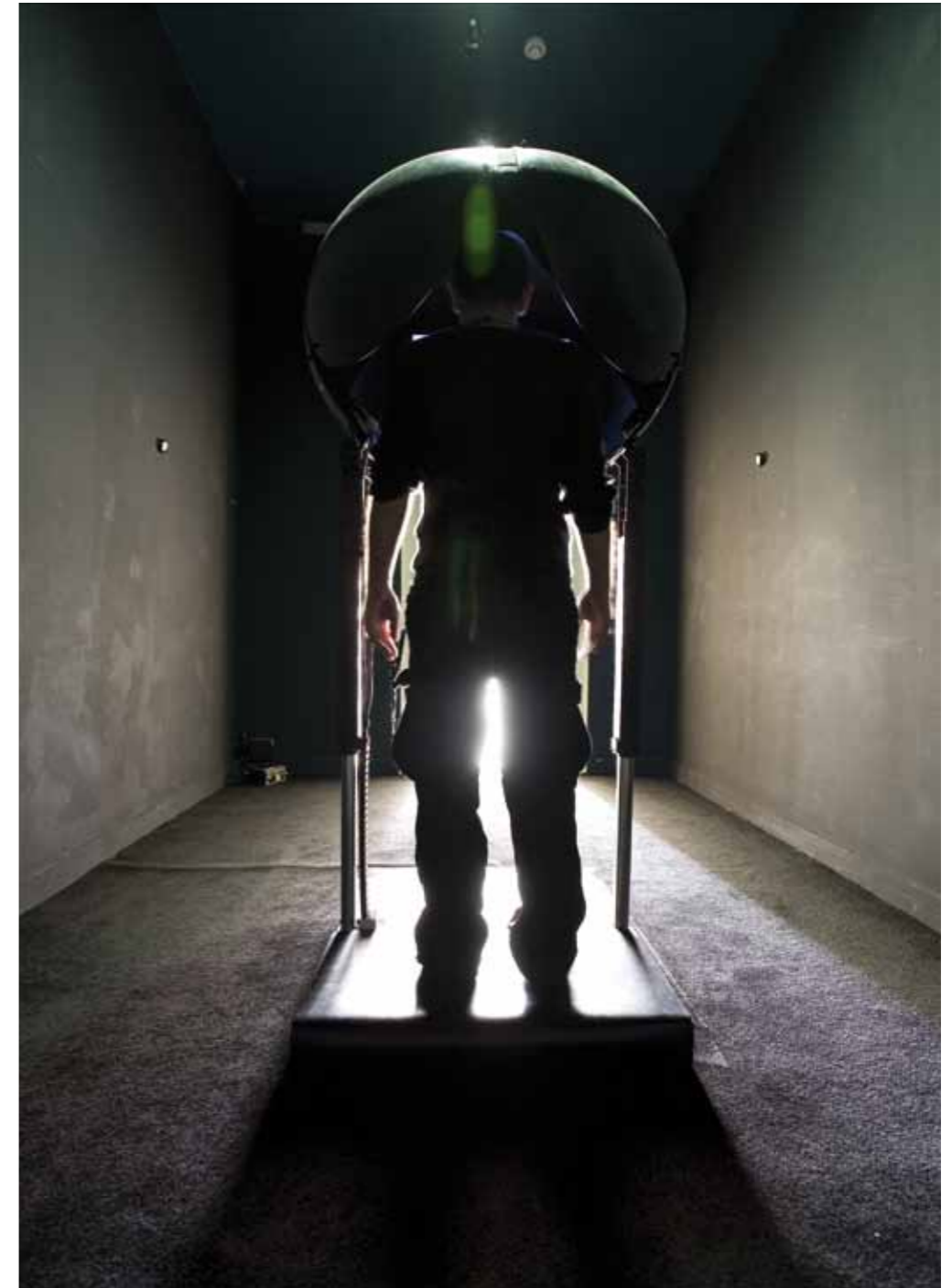
about this is Juhani Palasmaa's *The Eyes of the Skin. Architecture and the Senses*. Because we do not know that much about this, it is an enormously interesting field to research. I explore this domain because I want to discover something when I create art. An artwork, as any experience, relates to me both as a physical and metaphysical being. In the end it is about the ontological question: why am I really here? If I know what I am, then maybe I can begin to understand why am I here. To understand what I am, I first have to become more aware of my physical being, and my physical being is subjected to physical perceptions, to impulses. If we keep absorbing external stimuli without questioning them, they become habitual. That happens a lot in contemporary society, I find that everything has become very mechanical and formulaic. You run the risk of becoming like that too, and then you limit your possibilities, you limit yourself to a limited domain of actions. For me art should open up these possibilities. The aim is to understand more, and to question more deeply how the stimuli are influencing you, how they are penetrating you, how they open you up, how they create intuitions. To understand how that happens should be a very primary concern of artistic practice. We can research it, for instance, by creating very basic stimuli and then try to understand how they work. That is why I try to create these instruments, immersive installations and other experiential machines, and why I play with them. I am now developing a new installation that I conceive of as an instrument. It is a photosonic environment. I find it fascinating that I can create an instrument that is also an environment, a space, and an object with sculptural and architectural components. There is even a design aspect to it, not for aesthetic reasons, but in order to optimize the experience. And it is an experience that opens up to the non-habitual.

This photosonic environment is a sensory, physiological instrument?

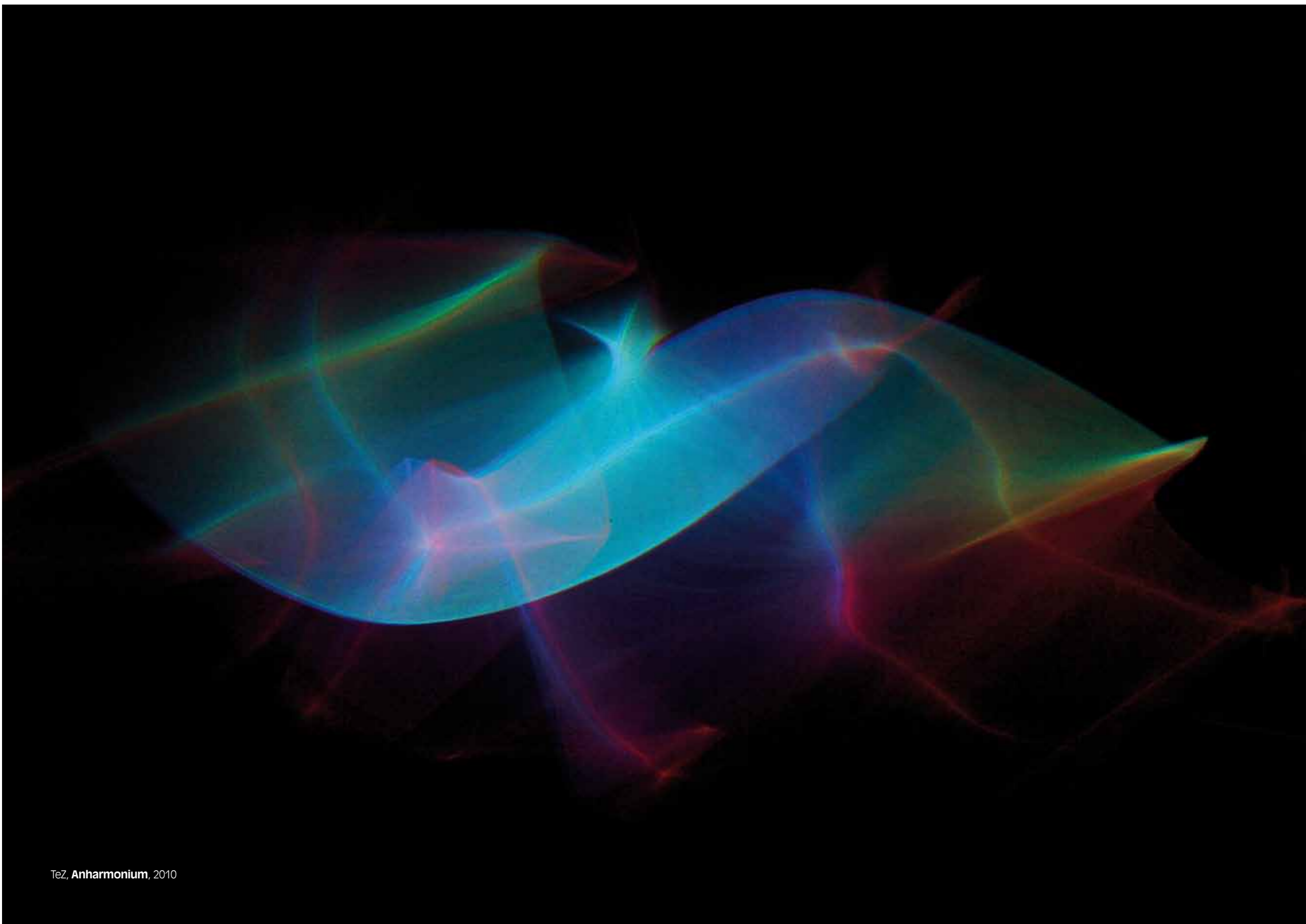
Yes. This is also where we get to the psychophysics that we are now investigating at the laboratory. It is a real branch of science, which has been somewhat obscured by the more specialized domains of neuroscience. Anyway, it is difficult to label what we are really doing. Is it art-science, immersive art, post-media, or something else? What counts in the end is the materialization of serious research in a piece. This is what interests us, to materialize a space, create instruments, find our own techniques, always approaching it from the experiential aspect, more than from an aesthetic angle, and including science not as just an option.

I'll play devil's advocate for a bit. What if I say that your work stays at the experiential level, and does not ascend – as art should do – to a level of interpretation, to meaning and to an application of that meaning to life? It's fun to have the experience, but that's it.

The aim of what I do goes beyond the idea of representation. The interpretation is important though, because the development of society is based on the development of our consciousness. Consciousness develops in tandem with understanding, but it also develops through physical functions and emotions. My conviction is that when the intellectual, the physical and the emotional are engaged in an experience, consciousness opens up, and expands as well. Only this allows a more sincere and effective progress of individuals, and thereafter society. But that's

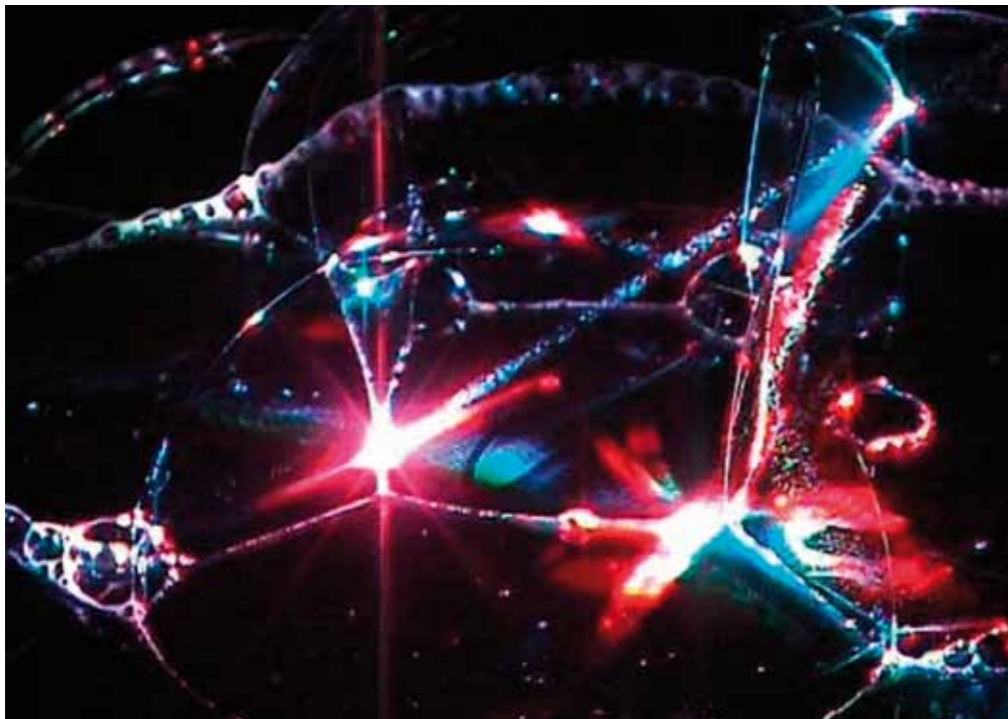
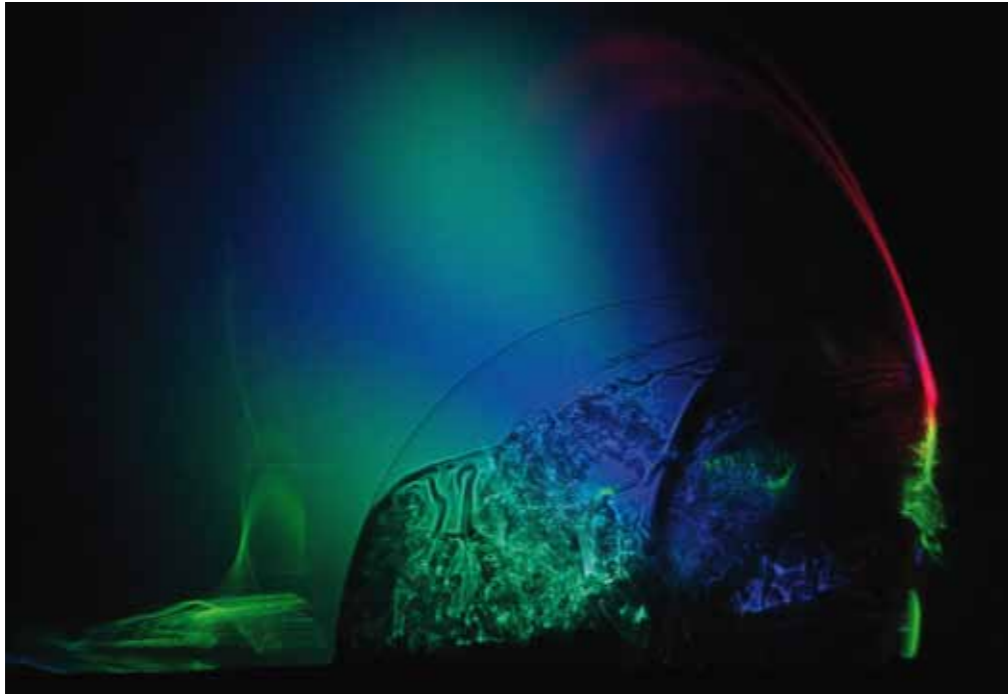


TeZ, Optofonica Capsule, 2008









Evelina Domnitch & Dmitry Gelfand, **10000 Peacock Feathers in Foaming Acid**, 2008

just my idea and I am completely convinced of it. It motivates me to work. I am not saying that because I provide instruments for expanding consciousness, my work will change the world or society. When I start a work I start it for myself, because I am interested in expanding my own consciousness. I am trying to create something that engages these three levels of comprehension, and if it works for me, who knows... it might work for someone else too.

There's something in your work that refers back to underground ideas of the 1960s. The *Dreamachine* of Gysin and Burroughs is an obvious reference, 1960s environments, expanding consciousness... What attracts you to that period?

Periods repeat, certain practices recur, there are cycles in the history of art. That's important to understand: these cycles happen and renew themselves, hopefully refuelled with fresh possibilities. I feel completely connected to the 1960s underground. What is so interesting about that period is that many things, such as the idea of expanding consciousness and experiential art, happened on such a broad level – it was not only happening in the arts world, it was everywhere. Not that these things were novel to the 1960s: history is full of examples of creating spatial occasions and spatial environments where an experience can occur; consider, for example, the Dionysian cults. I think we should take advantage of past research, as we do in all other fields of science. We should try to improve on it as much as we can.

What strikes me is that you take on the hard sciences, but you connect that to, let's say, spiritual techniques as well. This seems to me to be an aspect that was taken seriously at some point in the 1960s, but has somehow degenerated into commercial new age since the 1970s.

That's correct. The interest in hard sciences and metaphysical teachings connects us at the laboratory. Moreover, different areas of human knowledge have become too separated. Buckminster Fuller pointed this out very well; his teachings are still fundamental to our society. When you understand this you look again for the unity of things... synergy! We always deal with both aspects of nature, the physical and the metaphysical. That is not an option – it is immanent. We can hardly speak about truth; nonetheless, we can always look for something that transcends habitual perception and habitual reality, something that addresses our psychophysical being without much mediation.

In *PV686* you use ambisonics and a flickering projection of colours. The last time I saw it I found it very contemplative, whereas I also remember a performance that I felt was almost an attack on my senses. How does *PV686* work?

No-one sees exactly the same thing, and that interests me. The stimulus is objective, but it creates a subjective perception. People often see all kinds of morphing forms and colours. There are also people who become slightly nauseous, for whom the work is too far removed from what they are used to. For some people it is very light, and for others it's a heavy piece. My aim is to make people understand that certain perceptions happen beyond the superficial part of their senses, they happen inside their bodies. What you perceive depends on your own

state. What you perceive in *PV686* and in other works that are based on the same principle, is the interference between the stimuli, the stroboscopic lights, and your own brainwaves. You see the actual interference, and that differs from person to person because none of us have the same brainwave frequency. Thank goodness! This is something that has been explored since the 1950s. It has been done partially with the brain machines of the 1990s, which also worked with light and binaural beats. I wanted to bring that to a performance level, where I could play with it, and combine it with spatial sound, in order to improve the sense of space in the performance. It can work quite well if the conditions are good.

What is your opinion on the new loudspeaker systems, the surround sound, the 'home cinema theatre' that some people have now. Do they also reflect a change in how we listen?

I don't think so. None of these new ways really improve the spatial sense of hearing. The 'iPod-like' medium is not creating a new sensibility. It seems to me that in recent times a lot of interest has emerged around sound spatialization, but most people generally do not know how it really works. But all these developments are really exciting. We now have computers that enable us to work with spatialization in a fairly simple way. Even though it is a very poor system, surround sound is often one of the reasons why people become interested in sound spatialization. Panning sound can be very effective, but it is not exactly the same as, for example, ambisonics or wave field synthesis. Maybe the new 7.1 channel sound standard for Blu-ray discs, which is rumoured to be uncompressed, opens up a new way of distributing true spatialized sound, albeit in an unorthodox way.

Will you continue to use flicker in your future works?

I keep experimenting with it. I will soon start working on a new piece that will use flicker again. The idea is to create a sort of aura in the space using a UV stroboscope. It might create another perceptual mode of flicker, one that is even more interior. In this installation the light will come from below while you stand on a translucent platform. I hope to use a magnetic liquid for light modulation. That material is still in an experimental stage. The piece will be called *Baptisterium*, and the idea is to create a rather transcendental experience. It's a new project, but I have been working on it for more than a year now. I see it as an instrument, I hope to create compositions for it and I'd like to play with it. It's an instrument for complete experiences, and for more than one person at the same time. It will have spatialized sound, part of which might be generative. I will not use interactive or reactive techniques, and I will make it truly physical. It will be an architectural piece too, with specific morphing laser light projections orchestrated with the sound. This is the level at which I am working now. I can't go back. Okay, I performed a sound-only piece last week, and I'd like to continue doing that on the side, but these many faceted immersive works for complete experiences are what I want to work on now.



# Cyborg Ritual and Sentic Technology in the Vortex Concerts

Trace Reddell



The virtual body images associated with each emotion have an unconscious origin. They are not wilfully created by each individual – they represent his heritage. So do essentic forms. This unconscious heritage travels with us into space. But we have seen that the autonomic and the unconscious meet. Through understanding our unconscious heritage consciously, we may be able to teach our autonomic systems to live in harmony with our old heritage, as well as with our new exploration of outer, and perforce, inner, space. (Manfred E. Clynes, 'Cyborg II: Sentic Space Travel')<sup>1</sup>

I evoke Manfred Clynes's Hollywood-sounding essay 'Cyborg II' to suggest the most extreme range of effects on mind, mood and body encountered in the Vortex Concerts of Henry Jacobs and Jordan Belson, and I propose that we take at face value the claims that these shows represented not only 'the theater of the future' but also a new form of 'entertainment for the space age'.<sup>2</sup> Indeed, some of the most compelling aspects of these concerts are evident only when we treat them in terms of the complementary sympathies and meaningful synchronicities that they share with astronautic research and cybernetic space sciences of the late 1950s and 1960s. Jacobs and Belson produced over 35 shows at San Francisco's Morrison Planetarium between 1957 and 1959.<sup>3</sup> Described by Belson 'as a pure theater appealing directly to the senses', the Vortex Concerts were a theatre without much content beyond their own technological formats and processes – a performance stripped to the essence of lights, optical effects, electronic sound and the unusually reflective acoustic stage of the dome. The prototypical DJ/VJ duo, Jacobs and Belson, both drew from libraries of pre-rendered sonic and visual elements – audio recordings on magnetic tape as well as film and slides – that were combined, edited, processed, and manipulated in real-time using the special interface technologies provided to Jacobs and Belson by the planetarium. The quadraphonic mixer enabled Jacobs to direct sounds to specific speakers, congregate sounds across discrete sections of the dome, or even put the whole sound-mass into circular motion with a rotary console device. Belson was supplied with a keyboard to trigger his lighting and visual effects. With these new performance interfaces in mind, both artists felt as though the dome had become 'an exquisite instrument'.<sup>4</sup>

We will loop back to this language of 'instruments' – of keyboards, consoles, and pure visual and auditory effects in particular – several times as we move about in the vortex of our interpretation of these concerts and their very direct appeal to the senses.<sup>5</sup> This is not easy. The Vortex Concerts are almost legendary for their lack of documentation beyond a couple of existing programs. We know that Jacobs' soundscapes combined ethnic music with new recordings by Stockhausen, Varése, and others, as well as his own electronic music and sound processing experiments. Much of Jacobs' play list would be easy to reconstruct, as most of his secondary sources are still available, while a Vortex album on the Smithsonian Folkways label called *Highlights of Vortex: Electronic Experiments and Music* (1959) documents the work of Jacobs and lesser-known electronic musicians. But these recordings do not

give us a sense of what it would have been like to hear a Vortex Concert live: missing are the volume, the novelty of the surround sound mix, the disorienting mobility of the sounds, and the unusual, alien nature of the sounds themselves. Visually, Belson included short 16 mm film segments culled from his own recent experiments, many of them along the lines of what became the 1961 film *Allures*, but Belson was most taken by manipulating the planetarium's house lights, sky generator and star projectors, as well as a variety of strobes and kaleidoscopic effects, prisms, and lens flares. Of course, this information gives us only a little sense of what a Vortex show looked like, much less, how it *felt*, given the unique ability of the planetarium to confuse the equilibrium, orientation and scale of human sensory experience.

Considering this lack of media documentation, what an actual Vortex experience might have been like, comes to us, if not as recollected by the artists themselves through retrospective interviews, then in the form of the frequently hyperbolic language of their contemporaries. These include San Francisco art critic, Alfred Frankenstein; Harriet Polt and Roger Sandall's more sober assessment in the Spring 1961 issue of *Film Quarterly*; and the unnamed correspondent for *Time* magazine who offers this account in February 1959: 'B-z-z-up. Whoo. Whoo. Twitter. Z-o-o-om. MA-A-A-CHINE! The sounds whooped and wallowed in the semidarkness, seemed to race one another, swooped head on into ear-splitting collisions. Under the domed ceiling, lights wriggled and flickered, reeled and burst in dazzling, flaky showers. A voice came booming in: MATCHWOOD SPLITS INTO MATCHES!'<sup>6</sup>

The significance of the passage of the Vortex Concerts into textual descriptors is not to be overlooked. It is part, in fact, of the Concerts becoming 'unconscious', and it is only as these concerts become unconscious that they provide our own era of audiovisual performance – particularly those shows designed for a planetarium – with an origin story and a heritage. More interesting to me than this legacy of audiovisual performance, however, are the many ways in which the Vortex Concerts resonate with and occasionally anticipate contemporary developments in the theoretical space sciences and astronautics, consciousness studies and psychedelic research, and post-structuralist philosophy. These resonances increase the significance of the concerts as a heritage by framing Jacobs and Belson's unique contributions to our understanding of humanity's relationship to outer space through technology, the body, and imagination.

The Vortex Concerts retrieve the posture and action of stargazing from science, pushing beyond the planetarium's function as a virtual, imaginary duplicate of the space observatory. Rather, Jacobs and Belson take space back from the hands of astronomers and pass the night sky back to the artist, myth-maker and philosopher, while collapsing the distinctions between outer space and inner space, macrocosm and microcosm, cosmos and psyche. While the collapse of such binaries potentially underscored the enterprise of space exploration as a whole, its full significance was largely ignored within the context of military, industrial, and scientific initiatives to push off-world and, eventually, land on the moon. This collapse would play out, however, as an essentially popular cosmological agenda within the Vortex Concerts, making them a far more significant reflection on space, philosophy and the arts than as a notch on the timeline of obsolete media ancestry.

I hope to raise the stakes of the discussion, then, when I suggest that the Vortex Concerts supply precisely the kind of 'heritage' that Clynes describes in his proposal for cybernetic space sciences. I mean to point to the simultaneously physical and mindful posture that predisposes our tendencies and behaviours – bodily as much as imaginatively – within the planetarium. That is, we encounter a kind of deep muscle memory, almost an autonomic pose, in the supine form of the reclining stargazer, and there comes with this pose an emotive memory, a stamping of mood and affect onto the body that manifests as nostalgic longing for the pure night sky, undiminished by light pollution and unblocked by construction. Clynes calls these body-emotion memories 'essentic forms',<sup>7</sup> and he claims that emotions are recorded in autonomic arrangements, such as the smile. Because of this physical, full-body dimension of our emotions, Clynes argues that affect could be regulated and stimulated by certain poses, repetitive motions, and autonomous reactions.

Though not quite this reductive, Clynes suggests that the simple reversal of the flow of physical pose and affective state – smile first, then feel happy – would draw the emotional life of the astronaut into cybernetic systems design, regulation and control through the processes of what Clynes labels a 'psychologic homeostasis'<sup>8</sup> and which includes regimes of biofeedback mechanisms, electronic and pharmaceutical, as well as sensory deprivation, hypnosis and cryogenics. Ultimately, the system that Clynes proposes centres on his concept of the 'sentic', which involves the 'communication of emotions in the present moment'.<sup>9</sup> Sentic action is shaped by one's tendencies toward the essentic form, such as the heritage of Earthly memory that resides within the physical body of the space traveller and predisposes that body toward specific postures, gestures and motions.

But what makes Clynes's research unique among his contemporaries in cybernetic theory and bionics research, and eminently applicable to the study of space-related art practices, is his insistent concern for the emotional and imaginative life of the space traveller. While others introduced biomechanical and pharmaceutical methods to manage the astronaut's body – including taking control over brain function through hypothermia and cryogenics, sensory deprivation, and drugs – little consideration was given to what might be going on in the mind of the astronaut. Given the likelihood of long episodes of boredom during space travel, Clynes proposes that a range of sentic technologies would stimulate specific muscular and autonomic events in the body in order to exercise the emotional range of the astronautic cyborg. He suggests that these emotive states might be orchestrated into routines that would be classified tonally and then placed under the control of a keyboard or tape deck.<sup>10</sup> Clynes recognized that one existing sentic format that did particularly well at communicating 'emotions in the present moment' was music, and his growing theory of 'sentic cycles' – programmable emotional states triggered on demand and in exercise routines – depended on both musical analogies as well as literal, musical and sound design elements. Music, Clynes surmises, is 'a generalized mode not dependent on specific situation or individuals', and its 'auto- and cross-communication is capable of generating and discharging emotional states through its vibratory touch forms, which we call sound'.<sup>11</sup>

The language here is odd, and is partly why Clynes's work begs for the contributions of an artistic sensibility, though it is consistent with his general

emphasis on the body's role in processing emotions. Clynes's emphasis on the vibratory, on the physical touch of sound forms, foregrounds that part of his agenda concerned with the immersive experiences of the astronaut, particularly the experience of immersion within the framework of such complex systems technologies as spacecraft. Clynes's stress on the physical form of the astronaut is met, therapeutically, by this idea of sound's vibratory touch, one that is capable of triggering discharges of emotion. Clynes finally proposes a tape program of 'E-actions', 'a sequence of 30 to 40 expressive actions of a particular emotion' that cover 'the entire spectrum of emotions' and which includes a menu of 'no emotion, anger, hate, grief, love, sex, joy, reverence'.<sup>12</sup>

This set of details suggests to me a bridge between cybernetic space research and what we encounter in the Vortex Concerts, during which the primary emotive response triggered in the human body is that of wonder and awe, an affect that is engineered through radical shifts in our sense of place, motion, and the scale of relative space and time. As the planetarium becomes an artistic venue as well as a visual music instrument, a kind of cybernetic emotive system is grafted onto its human occupants, altering the planetarium's typically representative, mimetic and educational functions to play along the emotive, aesthetic, imaginary, and speculative registers of a cosmological cyborg ritual meant to train 'our autonomic systems to live in harmony with our old heritage, as well as with our new exploration of outer, and perforce, inner, space'.<sup>13</sup>

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The primary media of the Vortex Concerts – the 'pure theater' of lighting and optical effects combined with unusual electronic tones and an immersive, highly dynamic sonic mix – threaten dismissal as visual and auditory 'noise' when they are in fact its celebration. Jacobs and Belson accommodated noise to a degree that Clynes's search for psychological homeostasis forbade. Clynes emphasizes instead distinct tonal associations with specific states of consciousness and emotion. To the contrary, Jacobs and Belson worked along the lines of the practising cybernetic psychonaut, Dr John Lilly.

Beginning with his work with dolphins in the late 1950s and continuing throughout the next two decades, Lilly constructs complex media ecologies of biomechanical interfaces and psychoactive substances in order to transmute outer space to inner space through the systematic deprivation and redirection of what he called the 'circuitry in one's computer usually occupied by perception of external reality'.<sup>14</sup> By 'one's computer', Lilly means to situate the brain within a larger unit, the whole 'human biocomputer' which is his way of extending the domain of exactly what could be systematized in cybernetic regimens – the entire body – as a means to profoundly alter consciousness. Lilly assembles a network of psychoactive substances, isolation tanks and other means of sensory deprivation, dream/sleep research, esoteric and Eastern spiritual practices treated as scripts and programs for psychological development, and trans-species communication. In ways both more extreme and more practically applied than McLuhan's technological determinism, Lilly describes the auto-amputation of the cyborg in terms of radical adjustments of the human sense ratio. Throw one sense out of whack, and at least one other

sense will over-compensate for that imbalance. Lilly sought to bring this process under the control of measurable experimentation in the laboratory. In his writings, Lilly discusses his findings in terms of the transformation of the human into a programmable biocomputer that relies on a complex system of embedded sub-routines that are at once physical, sensory, cognitive, and emotional. I am condensing this greatly here, but what I am interested in applying to our understanding of the Vortex Concerts is the shift that Lilly makes from the outer space of the senses to the inner space of the mind without disregarding the body's more holistic involvement in emotive and imaginative function. When deprived of its traditional formats of sensory input and their arrangement into more complex aggregates of experience, the human body and mind experiences a compensatory rush of false impressions and their corresponding effects and thoughts that fill the void of the senses in an autonomic effort to regain equilibrium.

Perhaps Lilly's most profound insight in this regard is his notion that the human biocomputer, precisely when engaged in this process of re-alignment, produces the 'self', an entity that is capable of becoming lucid in such moments and of acting as a participant (re-) engineer/programmer of the human biocomputer in which the self is embedded.<sup>15</sup> Borrowing language from cybernetics and computer sciences, Lilly raises the prospects for a new, space-age set of philosophical

and spiritual or religious practices, certainly mind-focused programming – what he labelled 'metaprogramming' – as the cybernaut participates in cognitive transformation of identity. This very high level of sentic communication follows from the subtraction of sensory input, which incurs the compensatory processes of the inner-sense organs and ghost limbs that function in our dreams and other hypnagogic states of consciousness. Lilly describes this process in terms of random bursts of noise: 'The increase in *white noise* energy allows quick and random access to memory and lowers the threshold to unconscious memories (*expansion of consciousness*).' Lilly continues, 'In such noise one can project almost anything at almost any cognitive level.... The major operative principle seems to be that *the human computer operates in such a way as to make signals out of noise and thus to create information out of random energies where there was no signal*' (emphasis in original).<sup>16</sup> In terms of Lilly's own practical research, noise was something that psychedelics in particular added after the initial, subtractive blockage of sensory input in an isolation tank, but the tactic also worked when submerged in swimming pools, or even in the ocean, with a pod of dolphins.

This is really beyond what Clynes has in mind, I feel, as his theories regarding sentic space travel reduce the self to little more than pure emotional pose and a set of responsive behaviours. Lilly, on the other hand, allows for a much wider range of possible cognitive behaviours and activities in which the cybernaut can engage. Therefore, it will be Lilly's approach that suggests why the Vortex Concerts are in fact an appropriate site for the cybernetic re-programming of the space traveller. But while Lilly's work in 'metaprogramming the human biocomputer' may be the overlooked link between Clynes's sentic space travel and the Vortex Concerts, I am inclined to add one further element that will give us a better idea of what might go on within the consciousness and affective body of the space traveller: the post-structuralist theory of Gilles Deleuze and Felix Guattari, particularly their discussion

As the planetarium becomes an artistic venue as well as a visual music instrument, a kind of cybernetic emotive system is grafted onto its human occupants, altering the planetarium's functions to play along the emotive, aesthetic, imaginary, and speculative registers of a cosmological cyborg ritual.



of ‘Cosmos philosophy’ and the ‘thought synthesizer’. This philosophy and its instrument, the ‘synthesizer’, are so important to our understanding of cyborgization and sentic space travel because of its functional emphasis on how things relate to each other, inform each other, get confused with each other, subtract from each other, and synthesize new things out of this relationship – all of which are elements of Lilly’s metaprogramming and crucial functions of any cybernetic system.

Deleuze and Guattari outline a philosophy of materiality that is first encountered in modern art, music and cinema. They cite Klee’s command to ‘render visible’ not ‘reproduce the visible,’ a shift that we have already encountered in the Vortex Concerts as Jacobs and Belson transform the planetarium venue into a space of rendering rather than mimetic reproduction. Philosophy in this mode, Deleuze and Guattari write in *A Thousand Plateaus*, ‘tends to elaborate a material of thought in order to capture forces that are not thinkable in themselves. This is Cosmos philosophy. [...] The molecular material has even become so deterritorialized that we can no longer even speak of matters of expression. [...] *Matters of expression are superseded by a material of capture*’ (emphasis in original).<sup>17</sup>

Deleuze comes back to some of these ideas in his writings on cinema and Bergson, but in *A Thousand Plateaus*, as well as in Guattari’s later solo volume, *Chaosmosis*,<sup>18</sup> it is synthesized sound that provides the primary model for thinking under the influence of ‘Cosmic philosophy’. The value of the synthesizer is its reliance on additive waveform generation as well as subtractive filtering, which ‘makes audible the sound process itself, the production of that process, and puts us in contact with still other elements beyond sound matter’.<sup>19</sup> As philosophical venture, cosmic music ‘is like a thought synthesizer functioning to make thought travel, make it mobile, make it a force of the Cosmos (in the same way as one makes sound travel)’, they conclude.<sup>20</sup>

Suffice it to say that we catch something of this highly mobilized thought – thought as cosmic force – at the very moment in which the planetarium becomes ‘an exquisite instrument’ for the performance of visual music. Again, without firsthand documentation of the Vortex Concerts, we must rely on such secondhand documents as the Belson film that he completed a couple of years after the concerts: the aforementioned *Allures*. This film captures the key technical effects that Belson used during this time, and Belson’s reflections on this film evoke the spirit of the Vortex Concerts as a whole, particularly as a performance of Cosmos philosophy. Belson emphasizes the notion of ‘*cosmogogenesis* – Teilhard de Chardin’s term intended to replace cosmology and to indicate that the universe is not a static phenomenon but a process of becoming, of attaining new levels of existence and organization.’<sup>21</sup> *Allures* documents Belson’s synthesis of microcosmic and macrocosmic phenomena, which takes place through the ‘combination of molecular structures and astronomical events mixed with subconscious and subjective phenomena – all happening simultaneously.’<sup>22</sup> Belson describes a film that is at once more about ‘human physical perceptions’ than his other works while also ‘a trip backwards along the senses into the interior of the being’,<sup>23</sup> both aspects that resonate with the concerns of Clynes and Lilly. But what strikes me most are not Belson’s descriptions of what we see on the screen as much as his accounts of the processes involved in their creation.

Belson’s experience in the Vortex Concerts not only provided the visual and sonic template for *Allures*, but it appears that Belson’s work in the dome taught him how to make films in a performative fashion. ‘Up until that time,’ Belson recalls, ‘my films had been pretty much rapid-fire. They were animated and there was no real pacing – just one sustained frenetic pace. After working with some very sophisticated equipment at Vortex I learned the effectiveness of something as simple as fading in and out very slowly.’<sup>24</sup> I find Belson’s statements about attaining what are essentially new technological modes of aesthetic expression to be symptomatic of science fiction cinema as a whole. Even in the case of such traditionally presented films as *2001: A Space Odyssey* (1968), technical innovations often complicate the film narrative, while technological solutions to design problems result in the concrete visual and sonic content of the film itself, shaping the narrative at larger scales. In the case of *2001*, the iconic images of planetary alignment that become significant narrative markers and carriers of symbolic meaning, as well as the slit-scan effects seen during the voyage into the monolith, are the direct result of Douglas Trumbull’s special effects team.<sup>25</sup>

I am not sure that Belson was so comfortable with the role of technology and hardware in determining the content of his films, and I suspect that this is partly why he has been so reluctant to disclose the processes involved in their composition. Belson concludes that *Allures* specifically, and this mode of authoring more generally, is ‘all still very impersonal’.<sup>26</sup> This would lead Belson further in the direction of such personal physical and mental processes as yoga and meditation, though I would suggest that even these practices are ultimately programmatic and technological, just as Lilly explained, systematically arranging certain repeatable effects along very precise stages of physical and mental activity.

Several of Belson’s films offer an account of personal technological processes that accrue psychological value and resonate with spiritual meaning by means of essentia formation and sentic association. Beginning in 1966 and continuing for two years, Belson underwent an intense process of ascetic reprogramming that included the severing of emotional ties to family and friends. Portraying the resulting inner work that he achieved during this time was the six-minute film, *Samadhi* (1967), which Belson described as ‘a documentary of the human soul’.<sup>27</sup> *Samadhi* depicts on the screen the otherwise occluded processes of deep consciousness, and to the extent that this depiction occurs in ways that meet Belson’s own criteria for accuracy, then he describes them as mimetic in nature, though imitative of interior states rather than external reality. Regarding this aspect of Belson’s films, Gene Youngblood writes:

‘He regards the films not as exterior entities, but literally as extensions of his own consciousness. “I first have to see the images somewhere,” he says, “within or without or somewhere. I mean I don’t make them up. My whole aesthetic rests on discovering what’s there and trying to discover what it all means in terms of relating to my own experience in the world of objective reality. I can’t just dismiss these films as audio-visual exercises. They obviously mean something, and in a sense everything I’ve learned in life has been through my efforts to find out what these things mean.”’<sup>28</sup>

So, getting back to the idea of technical innovations and problem-solving processes shaping narrative or aesthetic, the ‘deepest’ or peak experiences of consciousness expansion and spiritual evolution that these films document splice the events and forms experienced in deep consciousness with technical ones. Technically-generated visual effects have been arranged to suggest a narrative moment, what Belson calls the move from matter to spirit in *Allures* or *Samadhi*’s tracking of his yoga practice by moving the viewer through discrete layers, stages or levels of consciousness. But even while arguing for the materiality of the soul – he called it an ‘actual physical entity’ – what Belson ends up describing is the film’s technological manner:

‘I reached the point that what I was able to produce externally, with the equipment, was what I was seeing internally. I could close my eyes and see these images within my own being, and I could look out at the sky and see the same thing happening there too. And most of the time I’d see them when I looked through the viewfinder of my camera mounted on the optical bench. I’ve always considered image-producing equipment as extensions of the mind. The mind has produced these images and has made the equipment to produce them physically. In a way it’s a projection of what’s going on inside, phenomena thrown out by the consciousness, which we are then able to look at.’<sup>29</sup>

Though Belson does not discuss the methods used to produce his films, it is apparent that solutions to technical issues have become the content of the film (like Doug Trumbull’s work in *2001*), with Belson purportedly destroying footage in which his techniques were too obvious.<sup>30</sup> *Samadhi* is a particularly intriguing culmination of this approach in Belson’s work, because it is the first convergence or synthesis of very discrete processes and practices of bodily, emotive and mental functions (biofeedback control), with such technical functions as breathing practice and close observation of visual effect generators regulating the body. What is then mapped out on film is the convergence of the microcosmic and macrocosmic scales that Belson evoked earlier but played out in terms of sympathies between psychological, physical and technical systems.

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As the entire venue of Morrison Planetarium becomes an instrument handled by Jacobs and Belson, the *Vortex Concerts* exhibit parallels with the larger field of artworks devoted to a total, environmental experience that Gene Youngblood describes as ‘intermedia works’. Intermedia represented a blend of audiovisual technology, conceived through the arts rather than science and engineering, and ‘grounded in the fields of psychology, information theory, and communication engineering’.<sup>31</sup> As interest in multi-channel audio and video technologies combined with developments in early networked community and real-time telecommunication, intermedia art was from the beginning deeply influenced by the research and theory of behavioural scientists looking at the systematic ways in which humans engage their spaces, as well as interact with others within those spaces in order to regulate

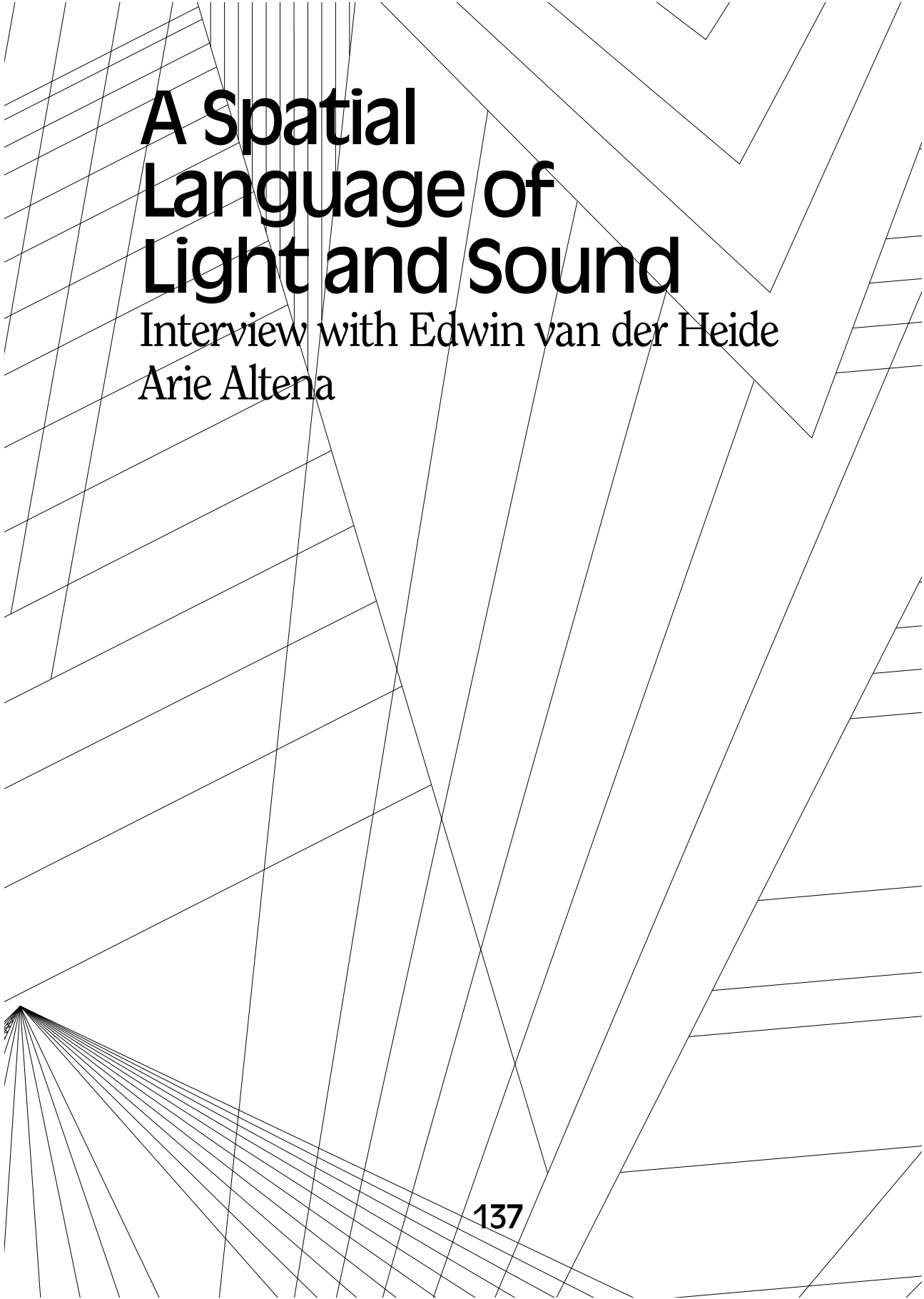
and control those spaces. Intermedia is, in other words, art’s branch of cybernetics. Youngblood perceptively anticipates intermedia’s tendency to move toward ‘that point at which all the phenomena of life on earth will constitute the artist’s palette’,<sup>32</sup> as well as a general shift toward emphasis on entertainment as education, something that we see in the major, institutionalized forms of intermedia found in IMAX theaters, the new generation of digital domes at planetariums, and interactive museum displays. Even as it institutes interdisciplinary relationships, however, intermedia is also about a mutually informed movement toward ‘inner and outer space, the microcosm and the macrocosm. On the one hand, intermedia environments turn the participant inward upon himself, providing a matrix for psychic exploration, perceptual, sensorial, and intellectual awareness; on the other hand technology has advanced to the point at which the whole earth itself becomes the ‘content’ of aesthetic activity.’<sup>33</sup> Youngblood points to an *intuitive* sensibility that he attributes to the newly emerged global citizens of the 1960s who realize that ‘life could be a process of non-ordinary realities’ propped up by the intermedia network, and in which the inner processes of the mind no longer have to be merely dreamed but can be lived in embodied space.<sup>34</sup>

The final turn I want to make is to link this concept of cybernetic intermedia to our sense of the embodied sentic space of the astronaut with hopes of grasping something of the experience of the *Vortex Concerts*’ audiences and the ways in which they suggest a newly globalized social body. Lilly provides us with the mechanism for understanding this, which is a bit ironic given his practical emphasis on isolation and deprivation. But it is Lilly who always pushes the cyborg self, already embedded in complex systems and engaged in self-aware metaprogramming tasks, toward not just communication but new forms of community and coalition – interspecies and extraterrestrial – that he felt were essential to post-human evolution.<sup>35</sup> Lilly’s sentic cyborgization hooks the human biocomputer into existing fields and media of communication typically blocked out by the primary senses and the habitually aggregated worlds that have built up around those senses. For Lilly, sentic re-channelling into already inhabited, pre-existing systems (such as, dolphin or alien communities) may be more in line with the community model put forward in practice by Jacobs and Belson. While Clynes does suggest a parallel between outer and inner space explorations sympathetic to this discussion, he never allows for the philosophical and the dreaming mind. This is highly ironic, for meditative inquiry, insight, and rejuvenation, as well as hypnagogic reverie and lucid dreaming, are precisely the unique states of consciousness known to be most enhanced by the mind-altering technologies incorporated into bionic space design and cybernetic engineering for extraterrestrial travel, exploration and habitation. Lilly provides an alternate route into inner as well as outer space, but the *Vortex Concerts* appeal to both, anticipating these trajectories by not only opening up channels of sentic reaction and deep human response to the night sky and the space beyond but by treating this as a community event. This suggests to me that when applied to cultural bodies, sentic forms manifest as collective ritual postures and actions. Cosmic philosophy is embodied thought, triggered in part by the lurch and spin of the *Vortex* machine. This *Vortex* marks our sentic heritage like a shadow cast back from the future onto its space-age audience of cybnauts, bodies poised for take-

off even as the technological nervous system of the planetarium extends to form a new kind of global self, already embedded within the intermedia environment, and occupying a space to which we are bound to return.

Notes

1. Manfred E. Clynes, 'Cyborg II: Sentic Space Travel' (1970) in Chris Hables Gray, Heidi Figueroa-Sarriera & Steven Mentor (eds.), *The Cyborg Handbook* (New York: Routledge, 1995).
2. See the liner notes to the 1959 LP, *Highlights of Vortex: Electronic Experiments and Music*, Smithsonian Folkways Records : Stereo FSS 6301 (1959).
3. See Cindy Keefer, 'Raumlichtmusik – Early 20th-Century Abstract Cinema, Immersive Environments', in *Leonardo Electronic Almanac*, vol. 16, issue 6-7, (2009).
4. Belson in Gene Youngblood, *Expanded Cinema* (New York: Dutton, 1970), p. 388.
5. As described in the program for Vortex IV, 1958. <[http://www.o-art.org/history/50s&\\_60s/Vortex/Vortex\\_4.html](http://www.o-art.org/history/50s&_60s/Vortex/Vortex_4.html)>. Accessed 23 December 2009.
6. See Harriet R. Polt and Roger Sandall, 'Outside the Frame', in *Film Quarterly*, vol. 14, no. 3, (1961), pp. 35–37, and 'Music: The Sick Machine', in *Time Magazine*, 2 February 1959. <<http://www.time.com/time/magazine/article/0,9171,894121,00.html>>. Accessed 23 December 2009.
7. Clynes, op. cit., p. 38.
8. Ibid., p. 36.
9. Ibid., p. 37.
10. Ibid., pp. 38–39.
11. Ibid., p. 38.
12. Ibid., p. 38.
13. Ibid., p. 42.
14. John C., M.D. Lilly, *Programming and Metaprogramming in the Human Biocomputer* (New York: Julian Press, 1967), p. 33.
15. Ibid., p. 92.
16. Ibid., pp. 76–78.
17. Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism & Schizophrenia* (Minneapolis: University of Minnesota Press, 1987/1980), p. 342.
18. Félix Guattari, *Chaosmosis: An Ethico-Aesthetic Paradigm* (Bloomington/Indianapolis: Indiana University Press, 1992/1995).
19. Deleuze & Guattari, op. cit., p. 343.
20. Ibid.
21. Youngblood, p. 160.
22. Belson in Youngblood, op. cit., p. 160.
23. Ibid.
24. Ibid., p. 162.
25. Ibid. pp. 151–56.
26. Belson in Youngblood, op. cit., p. 162.
27. Ibid., p. 171.
28. Youngblood, p. 159.
29. Belson in Youngblood, op. cit., p. 173.
30. Ibid., p. 158.
31. Ibid., p. 348.
32. Ibid.
33. Ibid.
34. Ibid.
35. Several of Lilly's publications deal with interspecies communication, dolphins in particular. In the case of alien contact, see John Lilly's 'Communication with Extraterrestrial Intelligence' (1966), revised and reprinted as Chapter 11 of *Programming and Metaprogramming in the Human Biocomputer*.



# A Spatial Language of Light and Sound

## Interview with Edwin van der Heide

### Arie Altena



Edwin van der Heide's work focuses on creating, structuring and perceiving space, and is therefore difficult to describe in traditional terms such as 'music', 'sound art' or 'media art'. As an artist he researches the spatial aspects of sound, he works with laser projections that generate the illusion of multi-dimensional spaces, and he enables visitors to an exhibition to explore the space with the help of self-made extra-sensory receivers. This interview was conducted in the hangar he shares with the Rotterdam artist Marnix de Nijs. Edwin van der Heide received me in a container up at the top of the hangar, the 'clean room'. He uses the hangar to develop and test his installations and laser performances.

Can you explain what you intend with the *Laser Sound Performance*? In this piece you combine spatial sound with laser projections on smoke.

As far as spatiality is concerned, there is a vast difference between sound and image. Sound is spatial by nature: the audience at a concert is always in the middle of a changing sound space that results from the sound source and its reflections. This is not to say that sound is always used in a spatial way or that you always experience it as such. Image works differently: you perceive light in those places where it reflects and we usually aren't aware of the source at all. Furthermore, our perception is able to distinguish between a sound source and its reflections because of the relatively 'slow' speed of sound, a speed that our senses can perceive. The speed of light is far too fast for us to perceive light and its reflections in a temporal way. I use lasers and make their light visible in space by projecting on smoke, mist or spouting water. The audience stands in the middle of the projected image. I create a new transforming space in an existing space. Light acquires an architectural quality and becomes almost tactile. I use lasers to create a composed light space that I combine with a composed sound space. *LSP* is light, space, colour and sound.

Is *LSP* about exploring or delineating space?

It is not primarily about exploring space but I do use the specific characteristics of the space, because the possibilities of the performance depend on the situation and the location where I present *LSP*. *LSP* has a frontal view – you can look towards the lasers – but you can also look towards the rear. Sometimes the projection on the rear wall is an important component in the performance, because certain shapes are so complex that you cannot perceive them in the space, but you can see them as projections on the rear wall. Other shapes are not at all interesting as projections on the rear wall, but they do work as projections in the space. *LSP* has also been presented outside where there is no rear view at all. It is an abstract work. For me, *LSP* is not about telling a story or presenting immediately recognisable forms. I am interested in expanding the concept of composition – as in a musical composition – whereby the spatial experience becomes a central part of the piece. The basis for *LSP* is creating direct relationships between image and sound. By

doing this I introduce enormous restrictions. And it is certainly not the case that each sound generates an interesting image or each image an interesting sound. Only a few combinations actually work. I use these to create development during the performance. I keep discovering new approaches that work for both sound and image; in fact, the range of my material keeps expanding.

How does that work in practice?

The waveform of the sound directly influences the visual form of the projection. Some combinations of sounds and relationships between sounds work well, while others don't. They work in the sense that they lead to interesting shapes. Some relationships generate a static image, others a dynamic image. You can work from static forms towards dynamic forms, which is mostly how I begin. It's difficult to always concentrate on both the image and the sounds. During a performance there are moments that I want to achieve something specific with the sound, so the focus on the image becomes temporarily less important. Conversely, I may find the image so interesting that I pay less attention to the sound for a moment.

Is each performance of *LSP* an improvisation or do you use a score as a basis?

I regard my setup as an instrument that I play. I do have a certain idea about the form beforehand, which changes from performance to performance and depends on the location and the situation. During live performances I utilize all the freedom I possibly can. I also find it exciting to be confronted with the relationships between image, sound and space in a live situation. I do test the space in advance, but even then you have no idea how it will work out exactly. I play with the difference between the sound in close proximity to your head and the sound that seems to come from far away or from the loudspeakers. How successful this is depends on the sound system and the acoustics in the space, which are never the same in any two locations.

Composing spatial sound does not really play an important role in Western music. Do you regard this as your 'compositional turf'?

Yes I do, but I'm not looking for generic setups and solutions. I research spatial composition and approach it from different perspectives. One important consequence is that there is no predetermined role for the audience. If you remain seated on a chair you miss half the show. You could say that I compose an environment that is meant to be explored, one that works on several different levels and that you can only truly experience if you actively explore it. This does not necessarily involve large movements. A lot happens in a very small area, within one square metre around the visitor.

That's because you play with the positions of the nodes in the space?

One of the elements I play with is the movement of and the distance between the nodes and anti-nodes of the sound waves. They often travel in space, and this means you can experience them as if they go right through your head. *LSP* is largely about our perception and how I play with perception.

So it's not about tuning the sound and image to the space?

I develop my own spatial language of light and sound that forms the basis for a performance. Then it's all about developments, contrasts, and creating tension. I also play with the expectations of the audience. These are all aspects you normally consider when composing music: it's about development, allowing certain things to run in parallel, the contrasts you create, and so forth. I think that 'real' composers still make a clear distinction between creating a piece and its actual performance. For them the score is the piece. Because they are fixed by a score, such works cannot really be about space; they cannot truly make use of space. I perform live so that I can insert the piece into a space, and really use the space. Carsten Nicolai and Ryoji Ikeda frequently perform scored pieces, the image then remains bound to the projection surface. Only the sound of it enters the space. I hope that because of my more improvisation-based approach, my performances are more effective at penetrating space.

Are cultural references such as Expanded Cinema and rock lightshows important to you, or do you only work purely from the basis of structural research?

There are examples of abstract films and Expanded Cinema that closely resemble my approach. Audiovisual rock concerts have a similar approach because, like my work, they penetrate space and immerse the audience. On the other hand, my approach cuts through all that. I base my work on the direct relationship between image and sound, and between sound and form, and I never deviate from that. I never make image to accompany sound, or sound for image. This doesn't only apply to LSP, but to my other works as well. For each work I research a specific principle. I strictly define my compositional research: what it is, and isn't, about. This sounds very serious but the resulting piece can be very playful.

Is that influenced by the Hague School of musical composition? By Dick Raaijmakers, for example?

'Perhaps. Dick Raaijmakers always raises very precise issues (what is the tiniest sound, the concept of falling), and he is usually less concerned with their independent compositional potential. Raaijmakers has a conceptual approach in which the concept is the subject of the piece. I work conceptually, but I am more concerned with an independent compositional elaboration; the original concept is less important. Questions that I pose are: how do I arrange it over time, how can I give a shape to space. In installations such as *Sound Modulated Light* and *Radioscape* I try to get the spatial behaviour of the medium so tightly under control and to understand it so well that I can create a spatial experience for the audience, whereby it is actually no longer that important that my starting point was a direct relationship between light and sound or the spatial behaviour of radio waves.'

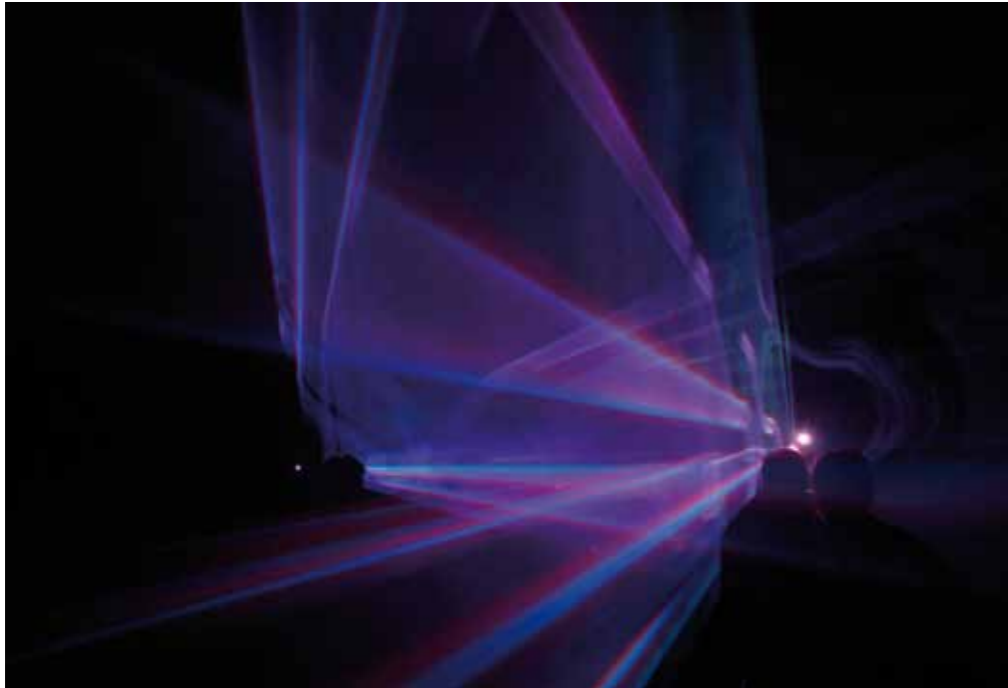
How does that work exactly in *Radioscape* and *Sound Modulated Light*?

*Radioscape* began with an invitation from Japan to work with sound in a larger area outside the city. I started with the idea that acoustic sounds always merge in space – you have different sound sources and as a listener you move between them. This is only interesting if you design it properly. It is a misconception to think that if you arrange loudspeakers in a space, each transmitting their own

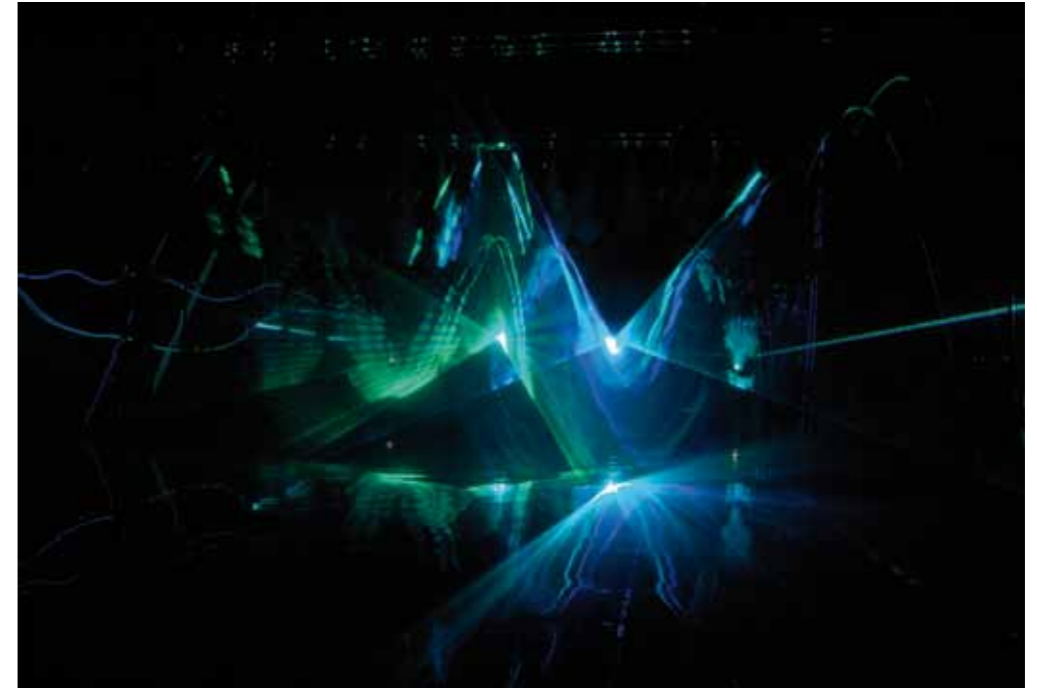
sound, it would by default be interesting to walk among them. I thought: what would happen if you transposed your sound upwards in the spectrum, so that it becomes electromagnetic (instead of acoustic), and then transposed it down to make it audible again? What happens if you transpose the sound signal up, amplify it, and connect an antenna (instead of a loudspeaker) to the amplifier, and receive that signal with another antenna (instead of a microphone), and then transpose the frequencies down to make them audible? This principle differs from a standard FM transmitter, because these make use of a carrier wave. I only transpose the sound frequency up and down without using a carrier wave. I expected that the transmitted sounds would merge. And that is what happened. You can indeed receive signals of different transmitters at the same time. Another element is the distance between the transmitter and the receiver: the sound is loud if you're close to it, and soft when you're further away. Using this principle it is possible to place different transmitters in an area of one square kilometre, each transmitter having its own sub-composition, and make a receiver for visitors walking through the space. I initially tested it on a small scale, and it worked. But upscaling it has turned out to be difficult. Acoustic sound and electromagnetic radiation have wavelengths; suppose that you use frequencies of around 100 MHz in the FM band, then you have a wavelength of three metres, that means that you get nodes (and anti-nodes) three-metres apart. This is something I didn't want in this instance because the piece would become too much of a fairground attraction: people would start searching for the nodes. I had to lower the frequency to make the wavelength much longer. The aspect of seeking out the nodes becomes less important, the volume changes become more gradual, and the behaviour of the sound improves. The surroundings also play a role in the behaviour of sound. Some buildings reflect electromagnetic radiation, or even become a conductor for it. You also have sources of interference, such as fluorescent lighting. But eventually the behaviour becomes controllable enough to create an interesting experience for the audience.

You give shape to the interaction between the audience and the piece...

A crucial question for a piece like *Radioscape* is how much the public has to do before a change in the sound becomes audible. You shouldn't have to walk around endlessly to experience something, and conversely, just a small movement should not produce a huge variety of shifts. What you hear must guide your next move. The piece has to provoke the audience into action. I recently opened *Sound Modulated Light* in Poland. There was a very varied public in the museum who didn't know what to expect. Some visitors stayed in the installation for half an hour and explored everything in detail. Others only stayed for five minutes, but came back later. If that happens, the piece is a success. *Sound Modulated Light* has undergone substantial changes during its development. Initially it did not function spatially as well as it does now. In *Sound Modulated Light* I connect a lamp to an amplifier: light becomes the carrier for sound. I started working with rows of lamps layered behind each other to ensure that the light always overlaps. In an earlier version some people only listened to each individual lamp in turn, without going into the space. In *Radioscape* and *Sound Modulated Light* I create parallel worlds with their own spatial qualities. You can see the *Radioscape* receiver as a new sense that you can use to explore a world that was made for that sense.



Top – Edwin van der Heide, **Laser Sound Performance**, Avantgarde Tirol, Seefeld, Austria, 2007.  
Bottom – Edwin van der Heide, **Laser Sound Performance**, Hypersounds, Madrid, 2009.



Edwin van der Heide, **Laser Sound Performance**, alveole 14, Estuaire 2007, Saint-Nazaire, 2007.





Edwin van der Heide, **Pneumatic Sound Field**,  
pavilion designed by Lars Spuybroek, Synthetic Times, NAMOC, Beijing, 2008.



Top – Edwin van der Heide, **Sound Modulated Light III**, Voltage Festival, Kunsten Centrum BUDA, Kortrijk, 2008.  
 Bottom – NOX and Edwin van der Heide, **Son-O-House**, interactive sounding architecture, Son, 2004.

You also work quite regularly with the architect Lars Spuybroek. What does that type of collaboration involve?

The collaboration with Lars Spuybroek is always content-oriented. This ensures that we don't infringe on each other's practice. Among our collaborations is the *Waterpaviljoen*, a building incorporating 60 loudspeakers, and *Son-O-House*, a permanent, interactive sonic architecture. There is little point to literally translating the shape of the building or a space into sound. I don't create compositions in which a curve in the wall corresponds to a specific sound. That doesn't work, and visitors to a building certainly don't experience it that way. Rather, the question is where interesting overlaps or interesting contrasts occur. My approach is not to provide the public with a sonic experience that parallels their journey through a building; in fact the reverse is true. With sound I try to create an environment which is as tangible as architecture. I do this by 'pulling on' the visitors by means of sound. In *Son-O-House* I very consciously work with interferences in the space so as to liberate the sound from the speakers. Acoustically the structure contributes very little because it is very open. It only has a concrete floor that reflects sound. I was determined to get away from the notion that sound is emitted by a loudspeaker, because once you're inside the building and see a loudspeaker you would think, 'That's where the sound is coming from'. That would be disastrous.

Lars Spuybroek designed a pavilion in Beijing for your installation *Pneumatic Sound Field*. Can you explain the principle behind that piece?

*Pneumatic Sound Field* often creates the impression that it is interactive. This is why some people keep moving about in it. I think they do that because the sound experience in the installation is very physical. It is different from the sound experience you have with loudspeakers. Because the sound is emitted through valves, it feels like the sound is close by and it stays that way even if you move to another spot. This sometimes results in the misunderstanding that the sound is following you when it isn't. *Pneumatic Sound Field* consists of a surface measuring ten metres by twenty metres with 42 valves, which is suspended four metres above the public. Movements take place in that field. I use pulses that I send through the field, sometimes slow, sometimes fast. You could probably make a valve organ with the same installation, where each valve produces a different tone. But I never use a valve for its own sake. Each sound is produced by all the valves. It is the timing between the valves that defines how it sounds. The piece is about the transformation from a slow movement to a faster one, and how you perceive this spatially. At a certain point it goes so fast you no longer hear that there is movement and you only perceive a profound spatial quality. You could compare it to film. If the frame rate is too slow you see the film flickering and the illusion of movement is lost. If the frame rate is fast enough you see a continuous image. Our hearing also recognizes a similar transition from the moment you hear the individual clicks in a rhythm change into a continuous tone. The work is also about a movement from the inside to the outside, and vice versa. I play with perceptions and the transitions within them, from inside to outside in the spatial field and from pulse to tone. Sometimes you have the feeling that the sound space becomes larger, that it is being expanded.



You are also researching the behaviour of overtones, and if I understand it correctly, you are investigating what happens when overtones become autonomous?

You can only answer the question of what happens if overtones become autonomous by making something that makes this perceivable. I will make a grid of 96 tiny speakers for the facade of the V2\_ Institute for the Unstable Media in Rotterdam. My question is: what happens if you take a sound – sounds always consist of overtones – and pull it apart spatially. What happens if each overtone becomes autonomous, and behaves in its own unique way? The sound is then the outcome of a specific arrangement and the specific behaviour of overtones that can also be viewed individually. Just like a molecule is made out of atoms, a sound is made up out of overtones. You could use the metaphor of a dandelion parachute ball: the dandelion is the sound, and if you blow it, the seedlings scatter throughout space. In my case they are distributed throughout the grid of 96 tiny speakers. Of course, it doesn't sound like that, but I think it's a good visual analogy.

Are there other composers who have investigated sound in a comparable way?

You can think of the spectral music by Tristan Murail and Horatio Radulescu. There is also a sound synthesis technique, SMS (Spectral Modelling Synthesis), where everything is created from overtones. But both spectral music and SMS were conceived from the perspective of sound. I have a different question: what can you do with autonomous overtones, and what happens at the transition point between, on the one hand, a hierarchical organization of overtones, and on the other, between really autonomous overtones? I focus on autonomous behaviour that I can occasionally steer in a different direction once in a while. In that way a dandelion parachute ball is sometimes created from scattered seedlings.

Although your work is concerned with sound, your approach has few similarities with the acoustic ecology of R. Murray Schafer. And yet, last year you taught a class in 'earcleaning', a term coined by R. Murray Schafer whose activities focus on learning how to listen to ambient sounds in a better way, as well as on combating noise pollution in a technological society. What spurred your interest in the idea of earcleaning?

The Earcleaning class is about learning to listen and learning to perceive. It is about aspects of sound-colour, space and experiencing your surroundings and really becoming aware of them. How I teach earcleaning is only partly related to Schafer. It is concerned with the surroundings, about the outdoors, the public space, but also with electronic sound and the spatiality of sound as I approach it in my work. Schafer was concerned with learning a new way to listen to your surroundings and what is happening in them. I am not so involved with acoustic ecology – for me the most important aspect is that you can make the step to listen to the surroundings and sound itself, and to learn to perceive it accurately. Earcleaning is a fantastic term, of course; isn't a good earcleaning what everyone wants?

# The Hybrid Architectures of Iannis Xenakis

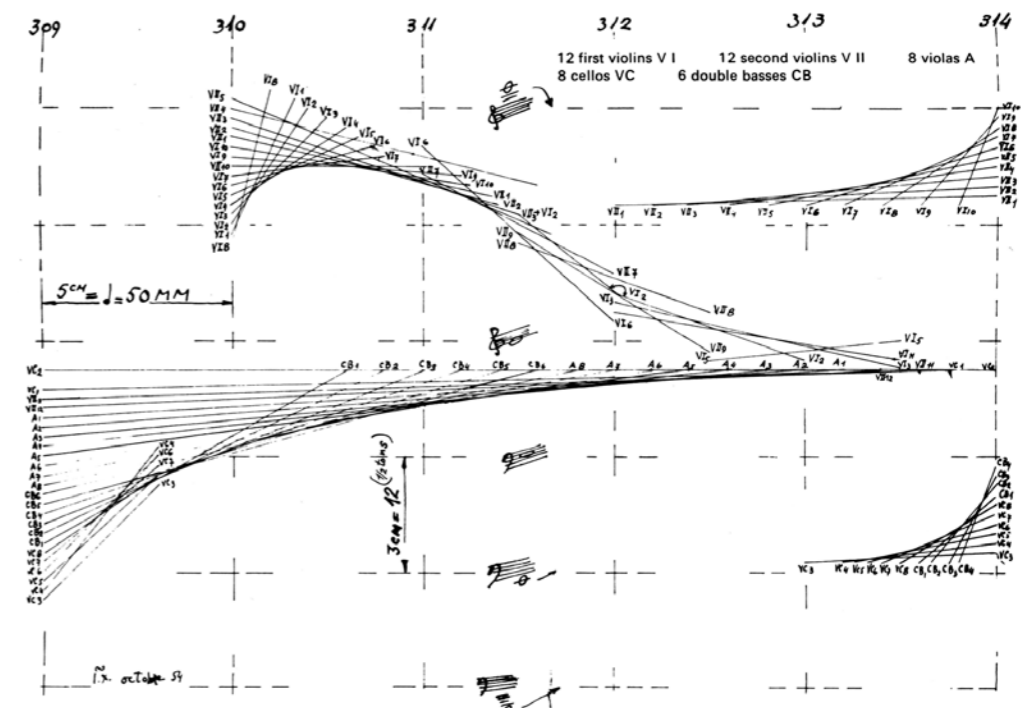
Elizabeth Sikiaridi



In the aesthetic production of the twentieth century, the *Poème Électronique* is a fascinating moment of artistic synergy. The architect, Le Corbusier, conceived an electronic synthesis of visual and acoustic events, and a vessel containing the poem for the Philips corporation presentation at the 1958 Brussels World Fair. The composer Edgar Varèse contributed the acoustic part, the spatialized piece of music entitled *Poème Électronique*. Iannis Xenakis (1922–2001), who was originally trained as an engineer, worked as an architect in Le Corbusier’s office. He designed – in co-authorship with Le Corbusier – the vessel containing the *Poème*, the shell structure of the Philips Pavilion. Xenakis, was to become an internationally renowned composer, and he continued his research into complex architectural forms and the equally complex ephemeral architectures of music, sound and light. Xenakis’s experience of working simultaneously in architecture and music opened the way for the practice of applying the same structures in music and visual events (his *Polytopes* and *Diatope*), and for transferring mathematical–scientific structures into artistic production. His transfer and use of scientific–mathematical methods is more than a practical solution to the problems of processing the dynamic formations of sound and light events, of organizing the mass phenomena of clouds of sounds and galaxies of light that he is confronted with while composing; it is an integral part of world-view and his approach to art.

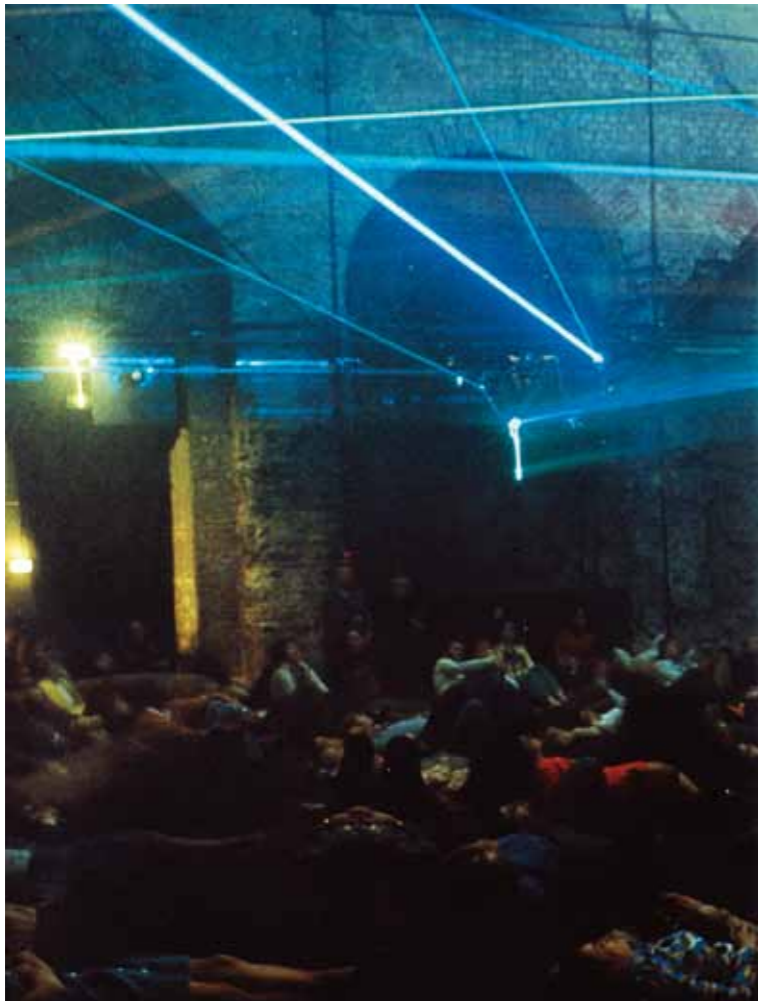
In the 1960s Xenakis started to develop a custom-made computer to control and (de-)synchronize the overlaps between musical and visual events, and integrated it in his creative process. This digital instrument, the UPIC, is a music-computer with an architect’s drawing board as interface that transforms graphical information into music and sound. Linking visual and acoustic forms via the bridge of mathematical information, this computer reflects Xenakis’s holistic approach to form and is an integral part of his research on complex structures and their materializations in very different media and dimensions, in sound, in light, in time and space.

Before working on the Philips Pavilion, Xenakis had introduced hyperbolic paraboloid structures in his musical composition *Metastaseis* (1953–54): graphs of straight lines mapping the rising or falling sounds of each instrument, the *glissandi*, generate curved, ruled, surfaces of sound.

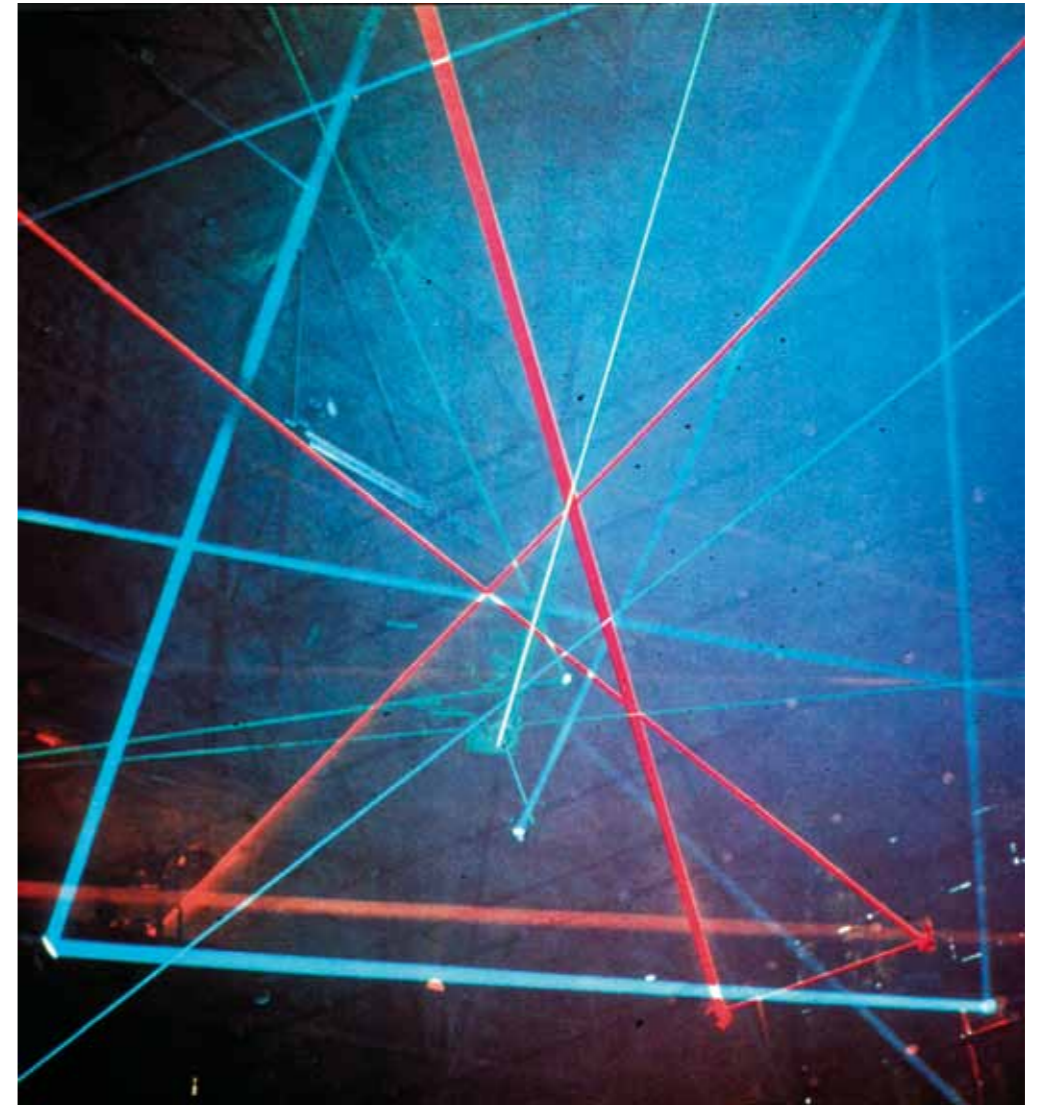


Iannis Xenakis, Notations for the hyperbolic paraboloid structures of *Metastaseis*, 1953–54.

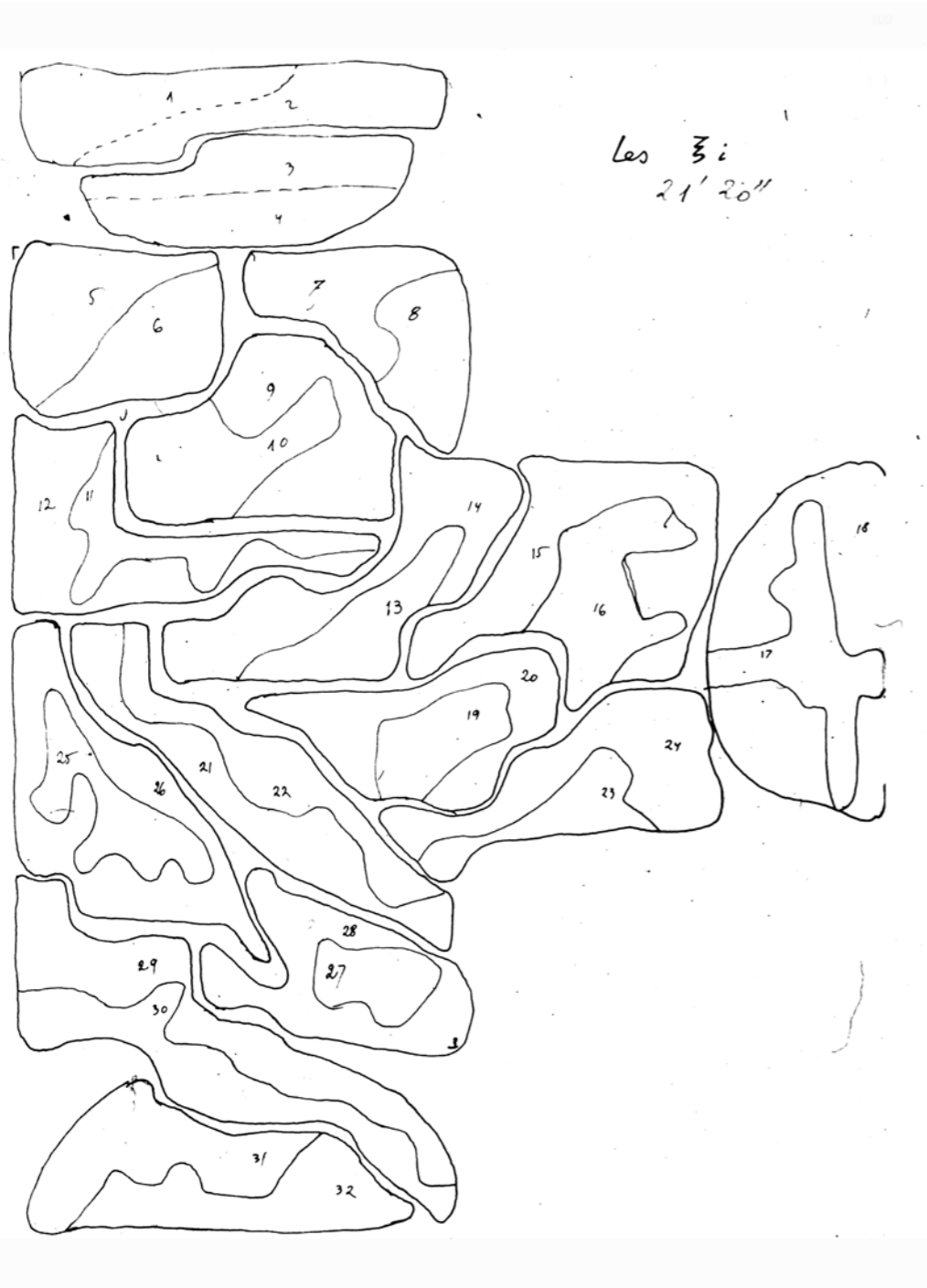
Xenakis worked with architectural elements that capture, guide and transform light. For the Convent of La Tourette, Xenakis designed a rhythmically structured facade, the *pans de verre ondulatoires* (undulating glazed panels), and the skylights, the *Light Canons*. These architectures of light evolved later in Xenakis's compositions of sound and light: the *Polytopes* (*Polytope* of Montréal, 1967; *Polytope* of Osaka, 1970; *Polytope* of Persepolis, 1971; *Polytope* of Cluny, 1972–74; and *Polytope* of Mycènes, 1978). The word *polytope* (*poly-topoi*, 'multiplicity of places') describes the overlaying of music and light, creating various ever-changing asynchronous places.



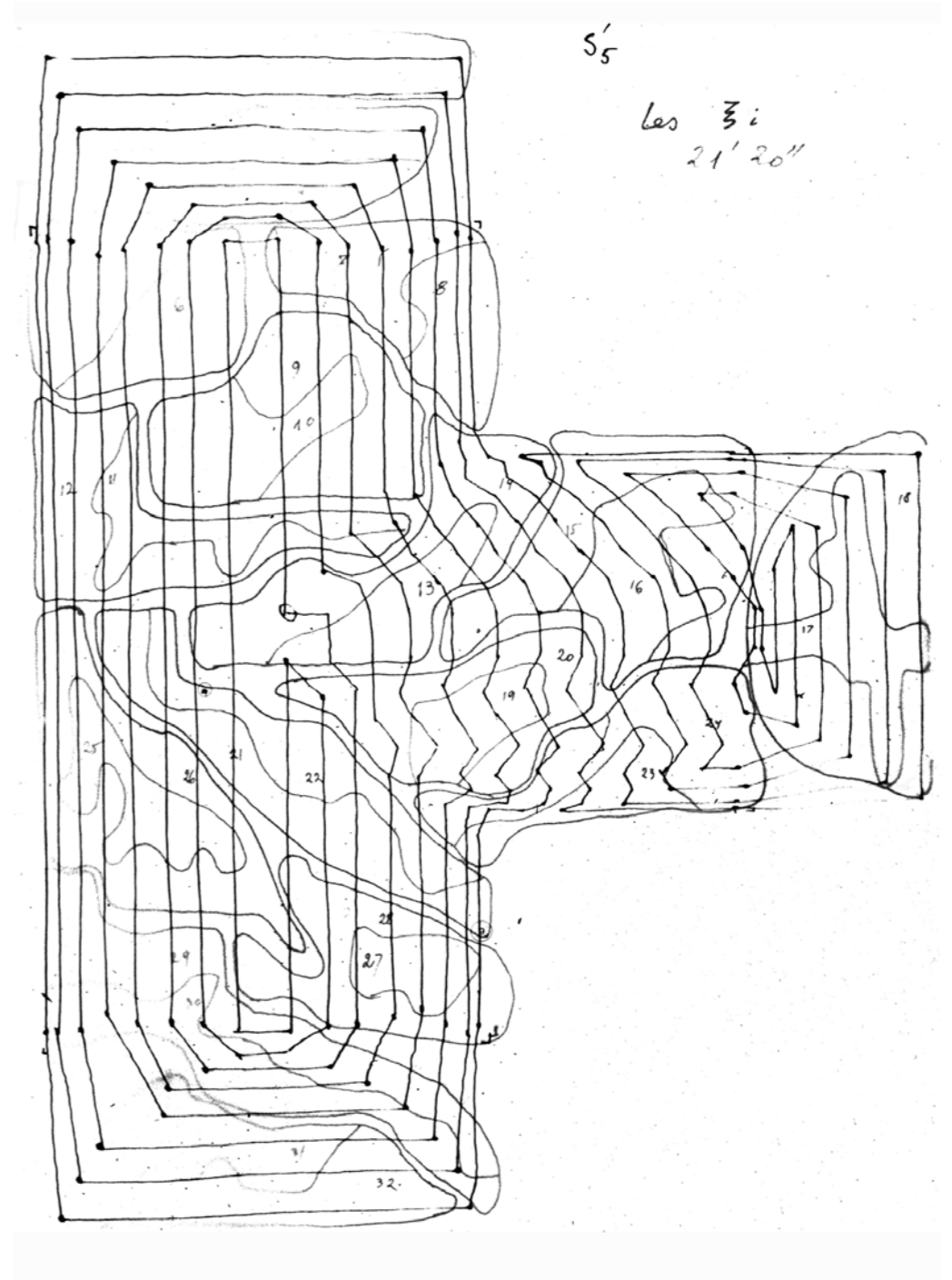
Iannis Xenakis, **Polytope de Cluny**, in the Roman thermal baths of Cluny in Paris 1972–74.



Iannis Xenakis, **Polytope de Cluny**, in the Roman thermal baths of Cluny in Paris 1972–74.



Iannis Xenakis, graphical notations for **Polytope de Cluny**.



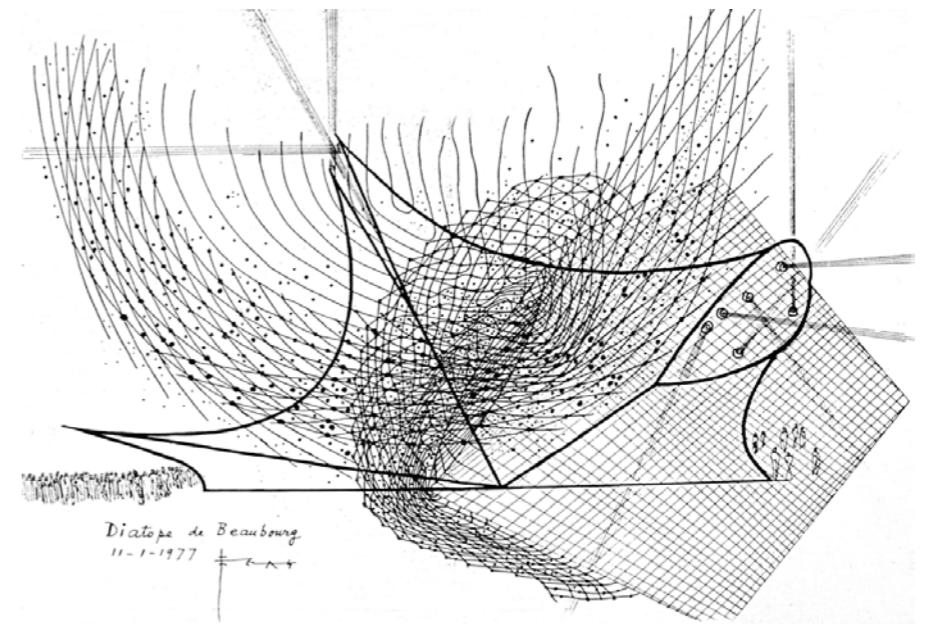
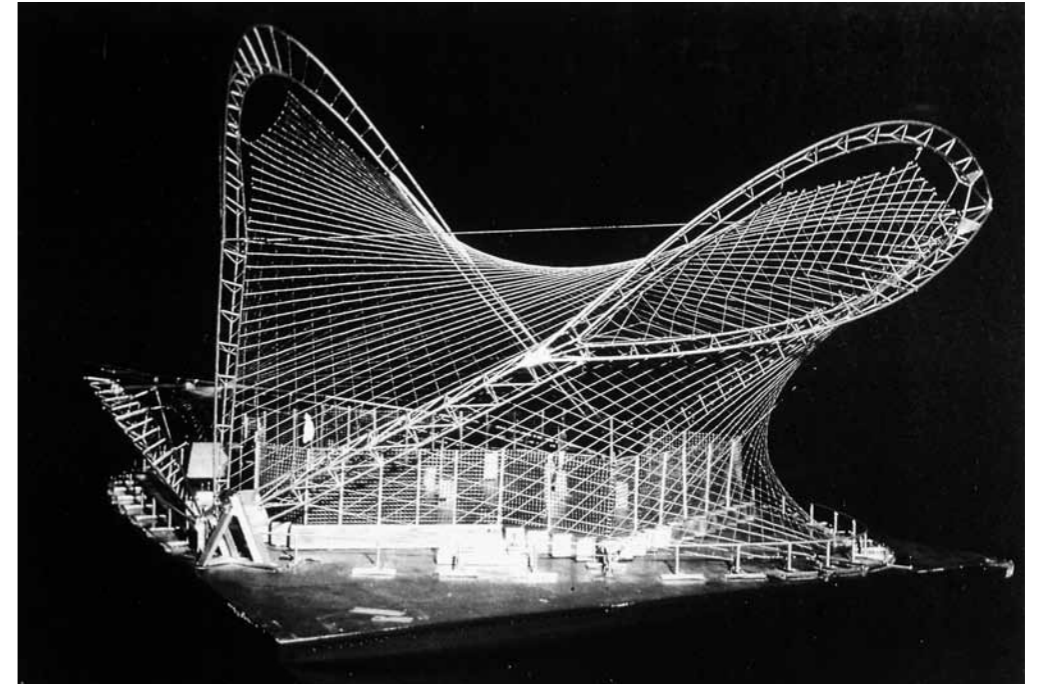
Iannis Xenakis, graphical notations for **Polytope de Cluny**.



The *Diatope* (meaning 'through-place') was a combination of sound and light effects in a translucent pavilion Xenakis designed for this purpose. The *Diatope* was planned for the inauguration of the Centre Georges Pompidou in February 1978, but for technical reasons was only realized in June 1978 and set up again in Bonn in 1979.



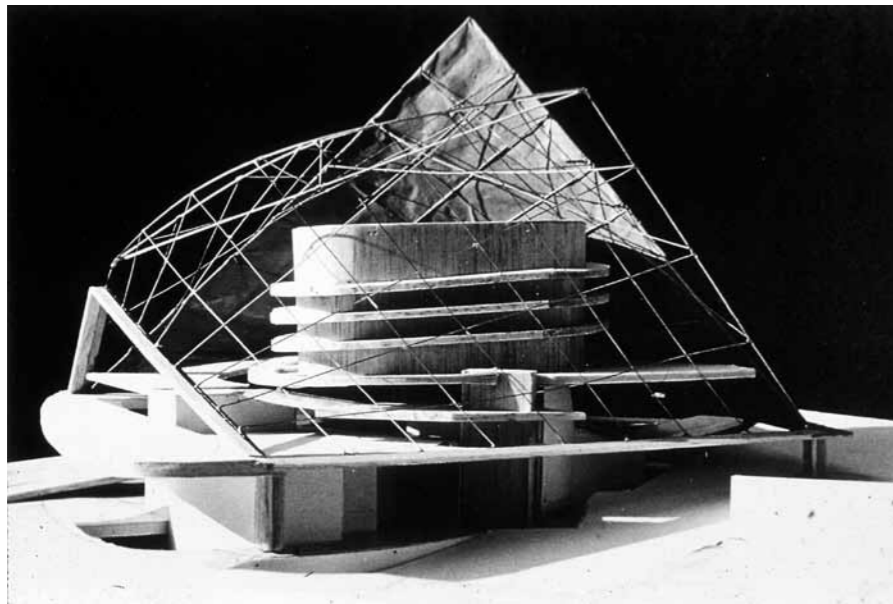
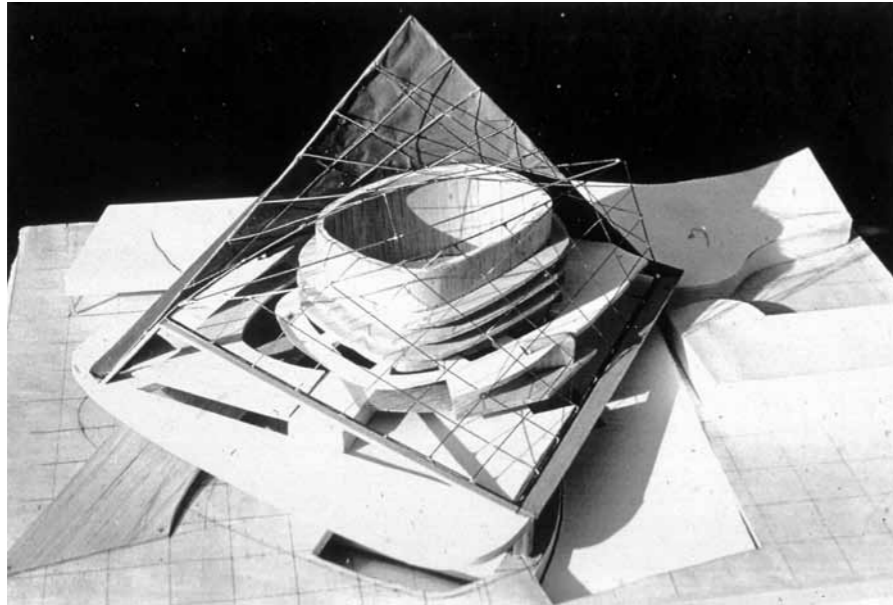
Iannis Xenakis, Interior of the **Diatope**, Paris/Bonn, 1978-79.



Top – Iannis Xenakis, Model of the temporary, mobile pavilion of the **Diatope**, Paris/Bonn, 1978-79.  
Bottom – Iannis Xenakis, Sketch of the **Diatope**, Paris/Bonn, 1978-79.

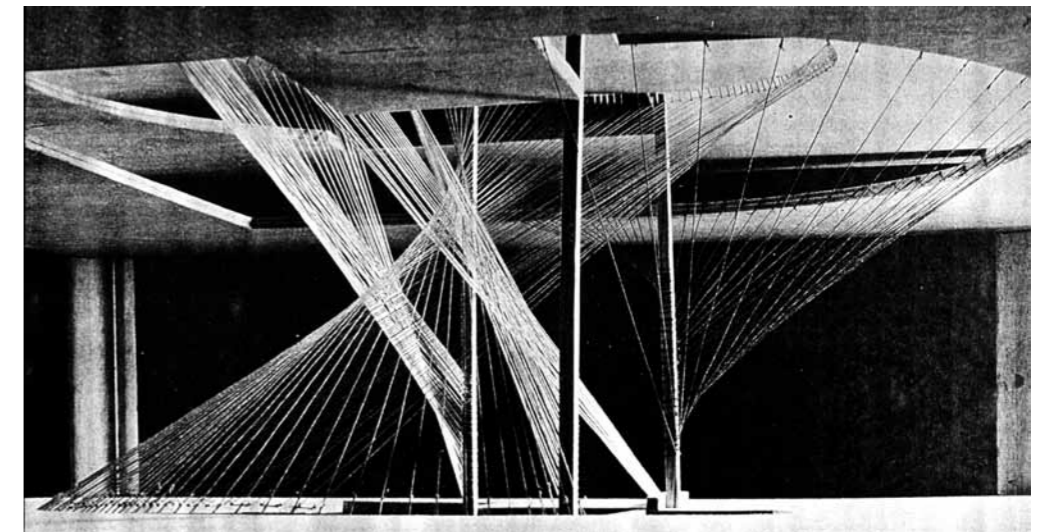
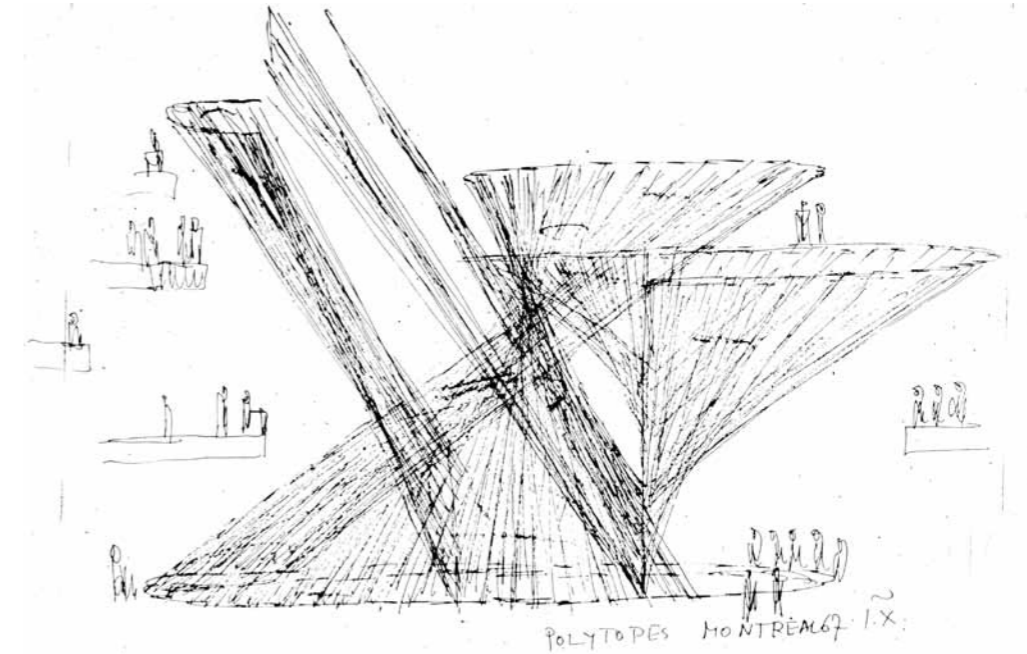


The hyperbolic paraboloids became Xenakis's artistic signature. Most of his architectural designs are based on the geometries of the hyperbolic paraboloids and conoids he had also incorporated into the design of the Philips Pavilion.

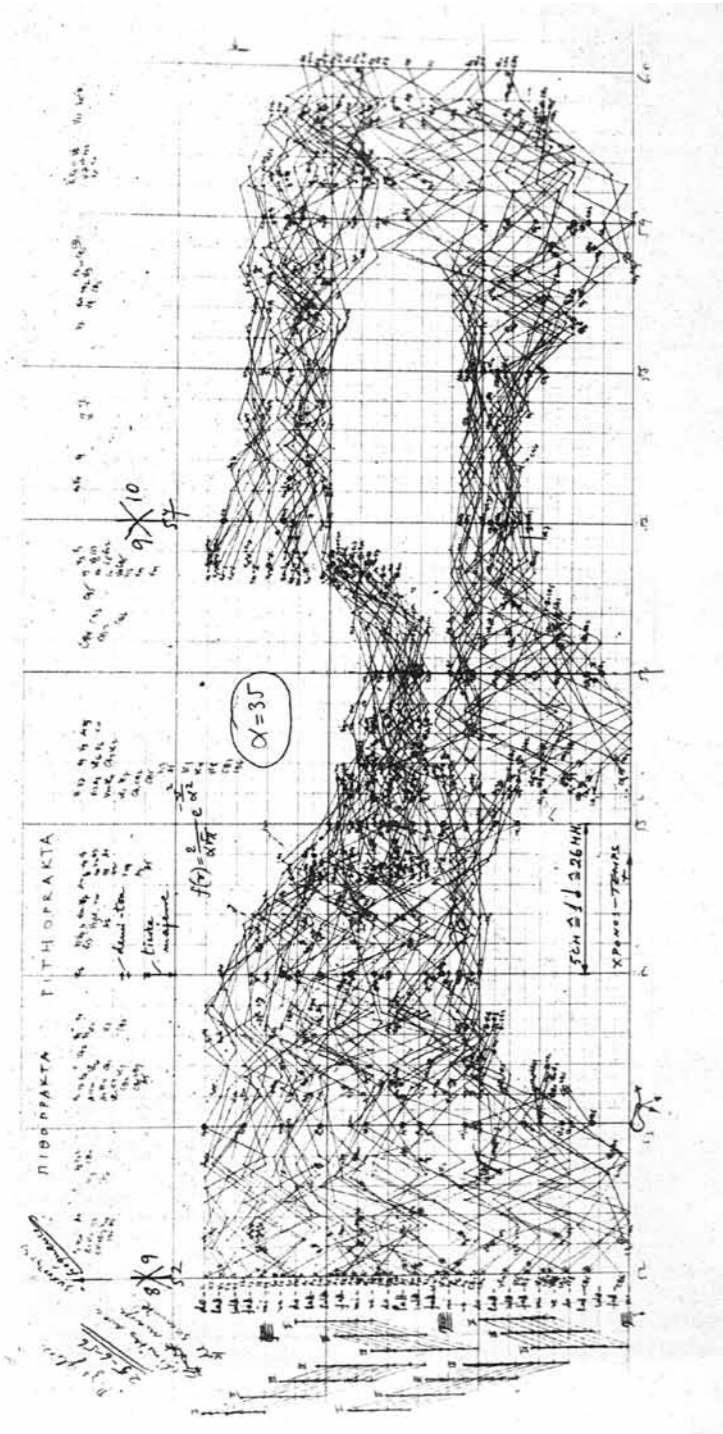


Iannis Xenakis and J.L. Véret, Model for the Cité de la Musique, 1984.

Xenakis arranged the straight steel cables to which the lights were fixed to create hyperbolic paraboloid surfaces for his sound and light event *Polytope* in Montréal in 1967.



Iannis Xenakis, **Polytope** in the French Pavilion at the Expo '67 in Montréal. Sketch by Iannis Xenakis.



Iannis Xenakis, notation of the music composition **Pithoprakta**, 1956.

# Right Here, Right Now – HC Gilje's Networks of Specificity

Mitchell Whitelaw



The digital network, where many of us spend ever more of our time, is a vast infrastructure of generality. It deploys a system that is standardized, formally defined, highly structured, and internally consistent. If I send you an e-mail, I do it trusting that the interlinked systems of hard- and software, the protocols for data encoding and transmission, the network switches and servers, will all hold together so that the e-mail you receive is the same as the one I sent. We could say that the network generalizes our two points in space – for the network, they are the same. As I draft my e-mail it exists as a pattern of voltages and magnetic flux inside my computer. To transmit that pattern effectively, the digital network must erase or overcome any local errors or inconsistencies that it might encounter along the way, so that it does not matter if the pattern travels by optical fibre or copper, or in radio waves, or if a boat anchor cut through a cable near Indonesia. Those are specificities – local, material events and instances. Digital culture, and networked space, absorb specificities, compensates for them, rectifies them into generality. Wireless broadband and mobile computing make us into human nodes, bathing in shared connective protocols.

The aesthetics of digital media flow from a related generality, where sound and image are encoded as fields of data. If a pixel is a number, an image is a grid of pixels, video a stream of images, and each of these numbers can take any value at all, then formally, an aesthetics of digital video is only a matter of finding the right values – fishing around in a space containing all possible digital video. If digital media creates this generalized space, anything at all, the media arts are faced with unavoidable questions: not only what to make – which values to choose, but how to choose them, and why?

HC Gilje's work arises from a moment when the anything-at-all of digital video was just opening up, thanks to a combination of new real-time tools, cheap computing power, and some key interdisciplinary influences. Drawing on experimental sound and music, improvisation and performance became important solutions; working live in a specific situation, artists would gather, process, generate and recombine material. The results of works from the late 1990s and early 2000s by Gilje and his collaborators in 242.pilots, as well as by video ensembles such as Granular Synthesis and Skot, are abstract and intense, flows of layered digital texture. As performances they saturate the body and senses: big screens, big speakers. Instead of the narrative transport of cinema, which takes us somewhere else, this work creates – and is created in – an intensified sense of presence, what Gilje calls an 'extended now'.<sup>1</sup> This methodology is vital; it focuses the open-ended generality of digital media in to a point: on this, rather than anything-at-all.

This moment relies on a circuit, a close coupling between artist and media; data flows become experienced events – sounds and images – which in turn inform new data flows, and so on. Audience and performers share a digital-material situation. The specificity of digital media comes forward; for of course these media are always specific, always local, always embodied; but that specificity is usually suppressed by the functional logic of generality. At the same time though, the processes underway here depend on exactly that generality, on the machine's ability to rapidly transform data and shift it between instantiations – from the voltages in video memory to the patterns of projected light.

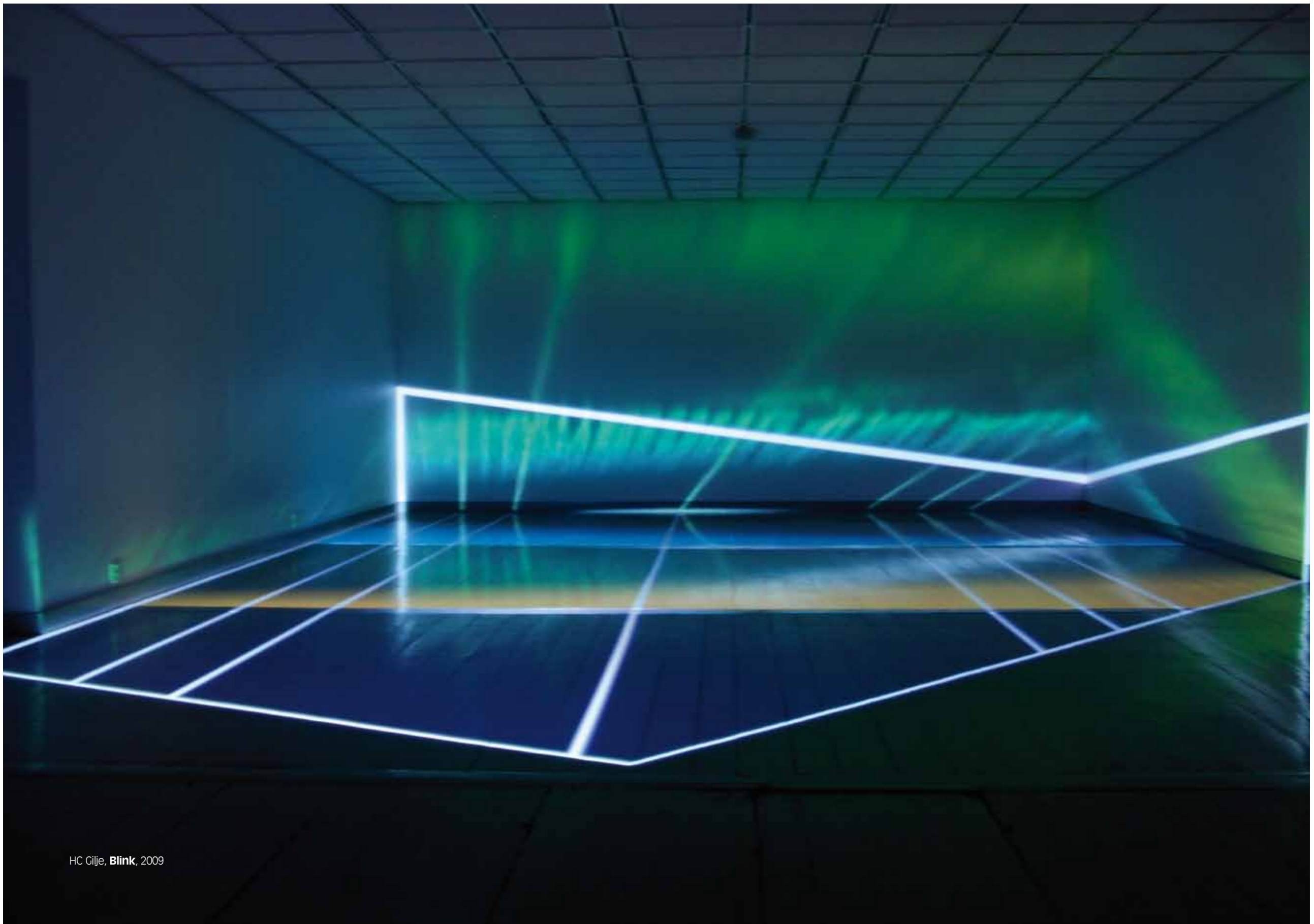
In *nodio* (2005–) Gilje creates a system of networked audiovisual nodes that process and share image material. Each node generates sound derived from its image, in a process of automatic translation. On the one hand this translation is another demonstration of the abstract pliability of the digital – its ability to transform anything into anything (generality); on the other, its tight audiovisual correspondences generate sparks of material intensity – real events, rather than digital effects (specificity). With these distributed nodes Gilje deploys audiovisual materials in space, creating flows and juxtapositions that function as dynamic sculpture. Of course the formal model of *nodio* echoes our most ubiquitous generalizing paradigm: the network. Once again, the artist applies this digital tendency for generalization in order to cultivate instances of specificity – the texture and sensation of the here and now.

From *drifter* (2006) to *dense* (2006) and *shift* (2008), Gilje's audiovisual nodes map out a developing exploration of specificity. *drifter* deploys standard computer hardware, formed into sculptural modules; in passing material between nodes Gilje begins to break the frame of the screen, creating an implicit inter-space. In *dense*, the hardware moves out of the sculptural field, and the screen is further deconstructed. Instead of the frontal configuration of the cinema and the computer, these suspended fabric strips are illuminated from both sides with a video 'weave'. The familiar architecture of the screen as a blank, general-purpose, substrate containing or supporting image content, is reconfigured here; the specific materialities of screen and content overlap. Even more so in *shift*, where the nodes are now wooden boxes, illuminated with precisely controlled video projections. As in earlier *nodio* works, sound and image are directly related. Here Gilje extends this fusion to the sculptural objects; each node is also its own speaker-box, so that the digital articulation of sound and image is realized, and grounded materially, in the nodes themselves.

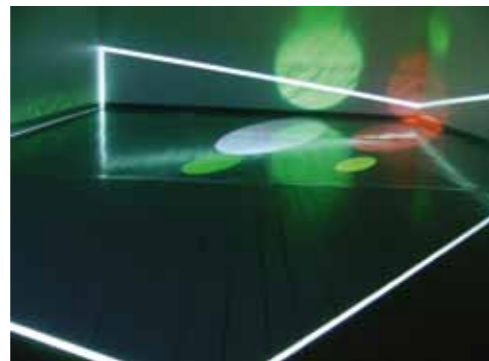
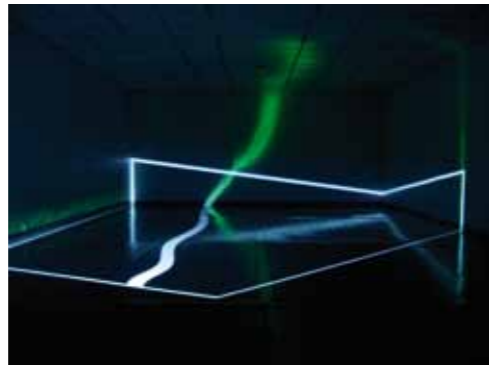
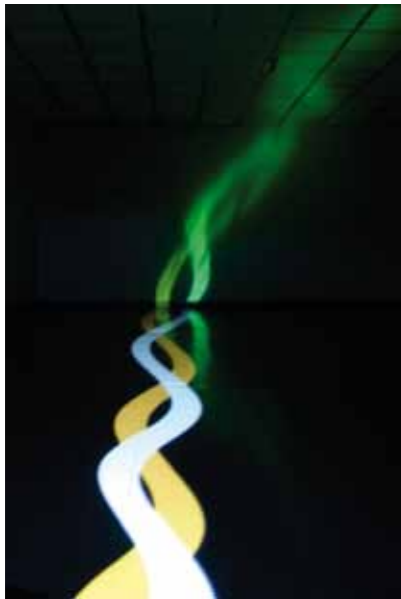
These works drive towards a spatial materialization of audiovisuals: dynamic constellations of audiovisual intensity, fields for what Gilje calls 'audiovisual powerchords'. The projectors, speakers and networks of the *nodio* works present one means to this end, deploying existing media technologies. Again we find an interplay of generality and specificity, as Gilje adapts generalizing systems – projectors, computers, networks – to realize materialized instances.

*Wind-up Birds* (2008) represent another angle of approach; Gilje sets video aside, and creates materialized, local, sculpturally autonomous nodes from electronic and mechanical materials. In these robotic woodpeckers digital media and sculptural embodiment are further enmeshed. The birds communicate using digital radio, and their behaviour is programmed in a custom chip; but their sound is simply percussion – a mechanical switch, tapping on a specially constructed wooden slit-drum. Again this is specificity over generality: a loudspeaker is an acoustic shape-shifter, a technology that promises any sound, in the same way that the screen promises any image. By contrast the *Birds* produce only one sound, their sound, a specific conjunction of solenoid, timber and vibrating air.

The *Birds* will run for a month on their own batteries, strapped to trees, calling to each other and any other creatures nearby. These nodes are unplugged: they begin to come away from the technological support system of mains power



HC Gilje, **Blink**, 2009

HC Gilje, **Blink**, 2009

and the shelter of the gallery or studio, and move out into the world. As in the artist's other work, the engineering here is inseparable from the artistic agenda; the *Birds* are in that sense a realization of Gilje's spatial and formal aims, an autonomous constellation of intensities. But they also literally expand from there; where the *nodio* works explore the composition of spaces within a network of intensities, the *Birds* move outwards, creating points of intensity in the wild, and evoking a spatial alertness – a way of being in and listening to the world – that extends beyond the well-marked edges of an artwork. The *Birds* are more like an experimental intervention, a digital-material overlay in a complex field of the living and non-living.

Similarly, the *Soundpockets* works (both 2007) make small sonic interventions in urban spaces, pursuing local intensification and juxtaposition through directional soundbeams and micro-scale radio transmissions. Once again we find this interplay of the general – the anything-at-all of the digital – and the specific, the here and now. The 'extremely local radio stations' of *Soundpockets 2* form a sort of folded juxtaposition of three layers: globalized network infrastructures and protocols, the traced or mediated locations of field recordings, and the specific time and place of the transmissions. Just as *Soundpockets 1* uses exotic soundbeam acoustics to perturb urban spaces, *Soundpockets 2* shows how we can draw in technological infrastructures in order to reconfigure the real environment, creating flows and distributions that form intense moments of difference and specificity.

In this reading, Gilje's work is partly critical. Pursuing specificity, and an intensified, material experience of the here and now, it pushes against the generalizing tendencies of digital media. By the functional logic of the network, each node is formally identical, and must be effectively insulated from its environment. Ubiquitous computing promises us 'everywhere' – total connectivity, the complete interpenetration of the network and our lived environment.<sup>2</sup> But if the network is a generalizing force, if it erases differences between places, what will life in 'everywhere' be like? Gilje's work suggests a utopian alternative: networks that are always local in time and space, nodes of right here, right now. Gilje's work strives for what Hans Gumbrecht calls 'presence', a way of knowing the world that is characterized by intense moments of encounter or revelation – aesthetic experiences that place us in the world, and of it – rather than observing from the intellectual distance of interpretation.<sup>3</sup>

The beauty of Gilje's work, though, is that it not only suggests this prospect, but demonstrates it, makes it happen, and in that sense the work is constructive, rather than critical. In emphasizing the specificity of media technologies, Gilje's work shows us a different way to frame those technologies; as always material, always in the world with us – a view I have called transmateriality.<sup>4</sup> As Matthew Kirschenbaum writes, 'computers [...] are material machines dedicated to propagating a behavioural illusion, or call it a working model, of immateriality'.<sup>5</sup> Gilje shows us both sides of this statement, the functional illusion – generality – and its material foundation – specificity. It shows us a way to reframe the network, too; as always local, always specific; a tangle of real flows and propagating patterns; and endless possible ways of reconnecting the world with itself. Finally Gilje shows us one crucial role for the artist in this context: seeking out configurations that intensify, rather than dilute, our sense of being in the world.



Notes

1. HC Gilje, 'Within the space of an instant', in Morten Søndergaard (ed.), *Get Real: Real-Time + Art + Theory + Practice + History* (New York: George Braziller, 2005).
2. Adam Greenfield, *Everyware: The Dawning Age of Ubiquitous Computing* (Berkeley Ca.: New Riders Publishing, 2006).
3. Hans Gumbrecht, *Production of Presence: What Meaning Cannot Convey* (Stanford: Stanford University Press, 2003).
4. Mitchell Whitelaw, 'Notes on Transmateriality', 7 March 2008, <<http://teemingvoid.blogspot.com/2008/03/notes-on-transmateriality.html>>.
5. Matthew Kirschenbaum, 'Every Contact Leaves a Trace: Computers Forensics and Electronic Textuality', in *Workshop in the History of Material Texts, University of Maryland*, 2005, <<http://www.otal.umd.edu/~mgk/blog/LeavesATrace.pdf>>.



# Space is Body Centred

Interview with Sonia Cillari  
Annet Dekker

Sonia Cillari's work has an emotional and physical focus. By tracking electromagnetic fields, activity, movements, and the attraction and repulsion between the participants and the performer she explicitly investigates the possibility of using the body as an interface. Cillari's interest lies in measuring human encounters, at the moment that the audience realizes that the boundaries of their bodies extend further than their skin. She is particularly interested in the notion of tactile awareness: how proximity, presence and touch influence the way in which we perceive ourselves and relate to others, and how this process can be imbued with new meaning. Her projects explore the relationships between bodies and between body and space, and Cillari uses digital and electromagnetic energy emitted by human bodies, which function as antennae, to generate dynamic forms. Cillari reveals how the audience models their internal and external worlds by means of their sensory systems, and the way in which our sensory input enables our consciousness to map the world around us. I interviewed Sonia Cillari twice, with an intervening period of two-and-a-half years. The first interview took place during an artist-in-residence at the Netherlands Media Art Institute in Amsterdam (2007) when she developed *Se Mi Sei Vicino*. The second interview was conducted by e-mail and Skype, while I was revising and augmenting the 2007 interview for *Sonic Acts in the light of The Poetics of Space*.

You were trained as an architect, and then moved to media art. What was it that attracted you to media art that you couldn't find in architecture?

When I was studying architecture I was specifically interested in the theory of space. Later on I chose the electronic arts field to investigate the way humans experience space, how we perceive space and reconstruct our internal and external worlds by means of our sensorial system. During my studies, I used the parameters of digital space. In architecture the functionality – for example gravitational restriction – is essential. I wanted to get away from the restrictions and started studying the 'black space of the digital domain'. Like the physical space that surrounds us, this isn't an empty space but a place where complex fluctuations of energy occur. This initiated my move from architecture to media art. While drawing my digital models I felt free from physical constraints, I was shaping spaces by applying parameters like vectors of transformation, flux, transition and interference. The main theoretical impetus behind my creations was the idea that movement comes before space. I believe that one cannot conceive of space as an inert receiver or as an homogenous and permanent external. Space is a generator of perceptions. My intention has always been to explore and stimulate the implications of our spatial experiences.

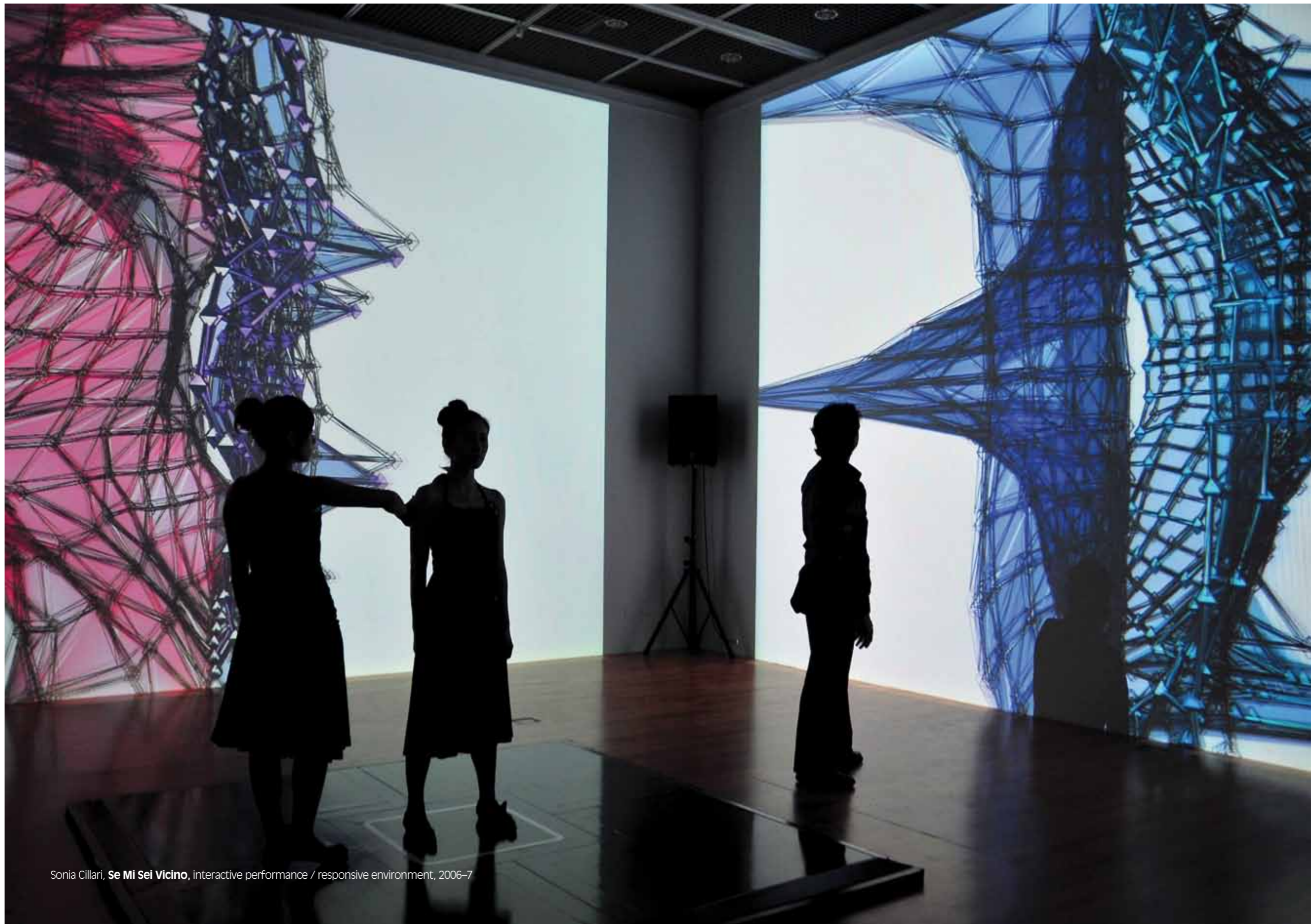
The idea of movement comes before space reminds me of Brian Massumi's remarks about the relationship between space and movement: 'When the relation between space and movement inverts, so does the relationship between ourselves and our experience. Experience is no longer in us. We emerge from experience.'<sup>1</sup> This inversion is similar to the importance of the movement in-between, the moving from one point to another, which creates meaningful space. Like Massumi, you move from architecture towards performance practices in order to come to terms with space and the forming of experience. Could you elaborate on this? What does performance mean to you and your work?

I'm very interested in highlighting both the physical and the metaphysical ways in which human beings interact with each other and with their environment. And yes, I believe that performance is one of the best forms of making art, to visualize things that are not in themselves visual. For me the relational and participatory situations are very effective to break the illusion of an objective reality. I intend to increase our perception of complex visions and embodiment in human experiences. It is through performance that we, from our subjective position, can gain access to undiscovered, imaginative, shared phenomena. The same individual recognitions of the basic elements in performance – such as space, time, bodies, emotions and other kind of relationships between the performer and audience – reveal our beings as potential containers of interrelated events. Over the years, my work has fused all these elements into generative and interactive works in which the personal experience of space is an illusion, and in which the body, gestures, images, sound, touch, and recently also taste and smell, play important roles. These are artificial spaces, each segment of which contains potential realities, some mirroring natural phenomena, some not. Another aspect I really care about, especially in my most recent performances, is that I try to minimize the distance between active performers and passive spectators. Asking the audience for a full bodily commitment that includes mostly movement, gestures and touch, blurs the boundaries of passivity and activity: everyone becomes a potential performer. Visitors leave the role of observers and slide in the role of creators of an autonomous reality.

You have referred a few times in previous writings and in interviews to the idea of 'space as body centred' and the notion of 'body as interface'. What do you mean by this, what is the relationship of the body to space as you define it?

I like to start answering this question quoting the philosophers Maturana and Varela. They state: 'Living systems are units of interactions. They exist in an "ambience". From a purely biological point of view they cannot be understood independently of that part of the ambience with which they interact, nor can the ambience be defined independent of the living system that specifies it. The systems that live in a continuous exchange with their environment are called "open systems". All living systems are "open" and in a "stable state". This means that they are never in a "stationary equilibrium" but always in a "state of flux".'<sup>2</sup> We experience space – this immense not-void that surrounds us – because we are perceptive and thinking beings. However our perception does not identify the outside world as it really is, but only the way we have come to recognize it. We experience electromagnetic waves as images and colours, vibrations as sounds, and chemical compositions





Sonia Cillari, **Se Mi Sei Vicino**, interactive performance / responsive environment, 2006-7



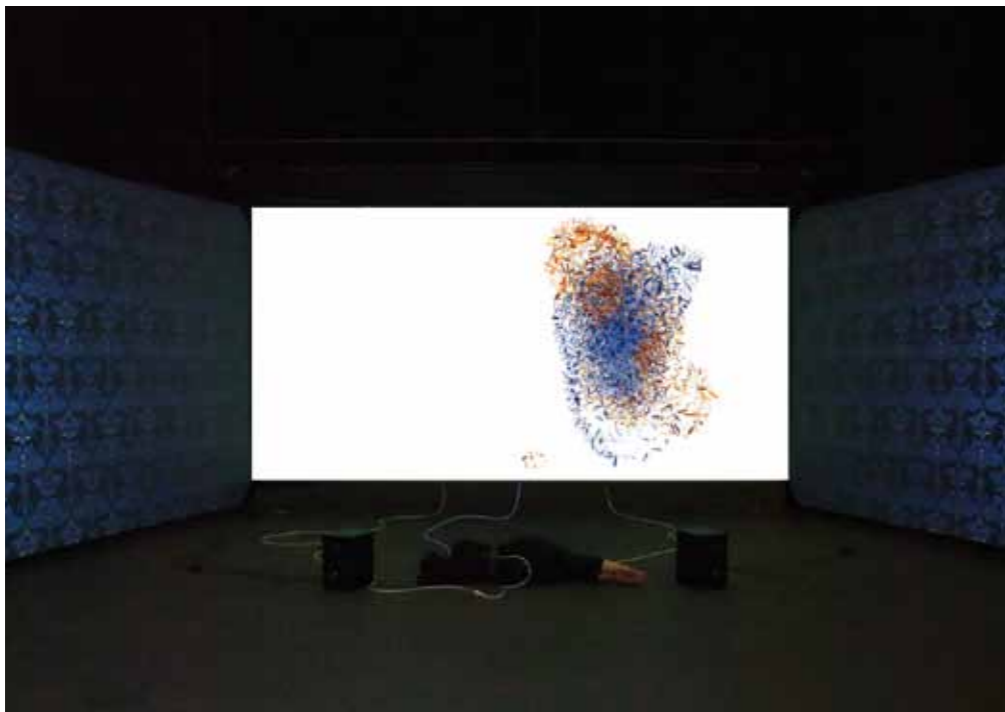
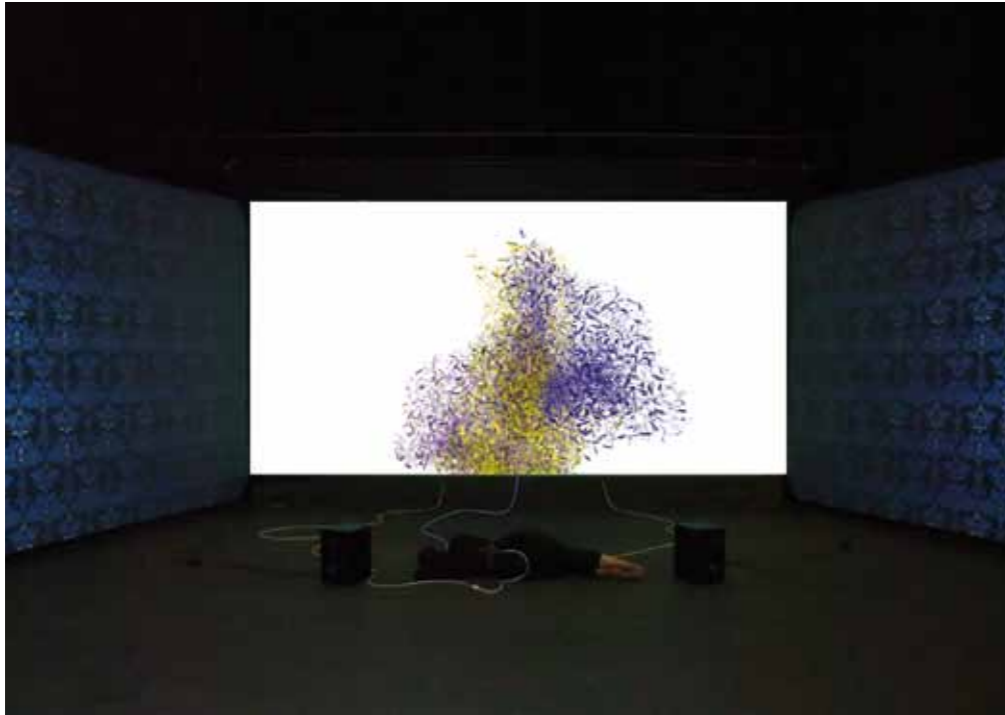


Sonia Cillari, *Se Mi Sei Vicino*, interactive performance / responsive environment, 2006–7

as smells and flavours. Colours, sounds, smells and flavours are products of our mind, built from our sensory experiences. They do not exist, as such, outside our brain. Diametrically opposed to the notion of objective space as an homogeneous 'external', the notion of reality as a learning process has its chief features in heterogeneity and consciousness. In space, I am immersed as a body and as an agent of emotions. I say I am immersed as a body because, I don't have a body, but I am a body, a body that is a vehicle of communication. The body puts us in contact with the outside world. Human beings, thanks to their own *poroi* (Greek for 'the ways in and the ways out'), and therefore by means of their own senses, are in contact with the world. The relationship between space, body and mind is an infinite and continuous interaction. This view places space and body within the dimension of subjectivity. Over the last years, I have become tired of objects representing interfaces between the external world and myself, and I focused on the body as interface. I realized some works that highlight the body as physical input and output in space. *Se Mi Sei Vicino* (If you are close to me) is the work that most satisfies the primary objective because the body of the performer, functioning as a human antenna, is the real interface. When members of the audience come close to or touch the performer, the proximity and the touch of the bodies are registered as electromagnetic activity. The point of departure was the desire to show that the boundaries of the self extend beyond our skin. I wanted to measure human encounters, intersections of our physical being with other physical beings. I was specifically interested in the idea of skin consciousness; in how presence, proximity and touch can redirect the way we understand ourselves and others. Such encounters are visualized and made audible, and the relative distance between the bodies determines what is seen and heard. The generated visuals and sound are a way to draw the audience in, but the interface is about the moment of sharing and contact, when the interaction occurs through our senses.

You also made a long performance titled *As an artist I need to rest* in which your breathing generates and influences the states of being of a digital feather projected on a screen above you. What is it you wanted to achieve or share with the audience?

The performance work *As an artist, I need to rest* results from the tensions in my personal impulses and desires of making art. It is a very intimate piece which confronts me with something I have never done before: an exhausting performance in which I emphasize the creation of my own work in front of the public over a period of time. *As an artist* I place myself in a completely self-possessive role: being in control of my work through my breath. As breathing is one of the few bodily functions that can be controlled both consciously and unconsciously. *I need to rest* to find a symbiosis between myself and the piece. Psychological and physical stamina are required to combat the risk of hyperventilation, in which I might find myself breathing deeper or faster to control the behaviour of the digital feather. During the performance the audience can hear the sound of my respiration becoming more fatigued. In this piece, breath, as the giver of life, represents keeping each other alive, a metaphor of interdependence between the artist and his own creation. Connecting the creation of my work to my own breathing highlights creation as a carnal act of experiencing, and as the vital instinct that can bring the artist into



Sonia Cillari, *As an Artist I Need to Rest*, generative interactive performance, 2009

a continuous state of excitement and frustration. The performative aspect of the piece over time is also very important. The intention is to enter into a certain state of mind, where I can push my body over the limit. I am interested in actions over time because I regard performance as a means of researching mental and physical answers. I like the idea of the audience being in a voyeuristic situation. It is important to confront the audience with this experience. The public has to take the time to see the piece. In fact, *As an artist, I need to rest* confronts me with finding the limits of my body over time, with a long exposure to the public, performing in an intimate situation.

What inspired you to make such a performance?

To highlight creation as a carnal act of experiencing, to emphasize the excitement and frustration in such action. I wanted to question the idea and the role of an artist working with interactive technologies in contemporary art, and to question the way we actually understand interaction in contemporary art. The artist codifies human experiences in numerous sensory languages. This substitution reveals the artist's capacity to feel, envision and believe, becoming sensitive to different kinds of knowing, spatiality and beauty. Technology can help us to extend the present. Peter Weibel once said that the use of technology frees us from instances of reality. By dealing with a real-time generation between my body, as the artist's body, and my interactive work, this piece manifests how the image of one's self and the relationship to one's world is reflected and transformed in interactive works. For me it is important to explore how we, individually, generate empirical concepts of the world, thus relating new impressions to existing ones. In other words: how the interaction between a person and his/her surroundings arises. How we, as perceivers, reconstruct the internal and external worlds by means of our sensory systems, and how our senses achieve the process of consciousness in order to identify these worlds. Against the rationalist notion of objective space and body, the core of my exploration is the creation of sensorial and perceptual mechanisms in immersive and augmented environments to instigate interactive processes. My artistic investigation examines how patterns of consciousness, perception and identity emerge in such settings. A recurring element in my works is an experimental praxis revealing a sense of instability and impermanence. I have always searched for new ways to observe and visualize behaviour. I use interactivity to explore the possibility of distancing oneself from the idea of objective reality.

You want to show the audience that their movements create something, and that these influence other things as well. I can imagine that some people wonder if interactive works are really the best way to convey feelings?

Feelings, communication and interactive strategies, that doesn't sound extraordinary to me. In my work I explore evolutionary and interactive strategies, non-linear behaviours and processes of movement to create communicative spaces that reveal emotional states. I use participation as a continuous mutation of the initial spatial conditions, to get away from the concept of the 'external-to-you' as something invariable. Individual being does not emerge in isolation.



In what way do you feel it is important to enrich our perception with a different spatial sensibility?

Our perception doesn't identify the external world as it really is – organic, fluid, the centre of probabilistic waves – but only in the way the senses allow us to recognize it. We are able to experience the external because of our senses. We need to create environmental stimuli to direct these physical and psychological stages of human behaviour. As the process of becoming aware of the external becomes true by the acquisition of information through sensations, new spatial behaviours need to emerge, creating higher levels of dynamic physical interactions with our environment. Sensing such spatial experiences, thinking about, remembering or evaluating the information, might extend throughout and even beyond the living body.

What direction are you taking now in your new project, *Sensitive to Pleasure*?

*Sensitive to Pleasure* is a performative electrical-field sensing and ambisonics sound environment. It lasts approximately three hours. It will be realized in Amsterdam and Venice. It is an homage to Pygmalion, the sculptor who falls in love with a statue he has made – as told by Ovid in his *Metamorphoses*. The work deals with an inverted relationship of control between the creator and his own creation. It explores the ambiguity of being in love and the physical sensation of pain, which might or might not be pleasant, as well as performing actions that might conflict with personal conscience.

#### Notes

1. Brian Massumi, 'Sensing the Virtual, Building the Insensible', in Stephen Perrella (ed.), 'Hypersurface Architecture', *Architectural Design*, Profile no. 133, vol. 68, no. 5/6, (May–June 1998), p. 17.
2. Humberto R. Maturana, Francisco J. Varela, *Autopoiesis and Cognition, The Realization of the Living* (Dordrecht: Reidel Publishing, 1980), p. 9.

*Sensitive to Pleasure* will be co-produced by STEIM and the Netherlands Media Art Institute in Amsterdam and Claudio Buziol Foundation in Venice. Expected premiere, Summer 2010. The project is supported by the BKVB Fund.

# Mental and Existential Ecology

Juhani Pallasmaa





### Settling the Mind

The task of buildings is usually seen in terms of functional performance, physical comfort and aesthetic values. Yet, the role of architecture extends far beyond the material, physical and measurable conditions and even aesthetic pleasure into the mental and existential sphere of life. Buildings do not merely provide physical shelter and protection; they are also a form of mental mediation between the world and the human consciousness. Architecture structures and articulates existential space. As the French philosopher Gaston Bachelard appropriately states: '[The house] is an instrument with which to confront the cosmos.'<sup>1</sup> In addition to housing our fragile bodies, architecture settles and inhabits our restless minds, memories and dreams. In short, architectural constructions organize and structure our experiences, beliefs, desires, and fantasies of the world; they project distinct frames of perception and experience, and provide specific horizons of understanding and meaning. In addition to articulating space, man-made structures also concretize the passage of time; they represent cultural hierarchies, and give a visible presence to human historicity and the nature of institutions. Grasping the continuum of tradition and understanding our cultural past also enables us to place our confidence in the future. We are primarily biological and historical beings, and architecture needs to protect the very biological and cultural historicity of the human being. Perhaps even more importantly, our constructed world enables us to understand and remember who we are.

### The Measurable and the Immeasurable

The analysis of the mental task of architecture takes us outside physics and physiology, and even beyond psychology, into our unconscious motifs and memories, desires and fears. In addition to structuring the external world, architecture also secretly organizes our inner world, the *Weltinnenraum*, to use the beautiful notion of Rainer Maria Rilke. As a consequence, the mental sphere of architecture cannot be approached by instruments of measurement; its poetic essence is grasped solely through an embodied encounter, intuition and empathy. Poetic signification is always a lived experience and meaning. Architecture focuses on lived experiential essences and mental meanings; this very focus also defines the architect's true approach and method. As Jean-Paul Sartre states: 'Essences and facts are incommensurable, and one who begins his inquiry with facts will never arrive at essences. [...] Understanding is not a quality coming to human reality from the outside, it is its characteristic way of existing.'<sup>2</sup> All artistic works, including architecture, seek this natural mode of existential understanding that is entwined with our very act of being. Consequently, the true essence of architecture does not arise from theoretical knowledge or an aesthetic aspiration; it originates in an existential desire.

Jorge Luis Borges describes memorably the essence of the poetic experience: 'The taste of the apple [...] lies in the contact of the fruit with the palate, not in the fruit itself; in a similar way [...] poetry lies in the meeting of poem and reader, not in the lines of symbols printed on the pages of a book. What is essential is the aesthetic act, the thrill, the almost physical emotion that comes with each reading.'<sup>3</sup> Similarly, the meaning of architecture emerges in the unique encounter of space and the person, in the merging of the world and the dweller's sense of self. In the poetic survey of architecture as well as poetry and other arts, the perceiving and experiencing self, the first person, has to be placed in the centre.

The mental dimension of building is not a mere surplus value on top of utility and reason; it is its very essence. Architecture has never in history arisen purely from material, climatic and economic conditions, as it has always reflected cultural aspirations and ideals. Soulless buildings are detrimental to life regardless of their functional, thermal, ergonomic, acoustic, economic and other qualities, as they fail to root us in our lived reality and to mediate between the world and our consciousness. These buildings do not help us to understand ourselves.

My essay attempts to identify the existential, sensory and embodied ground of architecture that gives rise to a *mental* and existential *ecology*, or to put it another way, the sustainability of mental life.

### Beyond Vision

The art of architecture continues to be regarded, theorized and taught as an art form for the eye. As a consequence, it is dominated by considerations of retinal qualities, such as visual composition, harmony, proportion, and novelty of the visual image. The dominance of vision has never been stronger than in our current era of the visual image and its industrial mass production, 'an unending rainfall of images', as Italo Calvino puts it.<sup>4</sup> As a consequence of this biased emphasis, buildings are turning into objects of momentary visual seduction, and they are losing their sense of presence, plasticity and hapticity. They have turned into aestheticized objects and commercial icons that are viewed externally rather than lived as inseparable parts of our awareness and sense of life. Buildings are also increasingly objects of admiration instead of being 'instruments to confront the cosmos', as Bachelard suggests. A profound building makes us marvel at the magnificence of the world – gravity, silence, light and life – not admire the building itself as an aestheticized object.

Today's unfortunate situation is further strengthened by the development of building processes, techniques and materials towards generic uniformity and detachment from the specificities of place and culture, as well as obsessive objectives of economy and instant gratification. Besides, today architecture aspires to rival other artistic media, such as cinema and rock music, but we need to acknowledge that architecture is fundamentally a slow and silent background phenomenon that frames human experience and gives it specific horizons of meaning. This silent presence is the special and monumental power of the art of architecture.

The sensory and mental impoverishment of contemporary retinally biased environments has made it clear that profound architecture is a multisensory art form; buildings need to address our senses of hearing, touch, smell and, even taste, as much as please the eye. They need to provide us with our corner in the world, instead of mere visual titillation. Maurice Merleau-Ponty argues strongly for the integration of the senses: 'My perception is [therefore] not a sum of visual, tactile, and audible givens: I perceive in a total way with my whole being: I grasp a unique structure of the thing, a unique way of being, which speaks to all my senses at once.'<sup>5</sup> The true wonder of our perception of the world is its completeness, continuity and constancy regardless of the fragmentary and composite nature of our observations. Meaningful architecture facilitates and supports this extraordinary and unexpected experience of completeness.

The current loss of hapticity, sense of intimacy and nearness has particularly negative consequences as it evokes experiences of alienation, rejection and distance. These experiences give rise to the feeling of 'existential outsidership', to use a notion of Edward Relph.<sup>6</sup> In order to root us in our world, buildings need to go beyond sensory comfort and pleasure into the very enigma of human existence. 'Writing is literally an existential process', Joseph Brodsky the poet argues, and the same must definitely be said of architecture.<sup>7</sup>

### Primacy of Touch: Hapticity of Self-image

All the senses, including vision, are extensions of the tactile sense; the sense organs are specializations of skin tissue, and all sensory experiences are fundamentally modes of touching, and thus related to tactility. 'Through vision we touch the sun and the stars', as Martin Jay poetically remarks in reference to Merleau-Ponty.<sup>8</sup> Our contact with the world takes place at the boundary line of the self through specialized parts of our enveloping membrane. The sense of self and identity does not stop at the surface of the skin, as we are part of the world and the world contributes to our understanding of ourselves.

Based on medical evidence, the view of the anthropologist Ashley Montagu confirms the primacy of the haptic realm, '[The skin] is the oldest and the most sensitive of our organs, our first medium of communication, and our most efficient protector [...] Even the transparent cornea of the eye is overlain by a layer of modified skin [...] Touch is the parent of our eyes, ears, nose, and mouth. It is the sense, which became differentiated into the others, a fact that seems to be recognized in the age-old evaluation of touch as "the mother of the senses"'.<sup>9</sup>

In their book *Body, Memory and Architecture*, an early study in the embodied essence of architectural experience, Kent C. Bloomer and Charles Moore similarly emphasize the primacy of the haptic realm: 'The body image [...] is informed fundamentally from haptic and orienting experiences early in life. Our visual images are developed later on, and depend for their meaning on primal experiences that were acquired haptically'.<sup>10</sup>

Touch is the sensory mode that integrates our experiences of the world and of ourselves. Even visual perceptions are fused and integrated into the haptic continuum of the self; my body remembers who I am and how I am located in the world. In Marcel Proust's *In Search of Lost Time: Swann's Way*, the protagonist, waking up in his bed, reconstructs his identity and location through his body memory:

'My body, still too heavy with sleep to move, would endeavour to construe from the pattern of its tiredness the position of its various limbs, in order to deduce therefrom the direction of the wall, the location of the furniture, to piece together and give a name to the house in which it lay. Its memory, the composite memory of its ribs, its knees, its shoulder-blades, offered it a whole series of rooms in which it had at one time or another slept, while the unseen walls, shifting and adapting themselves to the shape of each successive room that it remembered, whirled round it in the dark. [...] My body, would recall from each room in succession the

style of the bed, the position of the doors, the angle at which the sunlight came in at the windows, whether there was a passage outside, what I had had in mind when I went to sleep and found there when I awoke.'<sup>11</sup>

Proust's description provides a powerful example of the intertwining of the body, memory and space. My body is truly the navel of my world, not in the sense of the viewing point of a central perspective, but as the sole locus of integration, reference, memory and imagination.

### The Unconscious Touch

We are not usually aware that an unconscious experience of touch is unavoidably concealed in vision. As we look, the eye touches, and before we even see an object, we have already touched it and judged its weight, temperature and surface texture. Touch is the unconsciousness of vision, and this hidden tactile experience determines the sensuous qualities of the perceived object. The unconscious sense of touch mediates messages of invitation or rejection, nearness or distance, pleasure or repulsion. It is exactly this unconscious dimension of touch in vision that is disastrously neglected in today's retinal and hard-edged architecture. This architecture may entice and amuse the eye, but it does not provide a domicile for our bodies and minds.

The haptic fusion with space and place surpasses the need for physical comfort and the mere desire to touch. Bachelard recognizes the desire for a total merging of the self and the house through a bodily intertwining as he writes: 'Indeed, in our houses we have nooks and corners in which we like to curl up comfortably. To curl up belongs to the phenomenology of the verb to inhabit, and only those who have learned to do so can inhabit with intensity'.<sup>12</sup> The pleasure of curling up also suggests an unconscious association between the images of room and womb; a protective and pleasurable room is a constructed womb, in which we can re-experience the undifferentiated oceanic world of the child, the forgotten infant concealed in our adult bodies. Today's architecture, however, tends to offer mere wombs of glass for us to inhabit.

### The Simultaneity of the Senses

'We see the depth, speed, softness and hardness of objects – Cézanne says that we see even their odor. If a painter wishes to express the world, his system of color must generate this indivisible complex of impressions, otherwise his painting only hints at possibilities without producing the unity, presence and unsurpassable diversity that governs the experience and which is the definition of reality for us', Merleau-Ponty writes emphatically.<sup>13</sup> In further developing Goethe's notion of 'life-enhancing art' in the 1890s, Bernard Berenson suggested that when experiencing an artistic work we actually imagine a genuine physical encounter through 'ideated sensations'. The most important of these ideated sensations Berenson called 'tactile values'.<sup>14</sup> In his view, a work of authentic art stimulates our ideated sensations of touch, and this stimulation is life-enhancing.

In my view, a profound architectural work also generates an indivisible complex of impressions, or ideated sensations, such as experiences of movement, weight, tension, texture, light, colour, formal counterpoint and rhythm, and they become the measure of the real for us. Even more importantly, they become unconscious extensions of our body and consciousness. When entering the courtyard of the Salk Institute in La Jolla, California, a couple of decades ago, I felt compelled to walk directly to the nearest concrete surface and sense its temperature; the enticement of a silken skin suggested by this concrete material was overpowering. Louis Kahn, the architect of this masterpiece, actually sought the grey softness of 'the wings of a moth',<sup>15</sup> and added volcanic ash to the concrete mix in order to achieve this extraordinary mat softness. 'Art must give suddenly all at once, the shock of life, the sensation of breathing', as Constantin Brancusi argues.<sup>16</sup>

True architectural quality is manifested in the fullness, freshness and unquestioned prestige of the experience. A complete resonance and interaction takes place between the space and the experiencing person. This is the aura of a work of art observed by Walter Benjamin.<sup>17</sup>

### Space and the Self

Our normal understanding of space, the commonplace naïve realism, regards space as a measureless, infinite and homogenous emptiness in which objects and physical events take place. Space itself is seen as a meaningless continuum; signification is assumed to lie solely in the objects and events occupying space. The assumption that environment and space are neutral concepts existing outside man thus continues to be axiomatic in everyday life. Yet, it is precisely this separation of man and environment that anthropologist Edward T. Hall views as one of the most destructive unconscious cornerstones of Western thinking.<sup>18</sup>

One of the most influential thinkers to point out the essential existential connection between space and the human condition, the world and the mind, was Martin Heidegger. He also paid attention to the connectedness – or perhaps we should say, the unity – between the acts of building, dwelling, and thinking. He links space indivisibly with the human condition: 'When we speak of man and space, it sounds as though man stood on one side, space on the other. Yet space is not something that faces man. It is neither an external object nor an inner experience. It is not that there are men, and over and above them space [...].'<sup>19</sup>

Surely, we do not exist or dwell detached from space, or in an abstract and valueless space; we always occupy distinct settings and places that are intertwined with our very consciousness. Lived space always possesses specific characteristics and meanings. Space is not inactive; space either empowers or weakens, charges or discharges. It has the capacity to unify or isolate, embrace or alienate, protect or threaten, liberate or imprison. Space is either benevolent or malicious in relation to human existence.

The world around us is always organized and structured around distinct *foci*, such as concepts and experiences of homeland, domicile, place, home and self. Moreover, our specific intentions organize space and project specific meanings onto it. Even one's mother tongue, and unconscious notions of above and below, in front and behind, before and after, affect our understanding and utilization of space in

specific and pre-conditioned ways. So, even space and language are intertwined. As we settle in a space, it is grasped as a distinct place. In fact, the act of dwelling is fundamentally an exchange; I settle in the place and the place settles in me. This merging of space and self is one of the founding ideas of Maurice Merleau-Ponty's philosophy that offers a fertile conceptual ground for the understanding of artistic, architectural, and existential phenomena.

### Lived Existential Space

We do not live in an objective world of matter and facts, as commonplace naïve realism assumes. The characteristically human mode of existence takes place in worlds of possibilities, moulded by our capacities of memory, fantasy and imagination. We live in mental worlds, in which the material and the spiritual, as well as the experienced, remembered and imagined fuse completely into each other. As a consequence, the lived reality does not follow the rules of space and time, as defined and measured by the science of physics. We could say that the lived world is fundamentally 'unscientific' when assessed by the criteria of empirical science. In its diffuse character, the lived world is closer to the oscillating realm of dreams than scientific descriptions. In order to distinguish the lived space from physical and geometrical space, it can appropriately be called existential space. Existential space is structured by meanings, intentions and values reflected upon it by an individual or a group, either consciously or unconsciously; existential space is a unique quality interpreted through human memory and experience. On the other hand, groups or even nations share certain characteristics of existential space that constitute their collective identities and sense of togetherness. The experiential and lived space – not physical or geometric space – is also the ultimate object and context of both the making and experiencing of architecture. The task of architecture is 'to make visible how the world touches us', as Merleau-Ponty wrote of the paintings of Paul Cézanne.<sup>20</sup> In accordance with this seminal philosopher, we live in the 'flesh of the world', and architecture structures and articulates this existential flesh, giving it specific meanings. I wish to suggest that it is architecture that tames and domesticates the space and time of the flesh of the world for the purposes of human habitation. We know and remember who we are, and where we belong fundamentally through human constructions, both material and mental.

### The World and the Mind:

#### Boundaries of Self and Embodied Consciousness

'How would the painter or the poet express anything other than his encounter with the world?' asks Maurice Merleau-Ponty.<sup>21</sup> How could the architect do otherwise, we can ask with equal justification. Art and architecture structure and articulate our being-in-the-world, or the inner space of the world (*Weltinnenraum*), to use the notion of Rainer Maria Rilke.<sup>22</sup> A work of art does not mediate conceptually structured knowledge of the objective state of the world, but it renders possible an intense experiential and existential self-knowledge. Without presenting any precise propositions concerning the world or its condition, art focuses our view on the boundary surface between our sense of self and the world.



In the text that he wrote in memory of art critic Herbert Read in 1990, Salman Rushdie writes about the weakening of this boundary that takes place in an artistic experience: 'Literature is made at the boundary between self and the world', he writes, 'and during the creative act this borderline softens, turns penetrable and allows the world to flow into the artist and the artist to flow into the world.'<sup>23</sup> In fact, as we feel confident, protected and stimulated enough to settle in a space, we likewise allow the boundary between ourselves and the space to soften and become sensitized. All art articulates this very boundary surface in the experience of both the artist and the viewer. In this sense, architecture is not only a shelter for the body, but it is also the contour of the consciousness, and an externalization of the mind.

Human consciousness is an embodied consciousness; the world is structured around a sensory and corporeal centre. 'I am my body', claims Gabriel Marcel;<sup>24</sup> 'I am what is around me', argues Wallace Stevens;<sup>25</sup> and 'I am the space, where I am', states the poet Noel Arnaud.<sup>26</sup> Finally, Ludwig Wittgenstein concludes 'I am my world'.<sup>27</sup>

### The Task of Art

As the consumer and media culture of today consists of increasing manipulation of the human mind in the form of thematized environments, commercial conditioning and numbing entertainment, art has the ethical mission to defend the autonomy of individual experience and provide the existential ground for the human condition. One of the tasks of art and architecture is to safeguard the authenticity of the human experience.

The settings of our lives are irresistibly turning into mass-produced and universally marketed kitsch. In my view, it would be ungrounded idealism to believe that the course of our obsessively materialist culture could be altered within the foreseeable future. But it is exactly because of this critical view that the ethical task of artists and architects, the defence of the authenticity of life and experience, is so important. In a world where everything is becoming similar and, eventually, insignificant and of no consequence, art has to maintain differences of meaning, and in particular, the true criteria of experiential quality.

'My confidence in the future of literature consists in the knowledge that there are things that only literature can give us, by means specific to it', writes Italo Calvino in his *Six Memos for the Next Millennium*,<sup>28</sup> and he continues (in another chapter): 'In an age when other fantastically speedy, widespread media are triumphing, and running the risk of flattening all communication onto a single, homogenous surface, the function of literature is communicating between things that are different simply because they are different, not blunting but even sharpening the differences between them, following the true bent of written language.'<sup>29</sup>

In my view, the task of architecture is to maintain the differentiation and qualitative articulation of existential space. Instead of participating in the processes of homogenization of space and the further speeding up of human experience, architecture needs to slow down experience, halt time, and defend the natural slowness of human perception. Architecture must defend us against excessive stimuli, noise and speed. Yet, the most profound task of architecture is to maintain and defend silence. 'Nothing has changed the nature of man so much as the loss of silence', warns Max Pickard, the philosopher of silence.<sup>30</sup>

'Only if poets and writers set themselves tasks that no one else dares imagine will literature continue to have a function', states Calvino. 'The grand challenge for literature is to be capable of weaving together the various branches of knowledge, the various codes into a manifold and multifaceted vision of the world.'<sup>31</sup>

Confidence in the future of architecture can, in my view, be based on the very same knowledge; existential meanings of inhabiting space can be wrought by the art of architecture alone. Architecture continues to have a great human task in mediating between the world and ourselves, providing a horizon for understanding our existential condition and constructing settings for dignified life.

### Notes

1. Gaston Bachelard, *The Poetics of Space* (Boston: Beacon Press, 1969), p. 46.
2. Jean-Paul Sartre, *The Emotions: An Outline of a Theory* (New York: Carol Publishing Co., 1993), p. 9.
3. Jorge Luis Borges, *Selected Poems 1923–1967* (London: Penguin Books, 1985). As quoted in Sören Thurell, *The Shadow of A Thought – The Janus Concept in Architecture* (Stockholm: School of Architecture, The Royal Institute of Technology, 1989), p. 2.
4. Italo Calvino, *Six Memos for the Next Millennium* (New York: Vintage Books, 1988), p. 57.
5. Maurice Merleau-Ponty, 'The Film and the New Psychology', in Maurice Merleau-Ponty, *Sense and Non-Sense* (Evanston: Northwestern University, 1964), p. 48.
6. Edward Relph, *Place and Placelessness* (London: Pion Limited, 1976), p. 51. Relph defines the notion as follows: 'Existential outsidership involves a self-conscious and reflective uninvolvement, an alienation from people and places, homelessness, a sense of the unreality of the world, and of not belonging.'
7. Joseph Brodsky, *Less than One* (New York: Farrar Straus Giroux, 1986), p. 124.
8. As quoted in David Michael Levin (ed.), *Modernity and the Hegemony of Vision* (Berkeley, Los Angeles, London: University of California Press, 1993), p. 14.
9. Ashley Montague, *Touching: The Human Significance of the Skin* (New York: Harper & Row, 1968 (1971)), p. 3.
10. Kent C. Bloomer and Charles Moore, *Body, Memory and Architecture* (New Haven and London: The Yale University Press, 1977), p. 44.
11. Marcel Proust, *In Search of Lost Time, Volume 1: Swann's Way*, trans. C.K. Scott Moncrieff & Terence Kilmartin (London: Vintage, 1996), pp. 4–5.
12. Gaston Bachelard, op. cit., p. XXXIV.
13. Maurice Merleau-Ponty, 'Cézannes's Doubt', in Merleau-Ponty, *Sense and Non-Sense* (Evanston: Northwestern University Press, 1991), p. 15.
14. Bernard Berenson, as quoted in Ashley Montagu, *Touching: The Human Significance of the Skin* (New York: Harper & Row, 1986), pp. 308–9. Somewhat surprisingly, in my view, Merleau-Ponty objects strongly Berenson's view: 'Berenson spoke of an evocation of tactile values, he could hardly have been more mistaken: painting evokes nothing, least of all the tactile. What it does is much different, almost the inverse; thanks to it we do not need a 'muscular sense' in order to possess the voluminosity of the world [...]. The eye lives in this texture as a man lives in his house.' I cannot, however, support this argument by Merleau-Ponty. Experiencing the temperature and humidity of the air and hearing the noises of carefree daily life in the erotically sensuous paintings of Matisse or Bonnard, one is confirmed of the reality of ideated sensations. Maurice Merleau-Ponty, 'Eye and Mind', in *The Primacy of Perception* (Evanston: Northwestern University Press, 1964), p. 166.
15. As quoted in Scott Poole, 'Pumping Up: Digital Steroids and the Design Studio', unpublished manuscript, 2005.
16. Quoted by Dorothy Dudley in 'Brancusi', in *Dial*, no. 82 (February 1927). As republished in Eric Shanes, Brancusi (New York: Abbeville Press, 1989).
17. See Andrew Benjamin and Peter Osborne (eds.), *Walter Benjamin's Philosophy: Destruction and Experience* (London and New York: Routledge, 1994).
18. Mildred Reed Hall and Edward T. Hall, *The Fourth Dimension in Architecture: The Impact of Building Behavior* (Santa Fe: Sunstone Press, 1995).
19. Martin Heidegger, 'Building Dwelling Thinking', in David Farrell Krell (ed.), *Martin Heidegger: Basic Writings* (New York, Hagerstown, San Francisco, London: Harper & Row, Publishers, 1997), p. 334.
20. Maurice Merleau-Ponty, 'Cézanne's Doubt', op. cit., p. 19.
21. Maurice Merleau-Ponty, *Signs*, as quoted in Richard Kearney, *Maurice Merleau-Ponty, Modern Movements in European Philosophy* (Manchester and New York: Manchester University Press, 1994), p. 82.
22. Liisa Enwald, 'Lukijalle', Rainer Maria Rilke, *hijainen taiteen sisin: kirjeitä vuosilta 1900–1926* [The silent innermost core of art: letters 1900–1926] (Helsinki: TAI-teos, 1997), p. 8.
23. Salman Rushdie, *Eikö mikään ole pyhää?* [Isn't anything sacred?] (Helsinki: Parnasso, 1996), p. 8.
24. As quoted in 'Translator's Introduction' by Hubert L. Dreyfus and Patricia Allen Dreyfus, in Merleau-Ponty,

- Sense and Non-Sense* (Evanston: Northwestern University Press, 1964), p. XII.
25. Wallace Stevens, 'Theory', in *The Collected Poems* (New York: Vintage Books, 1990), p. 86.
  26. As quoted in Gaston Bachelard, *op. cit.*, p. 137.
  27. Ludwig Wittgenstein, *Tractatus Logico-Philosophicus eli Loogis-filosofinen tutkielma* (Porvoo and Helsinki: Werner Söderström Oy, 1972), p. 68.
  28. Italo Calvino, *op. cit.*, p. 1.
  29. *Ibid.*, p. 112.
  30. Max Picard, *The World of Silence* (Washington, D.C.: Regnery Gateway, 1988), p. 221.
  31. Italo Calvino, *op. cit.*, p. 45.



# Diller + Scofidio Blur Building Yverdon-les-Bains 2002

The *Blur Building* was an exhibition pavilion designed by Diller + Scofidio that was built for the Swiss Expo 2002 on Lake Neuchâtel in the town of Yverdon-les-Bains. It took the form of a lightweight tensegrity structure measuring about 90 metres wide, 60 metres long and 23 metres high that was supported by four columns and hovered above the water surface. Water was pumped from the lake and sprayed as a fine mist through a dense array of many thousands of high-pressure mist nozzles. A smart weather system read the shifting climatic conditions of temperature, humidity, wind speed and direction, and regulated the water pressure. The public could approach *Blur* via a 120-metre-long ramped bridge, which led to a large open-air platform where movement was unregulated. Visual and acoustical references were erased during the journey through the fog, leaving only an optical whiteout and the white noise of pulsating water nozzles. *Blur* was an architecture of atmosphere, a space-less, formless, feature-less, depth-less, scale-less, mass-less, surface-less and dimension-less habitable medium. Contrary to immersive environments that strive for high-definition visual fidelity, *Blur* was decidedly low-definition: there was nothing to experience but the dependence on vision itself.

Client: EXPO 02 by extasia  
 Architect: Diller + Scofidio  
 Principals: Elizabeth Diller, Ricardo Scofidio  
 Project Architects: Dirk Hebel, Charles Renfro  
 Engineers: Passera & Pedretti, Emch & Berger (structural) Toni Reisen (mechanical)  
 Media Collaborator: Ben Rubin, EAR Studio  
 Media Associate: Mark Wasiuta

*Blur* was part of the Arteplage Yverdon-les-Bains for the Swiss EXPO 02. Several architects and artists founded the collaborative group *extasia*, which won the competition for the site in Yverdon.



Diller + Scofidio, **Blur Building**, exposition pavilion for Swiss Expo, Yverdon-les-Bains, 2002.





Night view of Diller + Scofidio, **Blur Building**, exposition pavilion for Swiss Expo, Yverdon-les-Bains, 2002.



Diller + Scofidio, **Blur Building**, exposition pavilion for Swiss Expo, Yverdon-les-Bains, 2002.





Areal view of Diller + Scofidio, **Blur Building**, exposition pavilion for Swiss Expo, Yverdon-les-Bains, 2002.





Diller + Scofidio, **Blur Building**, exposition pavilion for Swiss Expo, Yverdon-les-Bains, 2002.

# Techno-poetry of Augmented Reality and Interactive Architecture

Interview with Daan Roosegaarde  
Arie Altena

One late summer's day, I visited Daan Roosegaarde's studio, a warehouse on an industrial site just outside Waddinxveen. In the last two years, Roosegaarde's career has taken off like a rocket; ten people now work in his studio developing and realizing his projects. Brimming with energy and infectious enthusiasm, he shows me around the warehouse. Here they store ready-made modules for his interactive installations, like *Dune* and *Liquid Space*, work on prototypes, and test innovative materials. Daan Roosegaarde's work is exhibited all over the world and he flies regularly to the United States and Asia. He has become a true artist-entrepreneur because of his method of working. The artistic concepts he seeks to realize require this type of dedication.

Experience is central to your work, it's all about what you feel and perceive. Is this more important than the discursive meaning of a piece?

My work is about stimulating connections and making people aware of them. We live in a relational society: your relational network determines who you are. Being able to build relationships and knowing how to fine-tune them is extremely important. If you walk through a tunnel and *Dune* reacts to you, then you become aware of your own body, of your relationship to other people, and of your relationship to architecture. *Liquid Space* was more successful at the Oerol Festival on the island Terschelling compared to the STRP Festival in Eindhoven. This was because of the context. It was located outside, surrounded by nature, with the result that the public attributed all sorts of natural properties to an artificial installation. This is the type of narrative I'm trying to encourage; it gives meaning to a piece. I make a work of art, visitors become participants, I watch them, and I learn. I engage the audience from the moment they first experience something. The first reaction you want is 'Wow!' – the old grey matter keeps on working even then – a dialogue starts between the work and the participant. In a way I make unfinished films and visitors have the starring role. *Liquid Space* is concerned with something that people think is alive: conveying a natural feeling by means of something artificial, and people will experience it as an extension of themselves. It's comparable to an escalator that you can also experience as an extension of the body. Your body adjusts to it, adapts itself. This is something you feel if you walk up an escalator that isn't working.

It's about incorporating technology, you make it tangible and you anticipate it?

I am interested in how technology develops in a natural way, how technology can dramatically change reality without us being aware of it because we adapt to it. Technology has resulted in a new nature: it is *supernatural*. It contains a poetry, techno-poetry. It's very interesting to see what happens when technology crawls off the screen and becomes part of the world around us. I want to encourage people to think about things like Augmented Reality by letting them experience it. Art provides a redefinition of reality and asks, 'Is this what we want?' It's bizarre that people feel threatened when they walk through a tunnel where hundreds of cameras are observing them, while they just love it when they see 10,000 light fibres light up,



Studio Roosegaarde, **Dune 4.2**, permanent interactive landscape beside the river Maas in Rotterdam, 2009.



Studio Roosegaarde, **Dune 4.2**, permanent interactive landscape beside the river Maas in Rotterdam, 2009.





Studio Roosegaarde, **Liquid Space 6.1**, public interactive artwork placed on the island Terschelling for Atelier Oerol, 2009.

as happens in *Dune*. This is the power and provocation of design. The role of the new media artist is to give meaning to these types of developments. Who else will do it otherwise? As an artist you do this by engaging with the world.

Is this why you think it so important that *Dune* is located in the public space?

‘That is key. And I didn’t rest until we achieved this. *Dune* was developed for the public space. It has been exhibited about 70 times, usually in as public a space as possible. The corridor at the Netherlands Media Art Institute (NIMk) in Amsterdam and the Maastunnel in Rotterdam are examples of this. *Dune 4.2* is permanently installed on the banks of the Maas River in Rotterdam. It is a wonderful example of a work that claims its own space and makes a place for itself. If you read Mondrian’s writings about his hope that art and life would merge, how he wanted to manifest that art in society, he’s not talking about museums, but about work that is truly part of the world. And that is precisely why we seek out public spaces: my most recent media art is about our world in the here and now, and is concerned with art, culture, creative industries, daily life, media and industry.

Your engagement with the world is extremely positive. You don’t create technological installations that scare people.

Yes, that’s a choice. People talk about technology as something to be feared, but it’s better to focus on the good things you can do with technology. To quote Kevin Kelly: ‘Technology is everything which was invented after you were born’. I believe that you can make technology your own by conducting a relationship with it and by provoking engagement with it. And in the same way, you can lay claim to artistry and autonomy in your work with technology. Things only become worse if you close the door in its face.

In your work, you introduce a possible future with spaces that respond to you, spaces that feel what you feel and think.

That future is already here. It just has to be completed. In a strange way I have already visited the future, I already know it. Flexible screens, 3-D printing, Augmented Reality, StreetView – all of these are already here. I’m more interested in bringing the future into the present and pushing it a centimetre further. I’m not that interested in futurism, the ‘what-if’ question. I’m interested in the poetry of it. I want to make it tangible; I want people to touch it. The way we look at black-and-white television now is the way we will look at ‘dead’ objects in the future, objects that don’t have any sensors and don’t react to outside input. This is what Augmented Reality is very much concerned with. But the key question is, who is going to make it, and who has control over it? Who has the agency? Look at how people use their iPhones. Technology is so much a part of our social identity. It’s going to speak our language; it’s becoming more and more simple. I’d like to see a real merging. I’d like to see it become so accessible and understandable that people can play with it themselves. I believe in co-control.

It's tremendously important for you that the work is not about technology...

I am not interested in techniques – for me they are merely tools. An installation of mine has to work perfectly, because it has to be about the question of what it generates, what it stirs up – it has to transcend media. My work has aesthetic value because that way I can lure people in; the users have to be unconsciously seduced. Once they're inside, I can enter into a dialogue with them, manipulate them, make a point, make them conscious of something, make them do things they wouldn't otherwise do, but that they experience as natural. Technology is so important now because it's such a significant part of who we are, because it has so many mediating qualities. I also find it exciting because you can make things that are never finished, things that encourage interaction. A lot of so-called interactive art is not interactive; it's only responsive. Interactive means if you give the work a slap, it will slap you back. This is how you construct a story, and then you can stimulate social engagement.

How do you work with space?

I would like to create spaces that are not finished, spaces that have a sort of openness in relation to the user. Space is everywhere; we define space by erecting walls, doors and windows, but what is a wall exactly? Is it a mediator? A partition? Is it permeable? I am interested in the mediatory properties of space: then it is concerned with the relationship between humans and space and between people themselves. Architecture is frequently busy restricting human behaviour: there are requirements a building has to meet, and things that are not allowed. I am particularly interested in the opposite: what a building should generate in its occupants.

You also studied architecture...

I was one of the first non-architects to attend the MA architecture course at the Berlage Institute. At a workshop the architect Rem Koolhaas once said to me: 'Daan, you'll never be an architect'. I thought, 'Perhaps that's true, but it doesn't mean I can't make architecture!' I enjoy working at the interface between art, design and architecture and that I am embraced and vilified by all three of these disciplines. I'm convinced that within five years we'll create architecture, and that within ten years we'll grow architecture with self-generating materials; then there will no longer be a need for design.

On the same afternoon I also interviewed Daan Roosegaarde about the fashion project *Intimacy*. This part of the interview is published online by V2\_ Institute for the Unstable Media as 'Fashion that Compels Intimacy' in a translation by Laura Martz ([www.v2.nl/archive/articles/fashion-transparency-intimacy](http://www.v2.nl/archive/articles/fashion-transparency-intimacy)). Some parts of this text overlap with the V2\_ interview. Re-used with kind permission of V2\_.

# The Diorama Revisited

Erkki Huhtamo

As I write this, there are 2583 dioramas for sale on eBay, including ‘Martha Stewart’s Pipe Cleaner Farm Kit with Diorama’, a ‘Frankenstein Resin Model Diorama’, ‘Vintage Glass Ball Ornament with Santa Inside (Diorama)’, a ‘1948 Ford Lightning Diorama Scene from “Grease”’, and ‘Star Wars Jabba’s Palace 3-D Display Diorama’. Behind their seemingly endless variety, most of them share at least one feature: they are miniature models for collectors. Many of them belong to branded product-clusters like Star Wars, Harry Potter or Barbie. Some are delivered ready for display, while others come as kits to be assembled by the buyer. Additional parts – tiny houses, miniature objects, action figurines – are often available, locking the customer to the brand and cycles of consumption, but also opening expressive possibilities: much like a doll house (a prototypical miniature diorama) or *The Sims* (with its supply of Expansion Packs and Stuff Packs), such dioramic microworlds can be expanded and customized.

Such are the things most people today understand by ‘diorama’. Yet, it has not always been like this. Since its appearance the concept has undergone transformations and translocations that have profoundly affected its meaning. When the Diorama was first introduced in the early nineteenth century, it referred to things that were overwhelmingly large, awe-inspiring, and mysterious, rather than miniaturized gadgets for private users. Dioramas were public spectacles for the eyes only; not toys for one’s fingertips. The vicissitudes of the word diorama demonstrate that the relationship between concepts and the things they refer to is anything but constant. Concepts mutate as they migrate within cultural processes. Their routes are winding and difficult to trace, their appearances unpredictable. As they move from one discursive formation to another, they become attached to new objects (material as well as immaterial), and these may be very different from the original ones.

This article traces the cultural trajectories of the diorama from its nineteenth-century origins to its recent manifestations, like those encountered on eBay. It goes without saying that such an undertaking can never be complete. The resulting ‘map-o-rama’ contains blank areas that can be bridged only by imagination and speculation. Trying to catch the diorama at various stages of its travels through the labyrinthine landscapes of history, this article develops an archaeology of artificial spaces.

### The Diorama Enters the Stage

In 1821 the Parisian *Journal de Commerce* announced a forthcoming attraction: ‘We have Panoramas, Cosmoramas, Panstereoramas, a Diaphanorama, and soon we will also have a Diorama.’<sup>1</sup> As this statement demonstrates, the Diorama was born into a pre-existing context of ‘o-ramas’, novelty visual spectacles. The o-rama phenomenon had begun to develop more than a quarter of a century earlier, when the Irish painter Robert Barker introduced his Panorama. Barker’s patented spectacle was a large-scale circular painting displayed in a custom-designed rotunda. The panorama surrounded its audience with an illusionary 360-degree environment. Its success encouraged others to concoct formulas that would profit from its features, but also improve upon its shortcomings, such as the lack of movement. Among the numerous hopefuls were two Frenchmen, the scene painter

Louis Jacques Mandé Daguerre (1781–1851) and the artist Charles Marie Bouton (1781–1853). Their creation, the Diorama, opened its doors to the public in Paris in 1822, and was followed by a similar establishment in London the following year. It persisted in cultural memory not only because of its success, but also thanks to Daguerre’s fame.<sup>2</sup> The role of Bouton may have been equally or even more important, yet it is Daguerre who is remembered because of the Daguerriotype, the early photographic process he developed with Joseph Nicéphore Niépce (1765–1833) and to which he managed – after Niépce’s death – to give his name.<sup>3</sup>

Daguerre and Bouton were thoroughly familiar with the preceding spectacles. Evoking the coining of the word panorama (pan+horama = all+view), the name they chose was also a neologism, combined from the Greek roots dia (through) and horama (view). And just like the Panorama, the Diorama was also a building that functioned as a viewing machine. It was a kind of theatre without actors and storylines, ‘partly optical, partly mechanical’.<sup>4</sup> The audience was placed in a sloping amphitheatre that was mechanically rotated around its axis between two viewing positions. Each program consisted of two gigantic (circa 22 x 14 metre) canvases positioned in tunnel-like stage openings. One of them normally depicted an exterior and the other an interior. The best-remembered subjects are views of Swiss mountain valleys and cathedral and chapel interiors. After one of the paintings had been observed for about fifteen minutes, a bell would ring, and the auditorium rotated – by means of a crank-operated mechanism hidden underneath – until it faced the other opening.

Beside the awe-inspiring size and accuracy of the paintings, the appeal of the Diorama was based on the trick of atmospheric transformations. A huge linen sheet was painted partly with opaque, partly with translucent colours. During the performance an alternation between direct and reflected light was produced by means of hidden windows (above and behind the canvas), as well as by a system of coloured screens, shutters, pulleys and counterweights. This arrangement made gradual changes possible – the sun would rise and the shadows move across the landscape. The repertory of dioramic effects was enhanced further by the invention of the double-effect diorama in 1834. The canvas was now painted on both sides, with partly different elements on each side. Much more dramatic decompositions of forms and longer temporal transformations became possible.<sup>5</sup> Humans and other objects could be made to appear and disappear by means of hidden lamps.

The Diorama was generally considered as something extraordinary.<sup>6</sup> A comment by an early visitor named Nathaniel S. Wheaton was typical: ‘Never was optical illusion more complete. I tried every possible way to possess myself of the feeling, that the scene before me [a view of the interior of the Canterbury Cathedral] was a painting on a plain surface; but without success.’<sup>7</sup> Some visitors suspected they were witnessing a large-scale physical model and performed ‘reality checks’, throwing small objects toward the representation to find out its true nature. The rotating auditorium also elicited comments, but they were more mixed. Some spectators found it hard to judge whether it was the auditorium or the paintings themselves that were in motion. A journalist writing under the pseudonym Jacob Goosequill claimed that the rotating auditorium caused him ‘awkward’ physical sensations, distracting his attention from the views themselves.<sup>8</sup>



### Dioramic Shows, but not Quite

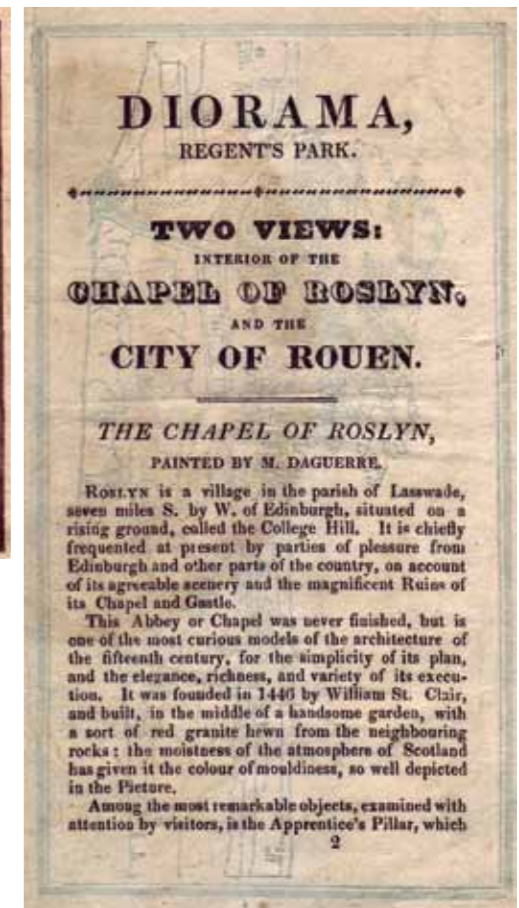
The Diorama inspired more or less similar establishments in cities from Stockholm to Madrid and all the way to Havana. Although most of these were relatively short-lived, the word survived and was applied to other kinds of attractions as well. These second generation dioramas often had little to do with Daguerre's and Bouton's majestic creation. Roadshow versions travelled across North America, and even modest peepshows were marketed under the grandiose title.<sup>9</sup> Among the plethora of dioramic curiosities there was even a 'dental diorama.' It was promoted by its owner during the American Civil War as follows: 'DIORAMA AND PANORAMA. – A Panorama is a passing view, Diorama an animated view; a real Diorama is to be seen gratis at the Dental Museum of N.B. Griffin & Bros., No. 258 Grand St, New York. Here is motion, animation, all but life. Here is the acme of art. It is more than a Diorama; it is the dead alive grinning and laughing like nature herself.'<sup>10</sup>

In the second half of the nineteenth century the word diorama was used for both moving panoramas and magic lantern shows. Moving panoramas were large, very long roll paintings presented in theatre-like settings, accompanied by a lecture, music and sound effects. It became commonplace to include a few translucent, backlit dioramic sequences ('prairie on fire', et cetera) in the painted panorama roll. The commonly used hybrid name 'moving diorama' was, however, a misnomer, because most of the 'miles'-long panorama had been painted on normal opaque canvas. When it was applied to the magic lantern show, 'diorama' referred to dissolving views, a format that may indeed have been inspired by Daguerre's and Bouton's Diorama. By using a pair of identical magic lanterns or a biunial (a magic lantern with two optical tubes), lantern slides could be 'dissolved' into each other. Familiar dioramic effects, such as the day turning into night, were thus produced in a cheaper and less work-intensive way.

The semantic drift of the word diorama began almost as soon as Daguerre's and Bouton's spectacle had been publicly introduced. Charles Nodier and Honoré de Balzac poked fun at the 'o-ramic' linguistic patten that seems to have erupted in the cultural circles of the French capital.<sup>11</sup> In England the popular one-man shows by the actor Charles Mathews were described as 'Mathew-oramas', and within a year after the opening of the London Diorama (1823), Andrew Wilkie published a book titled *The Diorama of Life; or, the Macrocosm and Microcosm Displayed: Characteristic Sketches and Anecdotes of Men and Things*.<sup>12</sup> Two years later the o-ramania was widespread enough to make a writer exclaim: 'The Ramas! – One would think the population of the British Metropolis had turned Turks, and this was the season of the Ramadan; for we have the Diorama, Cosmorama, Panorama, Peristrepthic-panorama, and Naturorama, all inviting the public to pay for a peep.'<sup>13</sup> In the following decades the supply of spectacles described as 'dioramas' increased, leading *The Leisure Hour* to conclude in 1886: 'Like panorama, diorama is a word now somewhat loosely applied.'<sup>14</sup>

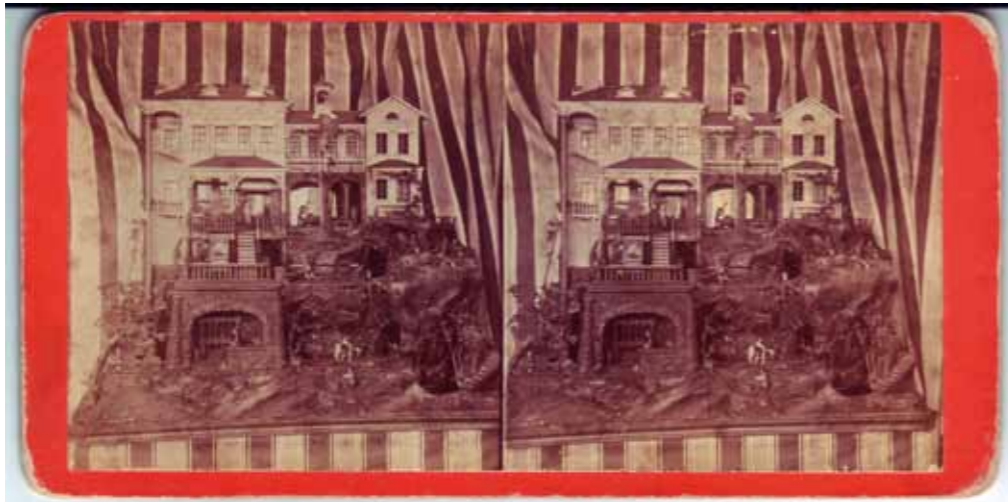
### Diorama and the Museum Display

Around the turn of the century the word diorama gained yet another identity. This was the museum diorama or habitat diorama – a three-dimensional display of animals and sometimes also humans (often natives) in their environments.

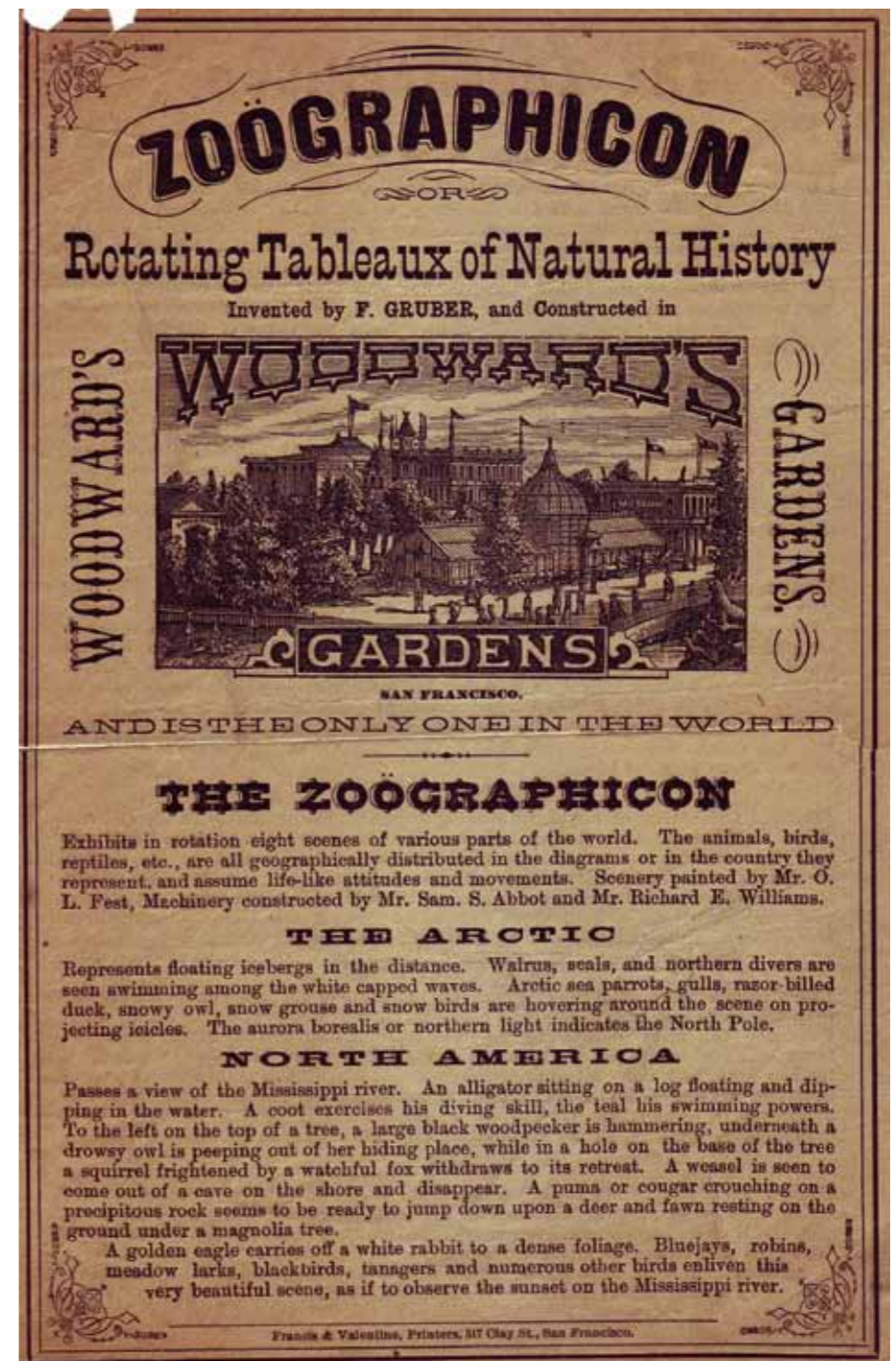


Top – Mr. Bullock's Exhibition of Modern Mexico at the Egyptian Hall, Piccadilly, London, 1824.  
Left – Demonstration of the mechanism of the Diorama, from Adolphe Canot's *Physique purement expérimentale à l'usage des gens du monde* (Paris: Chez L'Auteur-Éditeur, 1859), p. 388 (fig. 225).  
Right – Leaflet from the Regent's Park Diorama, 1826–27.





Top – Bergmann’s Automatic and Mechanical Wonder, a stereocard of a mechanical attraction, an animated three-dimensional miniature world said to have taken 17 years to produce. E. W. Tallman, Batavia, N.Y., 1870–80s.  
 Middle left – Title page of the Catalogue of the Musée Grévin, 1882.  
 Middle right – Ladies visiting the Paris Diorama, French fashion plate, 1820s.  
 Left – Advertising card for a Diorama shown in Paris to help fund the production of the Statue of Liberty, French gift to the Americans. Late 1870s.



Zoographicon or Rotating Tableaux of Natural History, broadside for an exhibit at Woodward’s Gardens, San Francisco, ca. 1880.



The animals were usually produced by the art of taxidermy (stuffing the skin of an actual deceased animal), while wax and papier-mâché were used to create prehistoric animals or humans. The figures were surrounded by plants, stones, buildings and other props, and displayed against a painted panoramic background. In his autobiography (1905) the naturalist and anthropologist Alfred Russel Wallace wrote about the advantages of such ethnographic displays, comparing them with earlier ones that he found ‘never very popular’ and ‘the subject of contempt and ridicule’.<sup>15</sup> Wallace explained the earlier drawbacks:

‘One reason of this was arrangement [of the earlier displays] in the open, quite close to the passing visitor, with nothing to isolate them from altogether incongruous surroundings. [...] To be successful and life-like, such groups should be each completely isolated in a deep recess, its three sides representing houses or huts, or the forest, or river-bank, while the open front should be enclosed by a single sheet of plate-glass, and the group should be seen at a distance of at least ten or fifteen feet. In this way, with a carefully arranged illumination from above and an artistic colouring of the figures and accessories, each group might be made to appear as life-like as some of the best figures at Madame Tussaud’s, or as the grand interiors of cathedrals, which were then exhibited at the Diorama.’<sup>16</sup>

It is not absolutely clear where such displays first developed and were designated as dioramas. In her authoritative work on habitat dioramas at museums of natural history, Karen Wonders claims that the decisive events took place along parallel tracks in two countries geographically far apart, the United States and Sweden.<sup>17</sup> According to Wonders, it was in Sweden that the word diorama was first adopted in the museum context around 1900. However, Wonders’s interpretation is questionable. For example in Germany dioramas were well known as part of tourist attractions in the second half of the nineteenth century. Although some of them may have been little more than illusionistic landscape paintings (sometimes labelled optical dioramas and viewed through magnifying lenses), the dioramas at the Kolonial-Museum in Berlin (opened in 1899) certainly contained groups of figures and painted backgrounds.<sup>18</sup> At the Great Exposition in Paris (1900) there were also similar exhibits identified as dioramas.

The Milwaukee Public Museum still displays a small glass-caged exhibit depicting muskrats in their natural environment, constructed by Carl Akeley in 1889. It was recently characterized as the ‘first known habitat diorama [sic] created for a science museum’.<sup>19</sup> It may be so, but the statement omits the popular museums and other exhibitions that paved the way for ‘respectable’ institutions.<sup>20</sup> In their colourful world the use of illusionistic three-dimensional displays was anything but unknown. For example, the wax museum owner Philippe Curtius (whose collection was inherited and extended by Madame Tussaud) displayed already in the 1780s a famous scene depicting the French royal family at the dinner table.<sup>21</sup> Even earlier, three-dimensional scenes that merged physical objects with painted surroundings had been used in churches for nativity scenes and other purposes. The most

spectacular example may be the 43 chapels of the Sacro Monte di Varallo in Italy, depicting the life of Christ with life-size terracotta figures in diorama-like settings. They were created by generations of artists between the sixteenth and eighteenth centuries and inspired similar ‘sacred mountains’ elsewhere.<sup>22</sup>

The habitat diorama that appeared in the late eighteenth century was clearly part of a wider phenomenon. Anticipating their use in science museums, Musée Grévin, a wax museum that opened its doors in Paris in 1881, placed its wax figures within carefully staged scenes that sometimes formed narrative sequences (as in the famous ‘History of a Crime’).<sup>23</sup> This practice may have been meant as a visual counterpart to the current intellectual trend called Naturalism (a scene from Zola’s *Germinal* was among the exhibits), but it shared parallels with other cultural forms as well, including *tableaux vivants* (real humans ‘frozen’ for a moment to depict famous paintings or other scenes), the sensationalist illustrations of boulevard newspapers, the displays of unidentified human corpses in the ‘show windows’ of the Paris Morgue, and shop window designs, which were becoming more and more ambitious.<sup>24</sup> As Frederick Arnold noted in 1888, for the ladies ‘the rich content of the shops behind the long lines of plate glass are a veritable picture-gallery, a wondrous diorama’.<sup>25</sup>

Even living things could be displayed in diorama-like settings. At *Mr. Bullock’s Exhibition of Laplanders*, organized at Bullock’s Museum Piccadilly, London) in the 1820s, ‘[a]gainst a “panoramic” view of snow-covered mountains and ice pinnacles of the North Cape, two tents were erected, one of canvas over poles for summer use, the other of moss for winter. Sledges, snowshoes, weapons, and domestic utensils were ranged around the room.’<sup>26</sup> A ‘real’ Lapponian family was seen living within this décor. Similar exhibits of mostly non-Western natives became a familiar feature of the midways of World’s Fairs and other exhibitions.<sup>27</sup> In Hamburg Carl Hagenbeck produced a peculiar version of this tradition in the 1890s, when he began displaying live animals within zoo panoramas for which he took a patent. Instead of behind bars and fences, the animals were seen on kinds of stages consisting of increasingly higher enclosures separated by concealed moats, hedges and paths, and ending in painted backgrounds.<sup>28</sup>

Besides their variety, what connected these exhibits was a quest for a reality effect, a perfect simulation of real space and lived experience.<sup>29</sup> For whatever purpose, the exhibitor tried to convince the visitor of the authenticity of what s/he was witnessing. In the early 1830s, when the popularity of the Diorama had begun to fade, Daguerre attempted to enhance its effect by adding material props. The presentation of the *View of Mont Blanc taken from the Valley of Chamonix* incorporated an imported Swiss chalet and perhaps even a living goat. The effort must have been influenced by the *faux terrains* (false grounds) then used in Colonel Jean-Charles Langlois’ panorama rotunda in Paris to mask the space between the viewing platform and the lower edge of the painting with naturalistic props.<sup>30</sup> Daguerre was ridiculed by the press and never attempted it again, but the story remained alive and may have influenced later efforts.

Daguerre’s and Bouton’s Diorama compensated for the lack of a totally circular panoramic environment by visual transformations that added a temporal dimension to the picture. Something similar could not be easily achieved in a



museum environment, as Franz Boas, the curator of ethnology at the American Museum of Natural History, noted in a somewhat confusing statement he made in 1896 while discussing the possibilities and limitations of habitat groups. Instead of a circular panorama, Boas may have had Daguerre's and Bouton's Diorama in mind as his point of comparison:

'In order to set off such a [habitat] group to advantage it must be seen from one side only, the view must be through a kind of frame which shuts out the line where the scene ends, the visitor must be in a comparatively dark place while there must be a certain light on the objects and on the background. The only place where such an effect can be had is in a Panorama building where plastic art and painting are made to blend into each other and where everything not germane to the subject is removed from view. It cannot be carried out in a Museum hall.'<sup>31</sup>

Museum dioramas were experienced through a pane of glass as in a show window-like setting. Visitors came and went, individually or in a group, often chatting with each other. Such a situation worked against total immersion. High-quality taxidermy, meticulous planning, skilful background painting and carefully applied lighting could produce an overall effect that was convincing, but hardly fully absorbing. However, this was not necessarily a problem because of the educational goals of the exhibit. Even at its most illusionistic, museum diorama aims not to be a goal in itself, but rather a pointer evoking real-life issues far beyond the confines of the museum. It is created to spread knowledge, raise curiosity about the subject matter, and increase ecological, environmental or historical awareness. To achieve all this, its design has to be engaging but at the same time avoid lapsing into illusionism for the sake of illusionism.

### Animated Dioramas

An article published in *The Year Book of Motion Displays* in 1938 divided the history of the diorama into three consecutive stages:

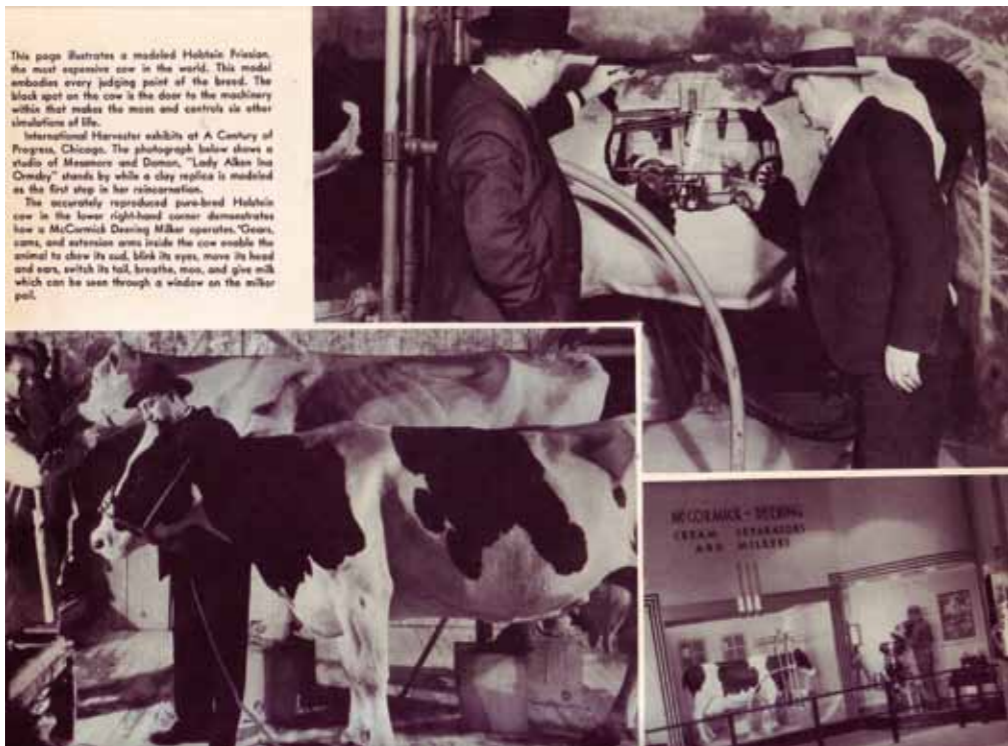
'The original diorama was a matter of transparencies and translucencies so painted as to give an illusion of perspective in combination with lighting effects. The next step is to be found in museums of natural history where animals, birds and reptiles are to be seen in miniature reproductions of their native habits. These dioramas are not translucent paintings: they are three-dimensional and in perspective. They are examples of modelling in all sorts of materials to imitate mountains, trees, flowers, brooks and rocks. The sky is, of course, a painted semi-dome to look like the heavens at different times and in different places, such as sunrise over the Andes or a sunset as seen in the jungles of Malay. The next and important step was taken by our alert sales-promotion men, ever on the look-out for something better in the way of advertising. Hence we see the transition from the static diorama of museums to the animated dioramas of the Century of Progress Fair [Chicago, 1933].'<sup>32</sup>

The entire book was devoted to the 'application of Animation to exhibitions', touted as the high mark of 'display showmanship'.<sup>33</sup> There are numerous examples of 'animated dioramas' both for shop windows and trade exhibitions. Technical articles explain in detail how their elements are put in motion, lights made to flash, et cetera. The key idea was simply combating static displays. This publication, and probably the concept of the animated diorama itself, was part of a trend that was inspired partly by the World's Fairs in Chicago (1933) and New York (1939). Articles in magazines like *Popular Mechanics* and *Popular Science* also attested to this. Modern industrial design and animated advertising displays were seen as tools for freeing the American economy from the turmoil of the Great Depression. The ample use of mechanical and optical tricks was in line with the ideology of the Machine Age and its belief in harmonizing modern life with new technology.

In spite of their many differences, the animated dioramas of the 1930s and 1940s shared some characteristics. They were often just one of the elements in a display that contained captions, illustrations, advertising slogans, informative charts and physical structures that were not part of the diorama itself. Most of the animated dioramas made no efforts to immerse the spectators in a seamless illusion. These were conceived with the underlying notion of spectators as mere bystanders without any possibilities of interacting with the display. Here, as in museums, the diorama played the role of an attractor and mediator. Its primary function was to introduce products and make the spectators eager to purchase them. The power of the diorama to attract the gaze of a passer-by was based on its curiosity-raising technological tricks rather than on quasi-naturalistic make-believe.

Advertising men had seen the future, and it was automatic. But was their vision really as futuristic as one was lead to believe? One should not forget that movement had been one of the attractions of Daguerre's and Bouton's Diorama. Attempts had also been made to set museum diorama-like exhibits in motion, even before the notion itself had been adopted by museums. An interesting example is the *Zoögraphicon*, or *Rotating Tableaux of Natural History*, created by the taxidermist and naturalist Ferdinand Gruber for the Woodward Gardens in San Francisco around 1880.<sup>34</sup> It consisted of 'scenes of taxidermied animals, props and painted backgrounds in motion'.<sup>35</sup> Although an advertising leaflet claimed that the exhibits 'assume life-like attitudes and movements', the motion might have been limited to the rotation of the eight scenes themselves, probably arranged as a cylinder or octagon turning around its own axis.<sup>36</sup>

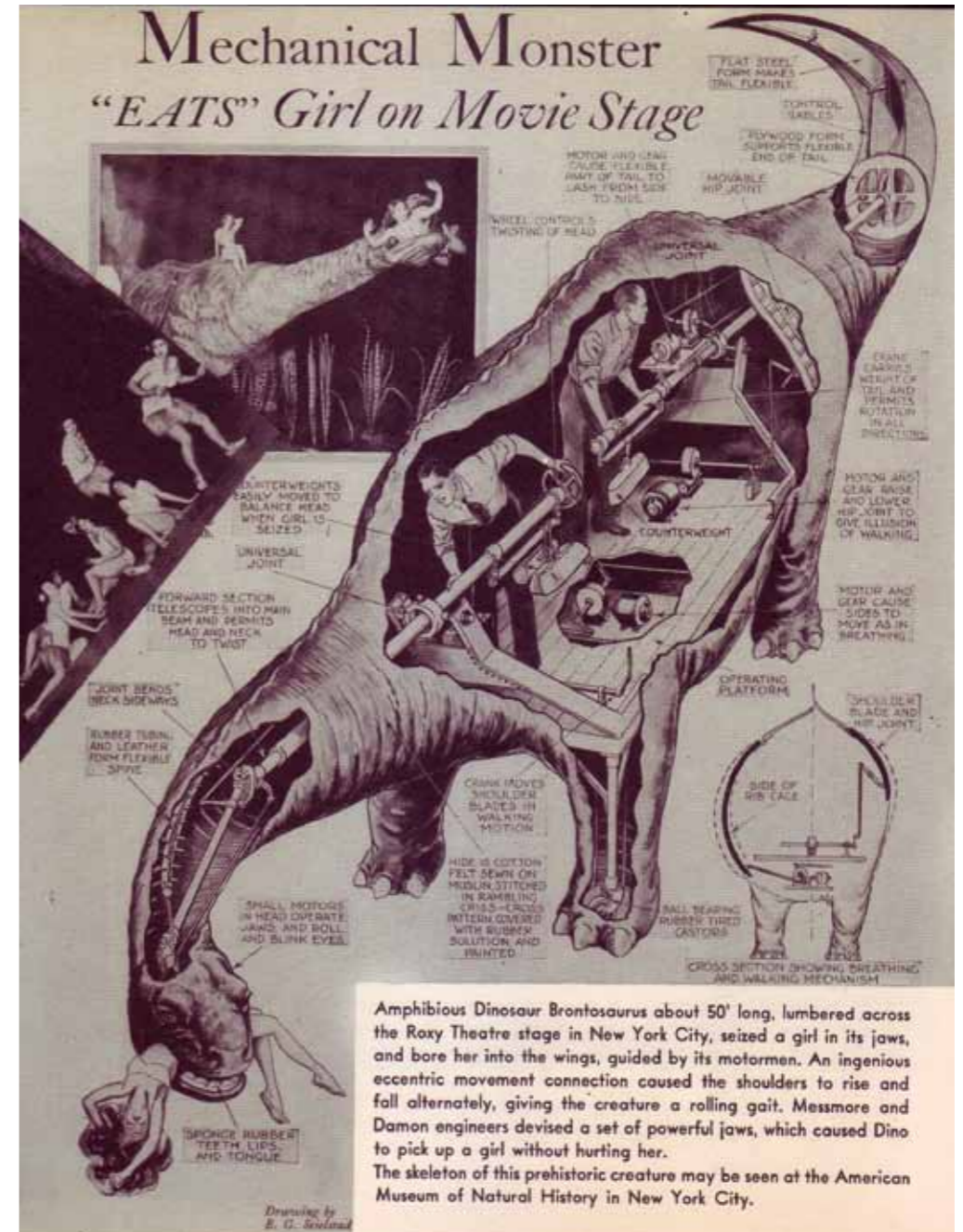
Whether knowingly or unknowingly, the animated dioramas of the 1930s and 1940s revived a tradition that had been popular for centuries: the displays of automata, self-operating technological marvels. Clockwork-powered automata in the shape of humans or animals performed all kinds of stunts, producing sounds, moving their limbs, and even reading, writing and playing chess. Automata were 'useless' anthropomorphized or zoomorphized machines with no other purpose than to astonish, to demonstrate the skills of their maker and to make money for the showman. With the emergence of industrial capitalism the possibilities of automata came to be exploited more fully. Industrial automation was built on the same tradition. The late nineteenth century witnessed the appearance of coin-operated attractions in amusements parks and arcades, including humoristic miniature scenes and fortune-tellers in the form of animated life-size characters.



This page illustrates a modified Holstein Friesian, the most expensive cow in the world. This model embodies every judging point of the breed. The black spot on the cow is the door to the machinery which that makes the mass and controls its other simulation of life.

International Harvester exhibits at A Century of Progress, Chicago. The photograph below shows a studio of Messmore and Damon, "Lady Aiken the Cow" stands by while a clay replica is modeled as the first step in her incorporation.

The accurately reproduced pure-bred Holstein cow in the lower right-hand corner demonstrates how a McCormick Dairymilk Mizer operates. Cream, curd, and extension arms inside the cow enable the animal to show its suit, blink its eyes, move its head and ears, twitch its tail, breathe, moo, and give milk which can be seen through a window on the milk pail.



Top left – People watching an animated diorama in a shop window, 1930s.  
 Bottom left – Mechanical cow as an element of an animated diorama. From the booklet for Messmore and Damon (New York) an animated diorama company, ca. 1938.  
 Right page – Mechanical brontosaurus based on the skeleton at the American Museum of Natural History, from the booklet for Messmore and Damon (New York), an animated diorama company, ca. 1938.



The visitors sat on armchairs placed next to each other on a moving conveyor-belt, observing from above, as if from an airship, an enormous miniature representation of American society in the distant future of 1960.

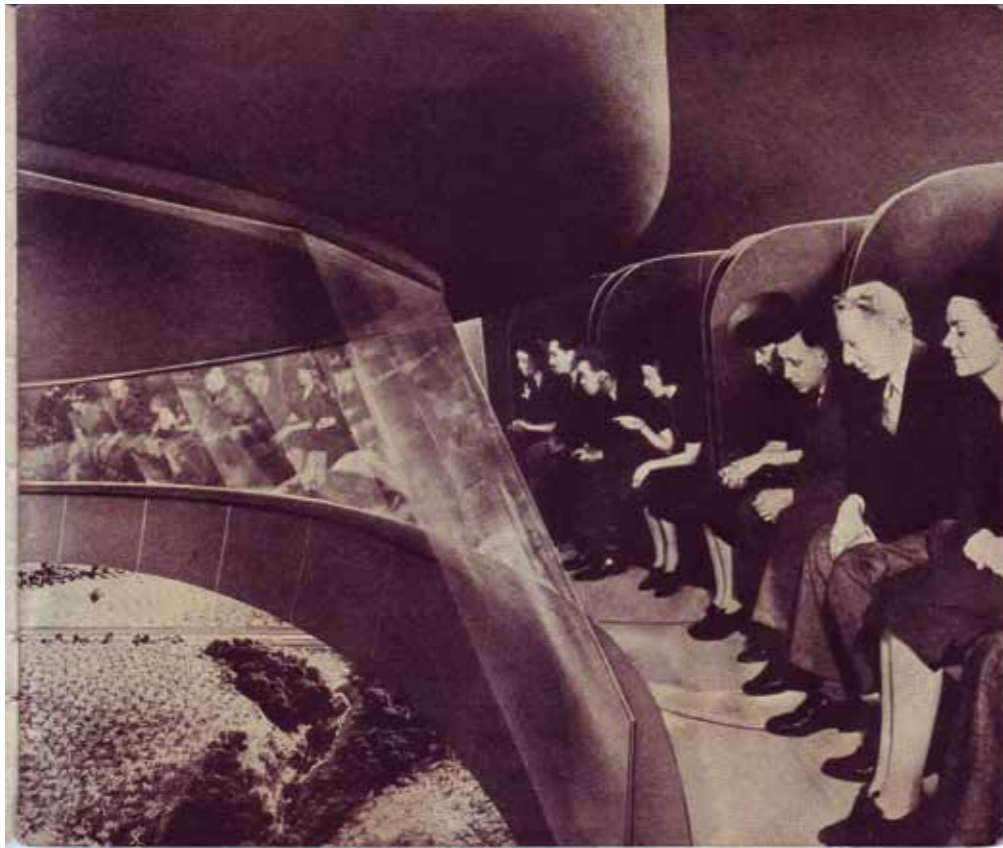
Animated dioramas had also been preceded by mechanical-optical attractions known as mechanical panoramas or mechanical dioramas. Johann Nepomuk Maelzel's (1772–1838) *Conflagration of Moscow* was displayed for decades both in Europe and the United States.<sup>37</sup> It combined transparency painting, mechanical motions, elaborate sound effects and perhaps even fireworks, merging everything into a kind of mechanical theatre. Maelzel's creation influenced others, including Lewis and Bartholomew's *Great National and Historical Moving Diorama of the Battle of Bunker Hill and the Conflagration of Charlestown*, another hybrid mechanical-optical attraction that may have owed its long-lasting success as much to its patriotic subject matter as to its technical features.<sup>38</sup> For the walls of the wealthy, there were mechanical clockwork-powered paintings based on similar ideas, but realized on a more intimate scale.

Department stores continued this tradition by displaying animated dioramic attractions as seasonal displays, particularly at Christmas time.<sup>39</sup> The fact that these were seen from the street through a pane of glass is significant. Even more clearly than in the case of the marvellous but fragile automata, they were a world apart: close but beyond reach. The dreamlike settings and the repeated movements of the figures brought fairytales, myths and childhood fantasies into the service of capitalist pursuits. In the reflections of the windowpane the bystanders could witness their own likenesses superimposed on the exhibits, feeling themselves transported into a fantasy realm. They were partly here, outside in the street, and partly there, in the dreamworld of consumerism.<sup>40</sup> For those who could afford it, the department store promised to turn the dream into a material(ist) reality. In 1901, the *Dry Goods Reporter* expressed the goal behind the art of window dressing in a manner that revealed the reverse of the reverie: 'Goods should be so displayed as to force people to feel that they really wish to possess them.'<sup>41</sup>

#### Dioramas and Miniaturization

As Karen Wonders states, in spite of renewed interest in the 1930s and 1940s, there was still considerable uncertainty as to what constitutes a diorama.<sup>42</sup> Scale was one of the issues. There were those who still remembered the Diorama's original association with enormous size. In 1930 *Popular Science* published an article about Daguerre, characterizing his Diorama as 'a gigantic painting exhibited first in reflected and then in transmitted light'.<sup>43</sup> Others understood the diorama as a life-size representation in the manner of the habitat dioramas. Stuffed animals were of course locked into their original size – the skin was the limit. There were also those for whom the diorama was a miniature representation – a painstakingly produced model of a city, house, landscape or other scene on a reduced scale. Many animated dioramas were small working models incorporated into advertising displays.

The association of dioramas and miniaturization may have had its origin in a curious semantic shift. In the rich world of nineteenth-century public spectacles there was a popular format known as panstereorama, which may have been simply absorbed by the dioramic tradition. It referred to a three-dimensional physical model depicting a landscape with miniature houses, human figures and geographical sites. One among many was advertised by a showman named S. Calkins as *Busy World. A Marvel of Human Ingenuity*. It was said to contain '[h]undreds of moving



Top – Cover of the booklet for General Motors' Futurama exhibit, New York World's Fair, 1939.  
Bottom – Audience sitting on the moving chairs of the Bel Geddes' Futurama, New York World's Fair, 1939.

life-like miniature figures representing Historical and Biblical Scenes, Machinery of all kinds in operation, Mountain Scenery, Forests, Lakes and Rivers of Real Water, Noah's Ark, Mount Vernon and Death of Washington, Marquette exploring the Mississippi, Uncle Tom's Cabin, Penn making his treaty with the Indians, Life in the Far West, etc. etc.', all '[c]arved by hand from a solid block of wood weighing 4000 pounds.'<sup>44</sup>

Descriptions of twentieth-century miniature dioramas often accommodated themselves to formulations found from such earlier promotional discourses. A descriptive booklet from the late 1950s or early 1960s declared: 'The GETTYSBURG BATTLEFIELD DIORAMA shows you the highlights of the three days of the historic struggle in MINIATURE, which took place here. Blended with realistic sound effects, you will see marching men, charging men, flashing and smoking rifles and cannon, burning wagons and buildings, trees, terrain, etc., all scaled in minute detail. / The DIORAMA, created by Curvin Heiss, was over six years in the making; it contains more than 3000 figures, 2000 feet of wire and more than 450 electric bulbs.'<sup>45</sup>

The idea of the diorama as a miniature model was emphasized in modern times by popular scientific and hobbyist magazines. In October 1940 *Popular Science* published an article about 'Scenes in Miniature', referring to 'the lavish use throughout the entire [New York World's Fair] of large and small dioramas or miniature scenes'.<sup>46</sup> In a statement echoing aspects of the original Diorama, the writer found them 'startling in their reality. They were illuminated by hidden lights, and some even showed the same scene under various lighting effects, such as dawn to dawn – all so beautifully done that you felt you were looking at a Lilliputian world.'<sup>47</sup> Edward Heckler Burdick, the president of the Diorama Corporation of America, had already pointed out in *Popular Mechanics* an interesting shift of scale: dioramas were growing larger, although their elements remained miniaturized.<sup>48</sup> This had been made necessary by the massive crowds visiting the World's Fairs of the 1930s. Although the diorama was often said to have been adopted from Europe, these challenges made the diorama industry bloom in the United States and re-introduced the word to the American public.

The most spectacular example of the trend Burdick described in his article was the Futurama, an attraction created by the well-known industrial designer Norman Bel Geddes for the General Motors' Highways and Horizons Pavilion at the New York World's Fair. It was touted as the largest diorama ever built and generally considered the most popular exhibit of the fair. The visitors sat on armchairs placed next to each other on a moving conveyor-belt, observing from above, as if from an airship, an enormous miniature representation of American society in the distant future of 1960. Among its millions of elements, the model was claimed to contain 50,000 small automobiles, 10,000 of them in motion. Each of the 300 laterally moving chairs was provided with a loudspeaker transmitting a synchronized narration – a difficult task to realize with the technology of the time.<sup>49</sup> When the 15-minute armchair trip was over, a sudden shift of scale took place: the visitors found themselves in a life-size intersection of a future city.<sup>50</sup>

Futurama is interesting not only because of its huge scale and its overly optimistic ideological vision of a future dominated by private cars and freeways, but also because of its links with the dioramic tradition. Like Daguerre and Bouton,



Bel Geddes put his audience in motion – the Diorama and the Futurama were both vision machines as dedicated buildings. Instead of a rotating platform Bel Geddes resorted to the conveyor belt that had first been used to transport people at the Chicago World's Fair (1893) and the Great Exposition of Paris (1900). In the latter, *a trottoir roulant* circled across the exhibition ground on an elevated platform, turning the city itself into a kind of diorama (or rather, panorama). Bel Geddes' decision to make the observers sit instead of stand or walk on the conveyor belt (as in Paris) made one observer compare his solution to 'an endless, 300-car train'.<sup>51</sup> In a way it was also in line with the dawning era of television that was to turn millions of Americans into notorious couch potatoes. Only this time the armchair was firmly anchored in the living room.

### Dioramas, DIY, and the Culture of Interactivity

An observer writing to promote inventiveness and industrial growth found a contradiction between the mode of armchair travel of the Futurama and the future-oriented content of the exhibit: 'You can't go through life on a Futurama. Too many of us just want to sit down and ride along surveying the world that is to come. Well, if many of us do that, the sights we'll see will still be those of the world of today.'<sup>52</sup> Interestingly, the discourse on miniature dioramas could be harnessed to counter this tendency toward passivity. Designing and producing dioramas was introduced as an example of perseverance, skill and inventiveness. In 1951 *Popular Mechanics* celebrated George Marchand, a creator of natural history dioramas, as an artist who 'can "re-create" the world of millions of years ago, making models of fossils as fresh and beautiful as a Technicolour movie.'<sup>53</sup> The reference to cinema may have been fortuitous, but it reminds us of the achievements of figures like the special effects master Ray Harryhausen, whose detailed model sets for the film industry are also part of the miniature diorama tradition.

After the New York World's Fair popular scientific magazines began presenting dioramas as a suitable model for do-it-yourself hobbyists to imitate. Diorama building was not only promoted as a good hobby, but also as preparation for active roles in industry and business. In October 1940 *Popular Science* offered '[h]ints on constructing small dioramas for home decorations, window displays, and advertising or educational purposes'.<sup>54</sup> A little later another article promoted the magazine's own construction kit for assembling a 'miniature colonial kitchen'. Instead of appealing only to the boy hobbyist, assembling miniatures was suggested as a pastime for the whole family: 'Father and son can cut out and assemble the furniture. Mother and daughter can help install the fixtures, as well as crochet tiny rugs for the floor and make curtains for the windows.'<sup>55</sup> Such an ideal of family life differed radically from the one that became increasingly common after 1946, when television broadcasting began its triumphal march into the American home. An iconic representation of the 1950s presented the young nuclear family glued to the screen, not contributing parts to a model kitchen from the past.

However, constructing miniature dioramas persevered as a hobby, addressed mostly to boys.<sup>56</sup> This is not surprising, because the trajectory of controlled boy hobbyism goes back all the way to the Victorian era. Countless handbooks and magazines meant to activate the boy, to turn him into an experimenter and inventor,

and to keep him away from bad habits, were already published in the nineteenth century. They routinely included instructions for constructing miniature panoramas and dioramas.<sup>57</sup> By 1950 the miniature diorama fad had also grabbed the eternal boy Walt Disney, who had grown weary of his animation film production. Disney found a new passion in collecting miniature models, and also constructed a Granny's Cabin, an opera house, a barbershop and other models.<sup>58</sup> These exhibits that were also shown publicly reflected Disney's nostalgic relationship to Americana, and may have affected the walk-in diorama-like quality of his next – this time monumental – venture, Disneyland (1955–), in particular the Main Street USA.

During the past half-century the diorama's association with miniaturized things seems to have grown stronger, while the other meanings have faded into the background of cultural memory. Handbooks of advertising and promotional displays have dropped it from their vocabulary, perhaps as a conscious reaction to its co-optation by hobbyists.<sup>59</sup> Daguerre's and Bouton's creation is often not mentioned at all. In 2000, Sheperd Paine defined the diorama 'in the strictest sense of the term, [as] a scene enclosed in a box and viewed through a small opening, something we more commonly call a "shadow box".'<sup>60</sup> He added that '[i]n recent years, diorama has come to mean any scene executed in three dimensions, whether it is enclosed in a box or not.'<sup>61</sup> He could have left out the words 'in recent years': free-standing panstereoramas had been labelled as dioramas decades earlier; Futurama was one of them.

The current popularity of miniature dioramas is not unrelated to the emergence of interactive media. The desire to do things with one's fingers and to both control and construct microworlds has gained mainstream traction thanks to videogames, computer hackerism, online role-playing environments (like *The Sims Online*), and social networking. Of course, building physical models could also be considered a reaction to over-exposure to things digital, a return to the material and tangible object.<sup>62</sup> Diorama hobbyism also has to do with the branching out of the entertainment industry. Global popular-cultural franchises like Harry Potter manifest themselves as many different types of products. Beside book publishers and film and game companies, toy and model manufacturers also want to profit from such global brands. Fans eagerly collect miniature models because they function as classic fetishes, bringing otherworldly and unreachable heroes and stars within arm's reach. Collecting and constructing miniatures constitutes an imaginary dialogue between a subject and the object of his/her desires, but whether the empowerment it provides is real or illusionary is far from clear.<sup>63</sup>

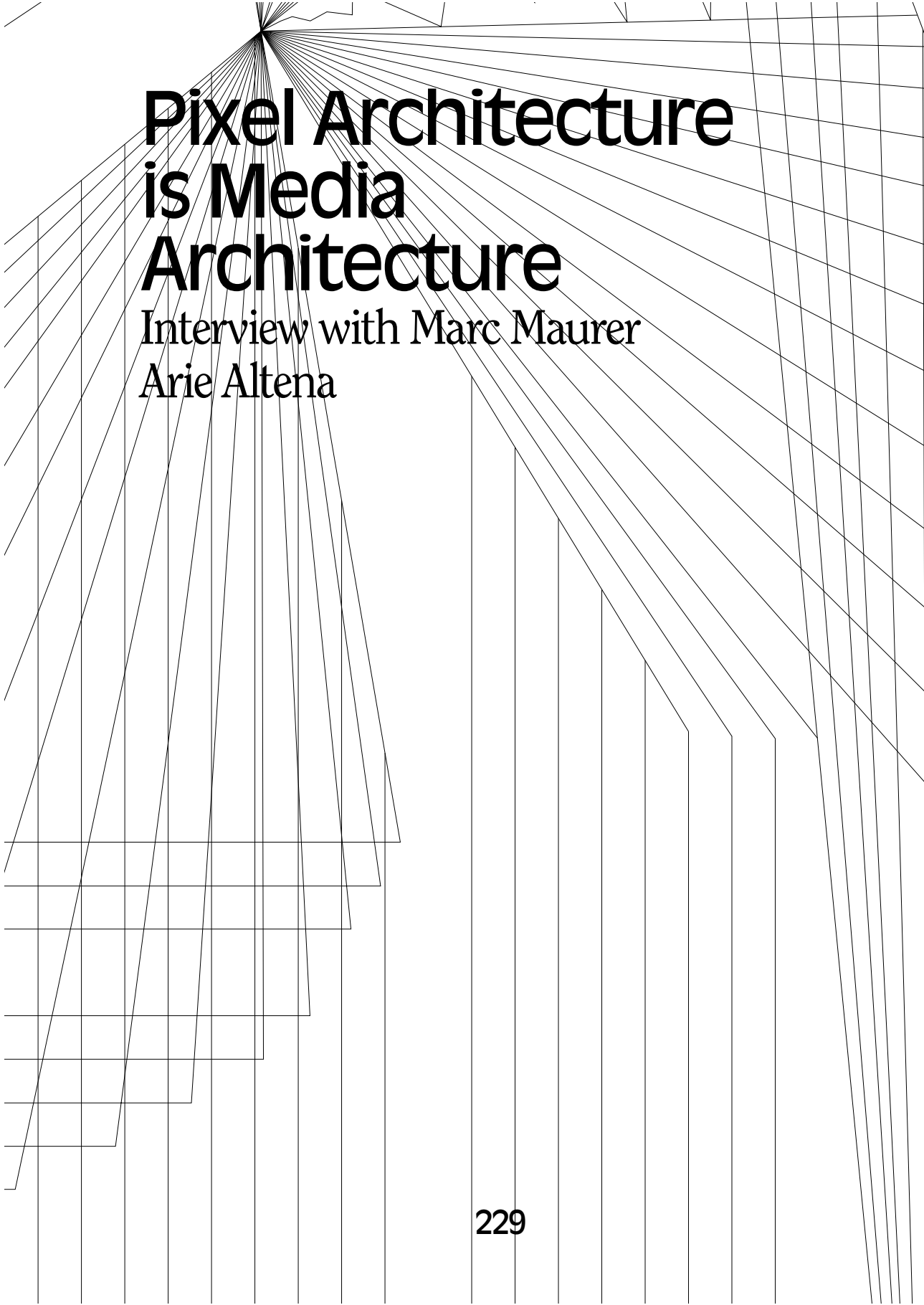
## Notes

1. 'Nous avons des Panoramas, des Cosmoramas, des Panstéréoramas, un Diaphanorama, et nous aurons bientôt un Diorama', in *Journal du commerce*, no. 118 (28 April 1821), p. 4, quot. Stephen C. Pinson, 'Speculating Daguerre', Ph.D. dissertation, in *History of Art and Architecture*, Harvard University 2002, p. 53.
2. I will use a capital letter to refer to Daguerre's and Bouton's invention (Diorama), and lower case to all other forms designated with this word.
3. Histories of photography normally mention the Diorama as Daguerre's earlier achievement. See Beaumont Newhall, *The History of Photography* (New York: The Museum of Modern Art, 1964), p. 14.
4. John Timbs, *Curiosities of London: Exhibiting the most Rare and Remarkable Objects of Interest of the Metropolis, etc.*, (London: David Bogue, 1855), p. 252. Another commentator mentioned that the Diorama 'resembles a small theatre'. See Leigh's *New Picture of London; or a View of the Political, Religious, Medical, Literary, Municipal, Commercial, and Moral State of the British Metropolis [...]* (London: Samuel Leigh, 1824–25), p. 382. Note the metaphorical use of panoramic and visual references in the book's title.
5. Daguerre himself uses the expression 'décompositions des formes' in his *Historique et description des procédés du Daguerreotype et du Diorama. Nouvelle Edition, corrigée, et augmentée du portrait de l'auteur* (Paris: Alphonse Giroux et Cie, 1839), p. 73.
6. A detailed discussion of the diorama's reception will be included in my forthcoming book *Illusions in Motion. A Media Archaeology of the Moving Panorama* (University of California Press, expected in 2010–11).
7. Nathaniel S. Wheaton, *A Journal of a Residence During Several Months in London; including Excursions through Various Parts of England; and a Short Tour in France and Scotland; in the Years 1823 and 1824* (Hartford: H & F.J. Huntington et. al., 1830), p. 152.
8. Jacob Goosequill, 'The Oramas', in *The London Magazine*, vol. X (September 1824), p. 275.
9. In the United States the touring diorama company Maffey & Lonati claimed it possessed Daguerre's and Bouton's original dioramic paintings, but whether these were authentic or copies has not been verified. See Kevin Avery, *The Panorama and its Manifestation in American Landscape Painting, 1795–1870*, Ph.D. dissertation, Columbia University, 1995, p. 50.
10. The Brooklyn Eagle, 14 March 1863.
11. Honoré de Balzac, *Old Goriot*, trans. Marion Ayton Crawford (Harmondsworth, Middlesex: Penguin Books, 1985 [1951]), p. 74; Charles Nodier, *Histoire du Roi de Bohême et de ses sept châteaux* (Paris: Delangle Frères, 1830), p. 148.
12. London: Edward Barrett, 1824.
13. 'One Tom', 'Sights of London, Etc. No. II', in *The Literary Gazette: A Weekly Journal of Literature, Science, and the Fine Arts*, 20 March 1824, p. 188.
14. 'Panoramas and Dioramas', in *The Leisure Hour* (London), vol. 35 (1886), p. 47.
15. Alfred Russel Wallace, *My Life. A Record of Events and Opinions*, vol. 1 (New York: Dodd, Mead & Company, 1905), p. 323.
16. *Ibid.*, pp. 323–24.
17. Karen Wonders, *Habitat Dioramas. Illusions of Wilderness in Museums of Natural History* (Uppsala, 1993, Acta Universitatis Upsaliensis, Figura Nova Series 25).
18. R. Krieger, 'Das Kolonial-Museum zu Berlin', in *Deutsche Kolonialzeitung. Organ der Deutschen Kolonialgesellschaft*, vol. 16, no. 42 (1899), p. 390.
19. Stephen Christopher Quinn, *Windows on Nature: The Great Habitat Dioramas of the American Museum of Natural History* (New York: Abrams, in Association with the American Museum of Natural History, 2006), p. 15. I went to see Akeley's display during a lecture trip to the University of Wisconsin-Milwaukee in 2006.
20. An early text that argued for the need to discuss such earlier museums in this context was John Rickards Betts, 'P.T. Barnum and the Popularization of Natural History', in *Journal of the History of Ideas*, vol. 20, no. 3 (June–September 1959), pp. 353–68. On dime museums, see Andrea Stulman Dennett, *Weird and Wonderful. The Dime Museum in America* (New York and London: New York University Press, 1997).
21. Vanessa R. Schwartz, *Spectacular Realities: Early Mass Culture in Fin-de-Siècle Paris* (Berkeley and Los Angeles: University of California Press, 1998), pp. 93–94.
22. Oliver Grau, *Virtual Art. From Illusion to Immersion* (Cambridge, MA: The MIT Press, 2003), pp. 41–46. Grau characterizes the Sacro Monte displays as 'diorama-like, highly illusionistic virtual reality'. Years ago I visited the Diorama de la Vie de Sainte Thérèse de Lisieux, which is part of the site of pilgrimage for St Thérèse in Lisieux, France. The diorama had been constructed along a long corridor, both sides of which had cubicles with life-size scenes of events from St Therese's life, realized as wax figures. The corridor led towards St Therese's wax statue with a light effect of a rain of roses. St Therese was an avid photographer, and took *tableaux vivants* photographs of the other nuns of the monastery in staged situations. *Tableaux vivants* are related to museum dioramas and wax museum displays.
23. About Musée Grévin, see Roger Baschet, *Le monde fantastique du Musée Grévin* (Paris: Tallendier & Luneau-Ascot, 1982).
24. Vanessa R. Schwartz, *Spectacular Realities*, op. cit., chapter 3.
25. Frederick Arnold, *Arm-Chair Essays* (London: Ward & Downey, 1888), p. 247.
26. Richard D. Altick, *The Shows of London* (Cambridge, Mass.: The Belknap Press of Harvard University Press, 1978), p. 274. The institution was later known as the Egyptian Hall, and became one of the principal showplaces of London until the early twentieth century.

27. Elizabeth Hanson, *Animal Attractions. Nature on Display in American Zoos* (Princeton, NJ: Princeton University Press, 2002), pp. 36–37.
  28. Hermann Reichenbach, 'Hagenbeck at 150', in *International Zoo News*, vol. 45/8, no. 289 (December 1998). See also Hanson, *Animal Attractions*, pp. 140–41.
  29. The concept derives from Roland Barthes and was used by Jonathan Crary to analyze popular nineteenth-century exhibits in 'Géricault, the Panorama, and Sites of Reality in the Early Nineteenth Century', in *Grey Room*, no. 09 (Fall 2002), pp. 5–25.
  30. Jean-Charles Langlois was the principal panorama exhibitor in Paris in the 1830s and is credited for perfecting the faux terrain as an element of the panorama. See Stephan Oettermann, *The Panorama. History of a Mass Medium*, trans. Deborah Lucas Schneider (New York: Zone Books, 1997, orig. 1980), p. 159.
  31. Quot. Karen Wonders, *Habitat Dioramas*, op. cit., p. 17.
  32. 'Animated Diorama – Monarch of Showmanship', in L.L. Cochrane (ed.), *Display Animation 1938. The Year Book of Motion Displays* (London: Reeder-Morton Publications, Inc, 1938), pp. 30–32.
  33. 'Foreword', in *Display Animation 1938*, op. cit., p. 7.
  34. According to a contemporary visitor, the *Zoögraphicon* 'undertakes to show the physical geography and the animal and vegetable fauna of the world, in eight rotating sections, and does it fairly well.' Caroline Wells Healey Dall, *My First Holiday, or, Letters Home from Colorado, Utah, and California* (Boston: Roberts Brothers, 1881), p. 150.
  35. Explanatory text on a stereocard titled 'The Zoögraphicon in Woodward's Gardens', Lange & Newth, San Francisco, c. 1880, author's collection. Woodward Gardens also included a marine aquarium, museums of natural history, tropical houses, as well as 'Zoological Grounds, Menagerie and Bear-pit'.
  36. 'Zoögraphicon, Rotating Tableaux of Natural History Invented by F. Gruber and Constructed in Woodward's Gardens San Francisco and Is the Only One in the World', leaflet, four pages, c. 1880, author's collection.
  37. Joseph Earl Arrington, 'John Maelzel, Master Showman of Automata and Panoramas', in *Pennsylvania Magazine of History and Biography*, vol. 84, no. 1 (January 1960), pp. 56–92.
  38. Joseph Earl Arrington, 'Lewis and Bartholomew's Mechanical Panorama of the Battle of Bunker Hill', in *Old-Time New England* (Fall-Winter 1951–52), pp. 1–17.
  39. Michael B. Miller, *The Bon Marché. Bourgeois Culture and the Department Store, 1869–1920* (Princeton: Princeton University Press, 1981), p. 169. See also Christoph Grunenberg, 'Wonderland: Spectacles of Display from the Bon Marché to Prada', in Christoph Grunenberg and Max Hollein (eds.), *Shopping. A Century of Art and Consumer Culture* (Ostfildern-Ruit: Hatje Cantz, 2002), pp. 16–37. As I could witness on my trip to Paris,
- David Lynch created a series of animated show windows for the department store Galeries Lafayette in Paris in September/October 2009. They evoked both surrealist memories and the aesthetics of popular fairground arts.
40. Eugène Atget expressed this bi-location beautifully in his famous photographs of Parisian shop windows. Their ghostly character was greatly admired by the surrealists.
  41. Quot. Michelle Henning, *Museums, Media and Cultural Theory* (Maidenhead, Berkshire & New York: Open University Press / McGraw-Hill Education, 2006), p. 32. Henning emphasizes the parallel between shop windows and museum dioramas: 'Both window displays and dioramas produce an oscillation between closeness and distance, between wanting to enter the scene and being placed outside it, something that is encouraged by their shared use of sheet glass, three dimensional models and lighting' (p. 33).
  42. Karen Wonders, *Habitat Dioramas*, op. cit., p. 14.
  43. H.C. Davis, 'First Photo Took 8 Hours Now – 20,000 in a Second', in *Popular Science*, vol. 166, no. 4 (April 1930), p. 44.
  44. Undated broadsheet, USA, (second half of nineteenth century), author's collection.
  45. *The Gettysburg Battlefield Diorama and Museum*, undated booklet (1950s or early 1960s), author's collection. The Diorama was located at 87–89 Steinwehr Avenue, Gettysburg. The current diorama at Gettysburg appears to be a later replacement.
  46. Herbert Lozier, 'Scenes in Miniature', in *Popular Science*, vol. 137, no. 4 (October 1940), p. 198.
  47. *Ibid.*, pp. 198–99.
  48. Edward Heckler Burdick, 'Lilliput outgrows Gulliver', in *Popular Mechanics*, vol. 71, no. 5 (May 1939), pp. 657–64.
  49. The technical solutions behind the Futurama were explained in detail by Schuyler van Duyne in an untitled, well-illustrated article in *Popular Science*, vol. 135, no. 1 (July 1939), pp. 102–4.
  50. Anachronistically, the cars on display around the modelled intersection were existing standard 1930s General Motors models.
  51. Van Duyne, *Popular Science*, vol. 135, no. 1 (July 1939), p. 102. On the same page the writer also characterized it as a 'sound-equipped "magic carpet" across a miniature America of the year 1960'. Simulated trains had been used as viewing platforms in earlier exhibits, such as the Trans-Siberian Railway Panorama at the Great Exhibition of Paris 1900; and the Hale's Tours, a silent cinema era attraction. The railway cars did not move. A very similar attraction was presented by the French railways in the 1930s. The audience sat in a stationary railway carriage, while a moving panorama roll rushed past behind the window. It was characterized as a diorama in the article, 'Scenic Diorama Rolls Past Windows of Train', in *Popular Mechanics*, vol. 69, no. 3 (March 1938), pp. 360–61.



52. C.F. Kettering, 'The Age of Opportunity', in *Popular Mechanics*, vol. 74, no. 4 (October 1940), p. 504.
53. 'Sculptor of a prehistoric world', in *Popular Mechanics*, vol. 95, no. 3 (March 1951), p. 97.
54. Herbert Lozier, 'Scenes in Miniature', op. cit., p. 199.
55. 'Miniature Colonial Kitchen. You'll find it easy to match this beautiful model by using the materials in our new diorama construction kit', in *Popular Science*, vol. 137, no. 5 (November 1940), p. 207.
56. As a boy the author assembled plastic models of World War II airplanes from Airfix and Revell kits, painting them and arranging them as 'dioramas' with tiny plastic soldier figurines. About do-it-yourself hobbyism, see John L. Wright (ed.), *Possible Dreams. Enthusiasm for Technology in America* (Dearborn, Michigan: Henry Ford Museum & Greenfield Village, 1992).
57. For an example, see 'How to Construct a Diorama', in *The Boys' Journal* (London: Henry Vickers, 1867), pp. 109–11.
58. Michael Barrier, *Animated Man: A Life of Walt Disney* (Berkeley and Los Angeles: University of California Press, 2007), pp. 230–31.
59. It is missing from Emily M. Mauger's *Modern Display Techniques* (New York: Fairchild Publications, Inc, 1964), although the author writes, perhaps echoing the memory of display dioramas: 'The conveyor belt kind of motion which presents a panorama of still life passing by a given spot is most intriguing to youngsters.' (p. 70). The word diorama is no longer used in Martin M. Pegler's *Visual Merchandising and Display*, second edition (New York: Fairchild Fashion & Merchandising Group, 1991).
60. Sheperd Paine, *How to Build Dioramas. Aircraft, armor, ship, and figure models* (Waukesha, WI: Kalmbach Publishing, 1999), p. 4.
61. Ibid.
62. Folk art dioramas are a blossoming part of the diorama phenomenon in many parts of the world, for example in Latin America. This topic needs to be addressed in another occasion.
63. Artists from Joseph Cornell to Jake and Dinos Chapman have also constructed miniature dioramas, creating an interesting parallel discourse, but this topic needs to be discussed elsewhere.



# Pixel Architecture is Media Architecture

Interview with Marc Maurer  
Arie Altena

Maurer United Architects is a Dutch architecture, design and media office run by Marc and Nicole Maurer. In the past ten years they have made a name for themselves with their own work and with their collaborative projects with both the graffiti artists Delta and ZEDZ, and the Dutch media artist Geert Mul. I spoke to Marc Maurer in Eindhoven at the Baltan Laboratories media lab where he is conducting a research project. At the time of our interview, *Indemann* – an observation tower with a media facade in the German town Inden – had just been realized.

Do you think of the *Indemann* as a media facade or as a building?

It really is a building. The *Indemann* is located in a region in Germany where lignite is quarried. Entire villages had to be relocated to do this. The Inden municipality wanted an object that represented the regional identity. The *Indemann* is an observation tower with a view over a quarry. Ten years ago we started rendering graffiti as architecture, with Delta and ZEDZ. The spaces we designed at that time were more than just architecture, the facade was also a message. It consisted of letters you could actually walk through. The *Indemann* has something similar: LEDs have been attached to the facade. Our point of departure was not to create a media facade, but an observation tower that marks the place and would be something the inhabitants could identify with. The observation tower is a hollow sculpture, based on a game character, in which people can project their own imagination or identity. It is a 36-metre-high building consisting of layers. All the floors are grilles, the outer walls are made from stainless steel fabric. You are surrounded by transparency and lines of perspective. The views from the inside are fascinating and they constantly change as you ascend the stairs to the top. In the arm you're floating in a cantilever, 18 metres above the ground. It creates a spatial interplay. These are not functional spaces; they are experiential spaces.

How did you incorporate the LEDs?

It's now possible to place the LEDs in the steel fabric – we didn't develop this technique but we are the first to apply it at this scale – and we use them to illuminate the steel fabric on the outer walls. This creates light reflections. The LEDs could be seen as independent pixels. There are 40,000 LEDs, so it's possible to display anything on the facade. You can simulate fire or show texts. We'd actually like people to be able to upload their own animations to the display. The design of the *Indemann* is derived from the large excavators that you can see there. For us the *Indemann* signifies the transition from an industrial age to a media age. This is only one of the narratives. Other people have said that it represents the beginning of the robot era. Everyone can project their own story onto it.

What do you think of the media facades that are currently being designed for buildings?

Media facades that you can mount on an outer wall are standard enormous flat screen televisions. These are actual very antisocial, you impose your message on many people who aren't in your target group. I think this is horrendous. The fusion of



Maurer United Architects (MUA), Marc Maurer & Nicole Maurer, *Indemann*, Watchtower/Landmark, Inden (Germany), 2009.





Maurer United Architects (MUA), Marc Maurer & Nicole Maurer, **Indemann**, Watchtower/Landmark, Inden (Germany), 2009.

the outer walls and the media facade is what is interesting. With the *Indemann* the pixels do not form a screen but an interface that belongs to the building. And you can do so much with LEDs that can also create an architectonic experience. Our office is also concerned with the meaning of things and not only the form.

The *Indemann* references street art and computer animations. To what degree is this still a central interest; after all, you have started working on projects in cooperation with graffiti artists?

Delta's spatial approach to typography greatly appealed to me, and as an architect you have to respect what he was doing. I asked myself at the time what type of architecture could be produced by working with graffiti artists – specifically Delta and ZEDZ. We also designed three skating rinks at that time with local skaters. The first skating rink was a double-curved surface. It was fluid architecture that was only just becoming possible to design with computers: it was so-called 'architecture for the media age'. The second skating rink only had one single-curved surface, and the third only had right angles. At the moment we are actually only working with right angles, and the case studies at Baltan Laboratories all deal with right angles. We are doing this to demonstrate that the double-curved surface is not the right type of expressive language for the media age. The flat screen television does not consist of double-curved surfaces either. All screens are flat and rectangular. It has been suggested that you would be freer in a landscape of double-curved surfaces, but this is not the case. If you drop a ballpoint pen it always rolls to the lowest point. Right angles direct you far less than flowing, curved shapes. You have far fewer predetermined perspectives if you work with right angles. We regard pixel architecture as media architecture.

One could also imagine that screens should be round and curved, and that we should also have half-domes at home for projecting films...

I enjoy working with right angles. Actually, both options are interesting. I want to show that the right angle is also interesting. I'm still greatly attracted to The International Style, Van der Rohe, Doesburg, Mondrian.... I think it is a more elegant tool. If you photograph a circular space with a fish eye lens nothing happens, but if you do the same with a cube you achieve beautiful effects. In the end, of course, it's all about the interplay between the two.

What about the *Oersprong* in Twente, then, where you intend to use globes?

With *Oersprong* we are trying to link the parks in Twente, and to tell the story of Twente using three themes as a basis: history, landscape and technology. Small pavilions will be erected in the parks, a complete globe, from which visitors can experience the location in a certain way, placed in a setting by, for example, the light falling through the cracks and holes in the globe, which also creates a perspective on the world outside. The globes are archetypal shapes and we use them to refer to the Panopticum and the Atomium in Brussels. We try to create objects that have simple shapes, but which are mediagenic, so that a narrative about the project can take place in the media. That is what gives meaning to the architecture.



Maurer United Architects [MUA], Marc Maurer & Nicole Maurer, **Oersprong Twente**, Pavilion, Twente, 2009/2010.



In *Oersprong* you use architecture to make the location experiential?

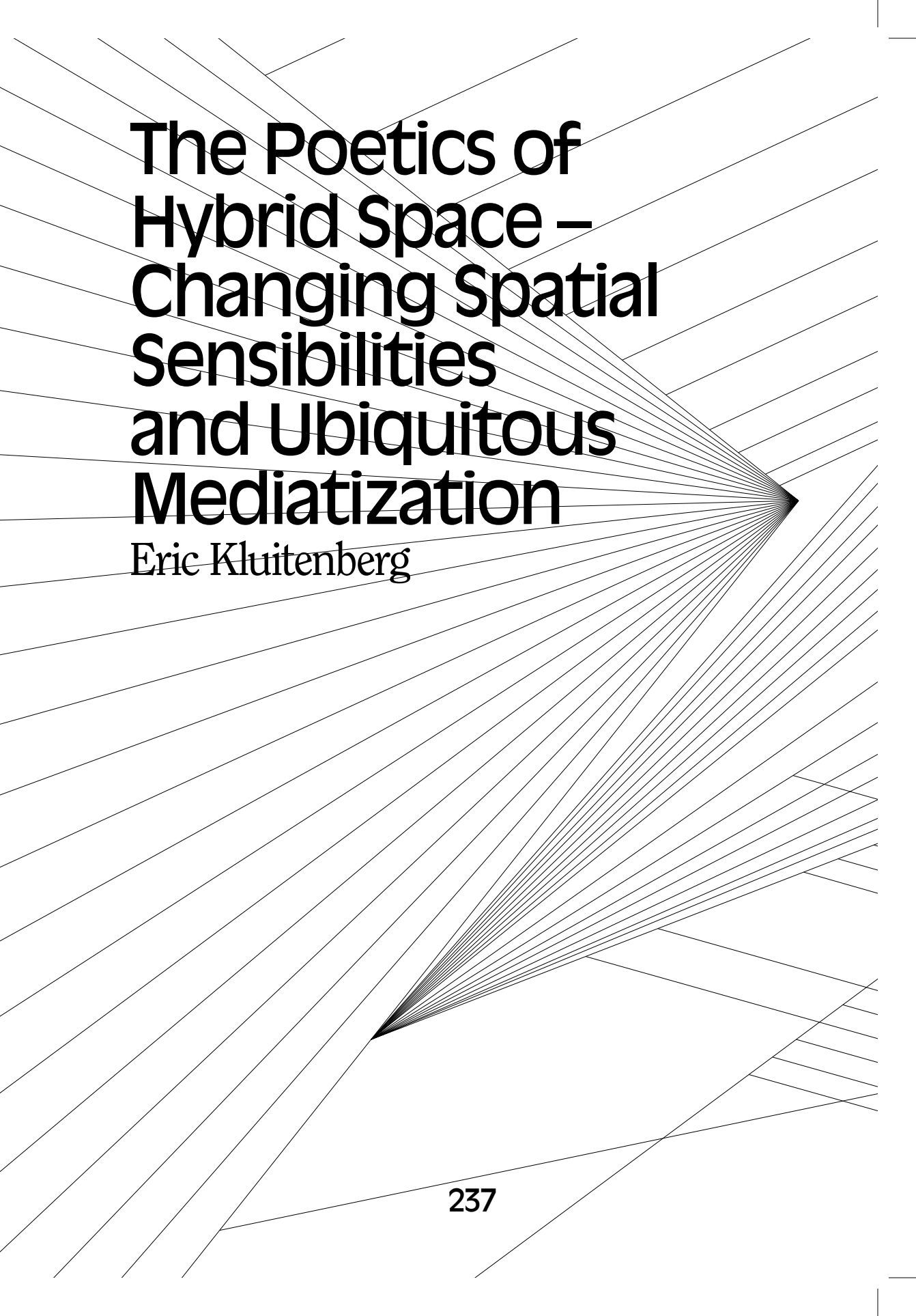
The architecture is used to create a specific experience for the visitors, whereby the location is the input and the architecture is the medium used to transform the input or give it shape.

You have also made installations. How did they come about?

We made *Loading\_Ready\_Run* with Geert Mul, for example. Collaborations like this happen very naturally, in fact. You develop the project during discussions with each other. We made *Loading\_Ready\_Run* in Las Palmas in Rotterdam, in a small indoor gatehouse. We thought of the installation, the aesthetics of the images and how the screen could be reproduced using mirrors. We placed them so that they refer to the octagonal columns in the building. The mirrored image is then a repetition of the physical space. When the projects with ZEDZ and Delta were not constructed we realized them in computer games to demonstrate what the spatial experience would be like. After this we created a few more games. It's relatively easy to place structures into the editing programmes of games, but it was the game characters that were a real challenge. More interesting than asking yourself how you represent 3D on a 2D screen, is the question of how you navigate as a character. If you achieve that, the space will come by itself. Now we've made the *Indemann* and a couple of others – we call them 'space characters'. But I wouldn't want to make anything that would be meaningless if the electricity failed. I have worked with sensors but I only find interactive architecture interesting if it's worth the trouble even if there is no interaction.

What thoughts do you have about the future of architecture? Will more interactive experiential architecture be made?

Which buildings require experiential architecture? Houses, offices and industrial buildings are designed for functionality, and not an architectonic experience. The architecture in a museum or cinema or concert hall is relegated to the background because the building itself cannot detract from what happens inside it. On rare occasions you might get 'staged' experiences with media. In the past every village had a church – they're also buildings dedicated to a particular experience, there's the stained glass windows, for a start. What I find far more interesting is that the concept of the dwelling plan established under Dutch housing law dates from as early as 1901. This plan is concerned with the quantities of light and air, and with health. And it indicates minimum dimensions, and uses the family unit as a basis. It is still being used today. It never took television into account, and certainly not a computer with an Internet connection. It's not difficult to imagine designing a space or a house around an Ambilight television or an Internet computer. How do you design a house in interaction with the latest technology? That's an interesting question. One thing's for sure – you would have to work with people who are fully up-to-date with the latest technological developments.



# The Poetics of Hybrid Space – Changing Spatial Sensibilities and Ubiquitous Mediatization

Eric Kluitenberg

The French philosopher of science Gaston Bachelard contrasts the attraction of intimate or 'felicitous' space with the hostility of the exterior in the realm of images: hostile space, a space of 'combat' and 'hatred' is one that can only be studied 'in the context of impassioned subject matter and apocalyptic images'.<sup>1</sup> Bachelard's starting point immediately elucidates the predicament of our current hybridized spatial experience. The 'dialectics of inside and outside' (Bachelard) have in recent years been turned inside out, We carry our intimate spaces into the public realm, and through our preoccupation with the devices we curiously dissociate ourselves from the essence of what constitutes the exteriority of public space: the unexpected encounter with the 'unknown other'.

It is this predicament more than any shift of a technological paradigm (the emergence of mobile and personalized communication and media technology) that determines the shifting experience of hybrid space. With it comes a confusion of intimacy and public-ness, a loss of spatial indeterminacy (henceforth you always know where you are), and a conflation of presence and distance (real-time connection on the go). Conceptually the status and scale of space implode. Practically it means that the way one now moves through space has radically altered: Customary patterns of spatial behaviour, sometimes established over centuries, have been obliterated in little more than ten years with the mass-adoption of mobile phone technology. Most strikingly, the new *modus operandi* in hybrid space is carried out almost without thinking. It is only when the operator is down or the connection is otherwise severed that the new patterns of spatial behaviour enter our consciousness.

The practical consequences of this remarkable shift are profound, as are the political implications. At present, however, I want to focus on the new spatial sensibility that accompanies, almost beneath the threshold of consciousness, the emergence of a mediatized hybrid space. The question that should concern us as artists, cultural theorists or producers, and as sensitive subjects more generally, is how this new sensibility for an increasingly hybridized spatial multiplicity can be intensified, to such an extent that it can enter consciousness, that it can be re-imagined, poetically – possibly reconstructed or reconfigured. Bachelard is right to point out that poetic imagination operates at a different level to productive imagination. We are not here to fix a merely practical problem, but instead to explore the significance of the current forms of intensive hybridization of space for spatial experience and modes of behaviour.

### Hybrid Space as a Non-Technological Construct

While the idea of Hybrid Space is initially associated with the fusion of physical and media space, the omnipresence of electronic screens in public space, the proliferation of mobile phone, Wifi, mobile data networks, wireless broadcast transmissions, in short with a continuing series of technological interventions in our lived spaces, it should not be limited to this technological dimension. Lived spaces have in one sense always been hybrid, because their structure, their appearance, as well as the individual, subjective experience, but also the collective experience of these spaces, has been determined by elements that are not present in an outright physically embodied form. Social habits and behaviours, cultural patterns, aesthetic choices

in urban and architectural design, economic flows – all these have a profound impact on the organization and use of lived spaces, and thereby also greatly influence the experience of these spaces.

Such influences often go by unnoticed as a vernacular, imperceptible as the quotidian design of the spaces of everyday life. At other times, however, particularly in moments of conflict and strife they tend to erupt explosively in consciousness. Lived spaces become embattled zones when the regular flows of everyday life are interrupted, when trade breaks off, when established cultural patterns are under threat, when otherness invades the streets and takes over, when architecture is shattered or when traffic runs out of control. It is curious that it is only in these moments of friction, interruption and breakdown that we become aware of the subtle interplay between the physical structures of the everyday and the social, cultural and economic flows, which pass through them continuously, but in themselves obey a different spatial logic than the built structures that try to contain them. And yet, so much of our everyday spaces are determined by forces that neither originate from, nor are immediately present in that same physical space. Forces, in fact, that can be quite alien to that localized space, sometimes even hostile.

The significance of the tidal wave of wearable, mobile and wireless technologies that has invaded our lived spaces, both intimate household spaces as well as public spaces (Bachelard's 'exterior space'), is not so much that they create a new condition of spatial hybridity, but much more that they intensify the hybridity of space and bring it to a point of crisis. This intensive superimposition of media space and physical space also profoundly increases the complexity of contemporary living and social spaces, especially so because the boundary between intimate and private spaces and public and social spaces becomes thoroughly blurred.

It is important to observe that spatial hybridity is not a technological condition, nor a specifically contemporary phenomenon. What varying social, economic and technological conditions imply is that the hybridity of space operates at different intensities in relation to its specific local and historical position. It would be too simple to think of such differences as simply 'more' or 'less' hybridity. Instead the ever-varying intensities of spatial hybridity must be made recognizable and our sensitivity towards them needs to be heightened. This inevitably means a shift from analysis to aesthetics.<sup>2</sup>

### Densities and Layering in Hybrid Space

The notion of Hybrid Space was first proposed to me by architect Frans Vogelaar, who together with Elizabeth Sikiaridi runs the Hybrid Space Lab in Berlin. Following Vilém Flusser's idea that media networks fuse in the greater network of intersubjective relationships, where subjectivities form at the intersection of the information channels (technical and non-technical) 'through which information flows (ideas, feelings, intentions and knowledge)'.<sup>3</sup> The density of these networks differs from place to place. Where the web is most dense, intersubjective relationships are most concrete and form stronger identities, acting as an 'attractive force' that draws more and more human relationships into its 'gravitational field'. This image of differing densities in the web of intersubjective relationships sketched by Flusser is compounded in Vogelaar and Sikiaridi's concept *Idensities*<sup>TM</sup>.



As architects their field of investigation concerns itself primarily with spatial relationships, not that of a more general philosophical analysis, nor a specific media-technological or media-theoretical consideration. It is the superimposition of technologically enabled communication, information and media networks onto lived and embodied spaces that leads to an increased density of intersubjective relationships in those spaces. Yet, the presence of such networks and these densities is never continuous. While we would be extremely hard pressed to find any place on the planet that is entirely free of media signals, the density of signals varies from place to place. Furthermore, the mere presence of a signal does not mean that the network that produces them is accessible to anyone within its reach. Even if the signals are accessible to anyone, it does not imply that the relationship is reciprocal: or to put it more plainly, there is no guarantee that the receiver of the signal can also act as a sender in the network, let alone on equal terms.

Discontinuity and difference of density, therefore, determines the hybridity of intersubjective relations that can be established in space, delimiting the possibilities of subjective appropriation of that space and the kind of identities that can be established there.

#### Isolation in Visibility

The proliferation of wearable and wireless media blurs the boundary between private and public spaces much more than previous communication and media technologies have already done. With the wired telephone, public and private conversations entered the living home on equal footing. And with radio and television, public life had already entered the living room long before the earliest prototypes of wireless communication media were even tested in the technology labs. The located-ness of these technologies had, however, imposed a boundary and a site for their use. It is difficult to walk on the streets with a wired telephone, and television is rarely watched on the street.

With the spread of mobile phones private behaviours and conversations were transferred to the public realm with a seemingly complete transparency. Now we had to be unwilling witnesses to the most intimate and private conversations on the street, in public transport, in queues, and in many other awkward situations. The primary consequence of this displacement of the private into the public realm is not so much a fusion of both spaces in terms of the behaviours conducted in them by their users, but rather a radical extension of the private sphere into the formerly public space, at the expense of the public functions of that space.

In Richard Sennett's landmark study, *The Fall of Public Man*, originally published in 1974, electronic isolation still referred to the subject in front of the television screen, witnessing the false transparency of social events. Politically this subject is impotent because s/he is locked in isolation in a private house, no longer witnessing social and political events in the company of others, as previously occurred in mass rallies, street protests and large communal gatherings. Action, at best, becomes indirect. Reaction remains impotent. Sennett literally asks, 'What can you do? Call your friends? Get unnerved on your own?' The electronic isolation in front of a television screen makes the subject politically impotent, even when all the events are right there before him or her.

What locative media attempt to impose on the erratic flow of everyday life is a rigorous order of spatial determination. All ambiguity of place needs to be erased.

What we witness in the age of wearable and wireless media is something much more confusing and paradoxical. We continuously see – and maybe quite often do this ourselves – people moving through public space entirely preoccupied and engulfed in their private space. We witness without frame or boundary, in absolute transparency and full visibility. Physically we are together in one space, but this presence has no bearing on the subjective experience of the person embroiled in a mobile telephone call, an SMS exchange, e-mail on the go, and pretty soon mobile video conferencing (thinking especially of the new generation tablet computers about to be deployed).

All these technologies establish spatial relationships and intensify and densify the web of intersubjective relationships. But these relationships have nothing to do with the public-ness of the spaces in which they are enacted. These hybrid spatial acts constitute in fact a pure denial of the public-ness of non-private space, characterized by Sennett above all else as an unexpected encounter with the unknown other – the very encounter that these consciously established private spatial relationships try to avoid or erase. Physically these actors may be in the public space, subjectively they are completely immersed in the private, and interrupting this relationship is simply considered rude.

### The Failure of Disconnectivity

As a parenthesis here: even in the late 1990s various futile attempts were undertaken to stop the spread of mobile phones in the public space. Governments went so far as to consider regulating communicative behaviour patterns in public space. One of the most hilarious and daring initiatives at the time was an impromptu activist group called the Phone Bashers,<sup>4</sup> who went around London streets and public places such as cafes and restaurants, dressed up as man-size walking mobile phones to smash any phone that went off on their route. The phone bashers would grab telephones from the baffled owners and smash them on the ground before running off, usually pursued by the outraged former owner of a mobile communication device. Though warmly appreciated and heartening for those who appreciate the public-ness of public space, their movement never became truly successful in stopping the long march of mobile phones through public spaces and institutions.

In later years I held a series of conversations with artists, rogue technologists and even quite mainstream new media theorists such as Howard Rheingold as part of a disconnectivity campaign. The aim of the campaign was (or is) to institute the fundamental human right to disconnect from all mediated communication and information flows. I still believe that this fundamental right is of the utmost importance, but in the age of terror and traceability such a form of electronic invisibility has become ever more unlikely to come about. You can switch off your phone but it does not mean that you can no longer be traced, tracked, or followed. Disconnecting may even become a liability, causing suspicion and attracting attention from the wrong official institutions.

### Located-ness and the Erasure of Spatial Ambiguity

Henceforth you will never be lost again! The new breed of locative media, mobile and wearable devices that contain a geographical positioning system locate your presence in space. Locative media can be utilized to create dynamic relationships between media objects and physical surroundings. Locative arts have used these capabilities to establish non-linear and poetic relationships between participative audiences and physical surroundings. Locations, defined by their co-ordinates in the positioning system, can be annotated with various forms of media content, which obviously is not present at these locations, but activated by the visitor at a particular location and transported via the network from whatever location the media server might have.

The density of hybrid spatial relationships in this case is intense, and the traceability of the subject engrossed in this interaction is also evident. While we can understand the interest of investigative agencies in the traceability of the terror suspect, it is much more likely that in daily situations we will encounter the corporate double of locative arts. Annotation of location can be used as an effective tool for communicating commercial interests. The introduction of the Layers software on mostly GPS-enabled smart phones is the best early example of this trend. Spatially these location-sensitive communication applications are comparable to the contextual web-advertisements popularized by the Google company. Such located advertisements densify the identity formation that results from targeted product placements.

Similarly, radio frequency activated identity tags (RFID) – small computer chips that either transmit a faint radio signal themselves or can be passively read by a radio frequency transmitter – locate products and the people that carry them in space. Pets, including my own dog, are tagged, or chipped, with a unique identification number that links up to a European pet database. Inclusion in the database and thus placement of the tag under the animal's skin is usually a prerequisite for the pet to be granted health-insurance, making sure that it is this specific individual, not a similar looking one, that is undergoing (expensive) treatment.

Chris Oakley's brilliant near-future shopping-mall dystopia, *The Catalogue*,<sup>5</sup> portrays a regular shopping mall from the perspective of a sophisticated observation system that traces and stores all identification tags of the products people buy and wear on them. These data – each identifier is unique – are correlated with payment card data and associated personal files. Furthermore, shopping preferences and even eating habits are monitored and used to suggest new offerings to regular visitors. The system also identifies untagged individuals, who removed all the tags from their belongings. Oakley's short film remains frighteningly dispassionate, indicating a very near dystopia of complete quotidian traceability.

What locative media attempt to impose on the erratic flow of everyday life is a rigorous order of spatial determination. All ambiguity of place needs to be erased. Not only is it no longer possible to get lost, the new spatial order attempts to articulate space itself in much the same way as digital image technologies have broken down and reconstructed the image in the exact and finite scheme of the



digital image matrix. Akin to how visual ambiguity is erased in the digital image, locative media similarly attempts to erase spatial ambiguity, and thereby inevitably invoke a system of control.

### Rupture in Hybrid Space

Hooked on smart phones, tablets, Wifi, 3G and soon 4G wireless networks, a broad range of consumers have accepted and embraced the new density of hybrid space as a daily reality. In the shortest time the presence of the new networks of relationships established through these technologies have been assumed as a given and put to use almost unthinkingly. Subjectively, the new densities of hybrid space remain absent from conscious reflection. At best their presence is subliminal, operating just below the threshold of consciousness.

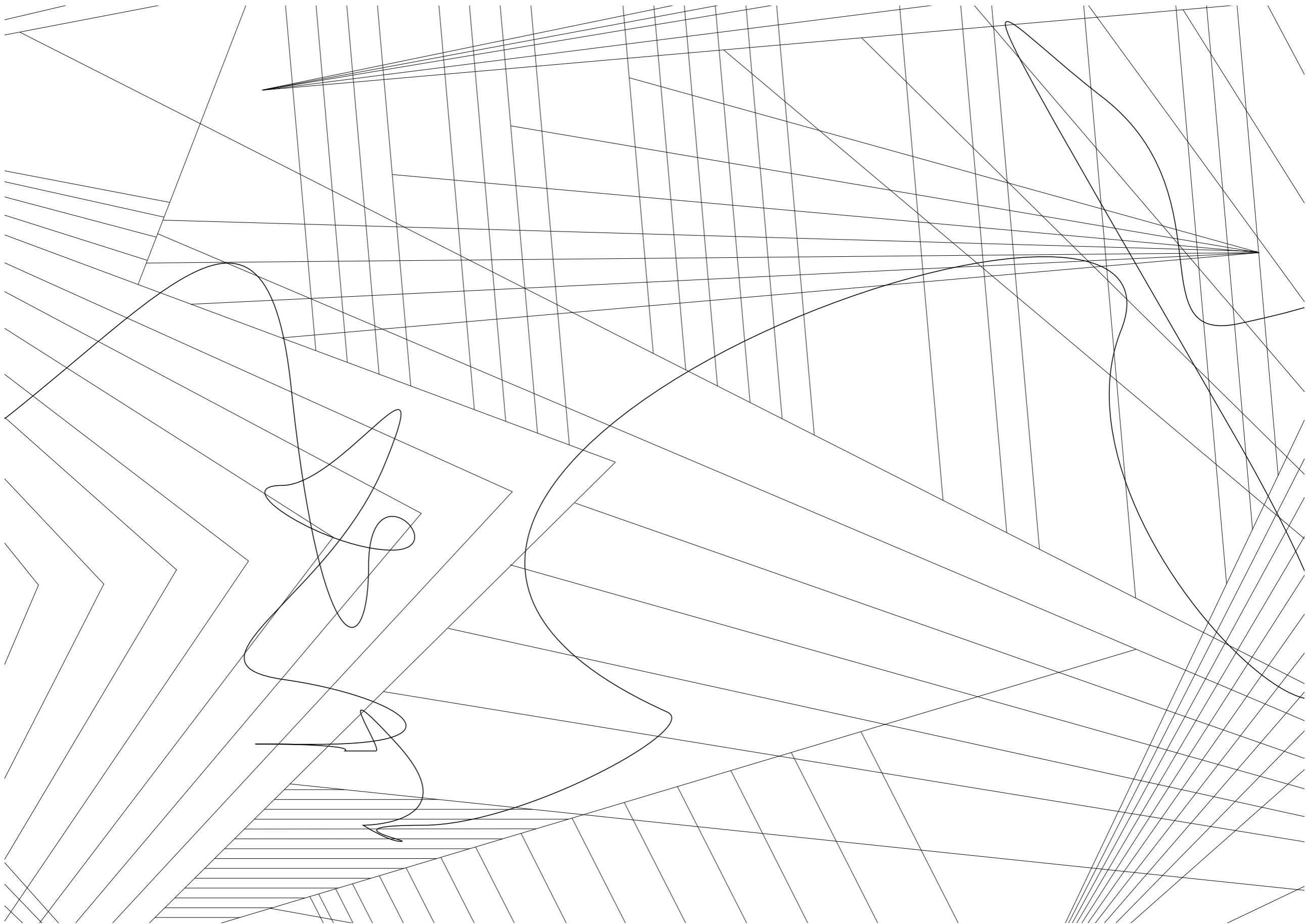
Just as the new structures of connection threaten to slip out of consciousness, an inevitable (temporary) breakdown of the network awakes its users to its existence and the dependence of the newly established behavioural patterns on the correct functioning of these networks. It is only in these moments of rupture, when the connection breaks, when the signal is interrupted, or when the system breaks down completely, that our sensibilities towards the new spatial and social behaviours conjured up by these technologically enabled networks of relationships are aroused. Outside the ruptures of hybrid space, and inside the so-desired seamless connection of corporate phantasies of telematic connectivity, it is practically impossible to remain aware of how the experience of daily life is transformed by them.

One direction where the significance of artistic experimentation with mobile and wireless media can be found is in the heightening of our sensibility to the intensive hybridization of space that these technologies bring about. This sensitivity, after all, needs to transcend those moments of rupture and breakdown. How would it otherwise be possible to imagine – and more importantly – re-imagine practices that continually tend to slip into the daily unconscious?

More than anything else it is poetic imagination and symbolic transformation (the established tools of artistic intervention) that can help us lift these unreflected practices out of their quotidian existence and transfer them from vernacular to active and conscious deliberation. This is the moment where productive and poetic imagination (can) meet.

### Notes

1. Gaston Bachelard, *The Poetics of Space* (Beacon Press: Boston, 1994), pp. xxxv–xxxvi.
2. I am fully aware of the problems raised by this emphasis on aesthetics and its implication of subjective finality of experience, i.e., taking as an object of study experiences that cannot be ‘communicated’. I follow here quite classically Kant’s understanding of aesthetic experience as subjective finality.
3. Vogelaar and Sikiaridi refer in particular to Vilém Flusser’s text: ‘Die Stadt als Wellental in der Bilderflut’ (1990), in Vilém Flusser, *Medienkultur* (Fischer: Frankfurt/Main, 1997).
4. See [www.phonebashing.com](http://www.phonebashing.com)
5. See [www.chrisoakley.com/the\\_catalogue](http://www.chrisoakley.com/the_catalogue)





**Arie Altena** (NL) is a member of the curatorial team of Sonic Acts. He writes on new media and art, and also works for V2\_ Institute for the Unstable Media, Rotterdam.

**Maryanne Amacher** (25 February, 1938 – 22 October, 2009) was an American composer and installation artist. She studied composition with George Rochberg and Karlheinz Stockhausen and did graduate work in acoustics and computer science at the University of Illinois. In 1967, she created *City Links: Buffalo*, a 28-hour piece using five microphones in different parts of the city, broadcast live by radio station WBFO. She worked extensively with the physiological phenomenon called otoacoustic emission, in which the ears themselves act as sound generating devices. Amacher composed several 'ear dances' designed to stimulate clear 'third' tones coming from the listener's ears. The subtitle of her first Tzadik Records album *Sound Characters (Making the Third Ear)* references these 'ear tones'. Over the years she received several major commissions in the United States and Europe. In 2005, she was awarded the Prix Ars Electronica (the Golden Nica) in the Digital Music category for her project *TEO! A sonic sculpture*. At the time of her death she had been working three years on a 40-channel piece commissioned by The Experimental Media and Performing Arts Center in Troy, NY. She never held a full-time job and lived simply in Kingston, NY. For the last decade of her life she taught at the Bard College MFA program. She passed away in 2009.

**Sonia Cillari** (I) is a media artist and architect who lives and works in Amsterdam (the Netherlands). Her work involves the creation of sensorial and perceptual mechanisms in immersive and augmented environments. Her artistic investigation examines how patterns of consciousness, perception and identity emerge in such settings. Over the last years she has been specifically interested in a field of research concerning the 'Body as Interface'. Her interactive installations, that are at the intersection of architecture and performance art, have been exhibited and presented internationally. She was artist in residence at V2\_, Institute for the Unstable Media (Rotterdam), Royal Academy of Visual Arts, STEIM and NIMK (Amsterdam) and IarsInumerica (Montbeliard). She is associated with Optofonica Laboratory for Immersive ArtScience (Amsterdam), and has received the 'Honorable Mentions' at VIDA 9.0: Art & Artificial Life International Competition (Madrid, 2006) and Prix Ars Electronica, Interactive Art (Linz, 2007), and the 'Excellence Prize' at Japan Media Arts Festival (National Art Center, Tokyo, 2008).

**Annet Dekker** (NL) is a program manager at Virtueel Platform, Amsterdam. Her main interest is the influence of digital media and popular culture on art and vice versa. She has worked as a curator and head of exhibitions at the Netherlands Media Art Institute (NIMK) in Amsterdam, and is a freelance curator. She is currently completing a Ph.D. in Cultural Studies at Goldsmiths College in London, supervised by Matthew Fuller.

**Raviv Ganchrow's** (US) work focuses on interrelations between sound and space, aspects of which are explored through sound installations, writing and the development of sound-forming technologies such as Wave Field Synthesis. He addresses an ambiguous status of sound that is at once material-spatial as well as phenomena-event. Recent installations directly engage the everyday acoustic environment, plumbing notions of 'place' that are constructed by way of frequency interdependencies between sound, location and listener. Ganchrow completed his architectural studies at the Cooper Union, New York, and received a second degree from the Institute of Sonology at The Royal Conservatory, The Hague. He has been teaching architectural design in the graduate program at TU Delft, and is currently a faculty member at the Institute of Sonology, The Hague.

**Edwin van der Heide** (NL) studied Sonology at the Royal Conservatory in The Hague where he graduated in 1992. He works as an artist and researcher in the field of sound, space and interaction. Van der Heide extends the term 'musical language' into spatial, interactive and interdisciplinary directions, resulting in installations and environments that go beyond the traditional concert presentation form. In 1995 he started lecturing at the interfaculty Image and Sound/ArtScience at the Royal Conservatory and the Royal Arts Academy in The Hague, the Netherlands. Since 2002 he lectures at the Media Technology MSc program of Leiden University, the Netherlands. In 2007 he became an assistant professor at the same institution.

**Erkki Huhtamo** (FI) is a media archaeologist, writer and exhibition curator. He is a professor at Design and Media Arts, UCLA where his area is media history and theory. Erkki Huhtamo holds a Ph.D. in Cultural History. He has written extensively on media archaeology and the media arts. In media archaeology, Huhtamo pays particular attention to the life of *topoi*, or clichéd elements that emerge over and over again in media history and provide moulds for experiences. Huhtamo has applied

this approach to phenomena like peep media, the notion of the screen, games and mobile media. Huhtamo has just finished a book on the history of the moving panorama and the diorama, tentatively titled *Illusions in Motion*.

**Douglas Kahn** (US) writes and lectures about the intersections of history, theory and contemporary practice in art, music, literature, media arts, cinema, sound, electromagnetism, science, technology and politics, spanning the late nineteenth century to the present, with an emphasis on the traditions of the avant-garde, experimentalism, and sub-cultural activities. He is a professor at University of California, Davis, where he teaches in the Technocultural Studies Program. He is the author of *Noise, Water, Meat: A History of Sound in the Arts* (MIT Press, 1999), co-editor of *Wireless Imagination: Sound, Radio and the Avant-garde* (MIT Press), and recipient of a 2006 Guggenheim Fellowship for research on the historical discovery of natural radio. Forthcoming publications include an anthology of essays and documents on the arts and early computing, *Mainframe Experimentalism*, edited with the art historian Hannah Higgins; and a book on the arts deployed across the electromagnetic spectrum, *Arts of the Spectrum*.

**Cindy Keefer** (US) is an archivist, curator and the director of Center for Visual Music (CVM) in Los Angeles. She curates, lectures, consults and writes on Visual Music and abstract media internationally. Keefer has preserved dozens of historic Visual Music films by Oskar Fischinger, Jordan Belson, John and James Whitney, Charles Dockum and others, and has presented film/video/digital programmes at museums, festivals, and symposia worldwide. At CVM she produces DVDs, most recently of Fischinger and Belson films, and Belson's *Epilogue* (2005). Her current research focuses on Fischinger and Belson, particularly their early Expanded Cinema work. She is working on a monograph about The Vortex Concerts. She has a degree in Film from NYU, and received a Peabody Award in 1993.

**Eric Kluitenberg** (NL) is a Dutch media theorist, writer and organizer. Since the late 1980s, he has been involved in numerous international projects in the fields of electronic art, media culture and information politics. Kluitenberg heads the media program at De Balie, Centre for Culture and Politics in Amsterdam. He is the author of *Delusive Spaces* (NAi Publishers, 2008), and he edited the *Book of Imaginary Media* (NAi Publishers, 2006) and the thematic issue *Hybrid Space of Open*, journal on art and the public domain (2006).

**Brandon LaBelle** (US) is an artist and writer. His work explores the space between sound and sociality, using performance and on-site constructions as creative supplements to existing conditions. He is the author of *Background Noise: Perspectives on Sound Art and Acoustic Territories: Sound Culture and Everyday Life* (Continuum, 2006). His work has been featured internationally, including the exhibitions and festivals Sound as Media, ICC Tokyo (2000); Bitstreams, Whitney Museum New York (2001); Pleasure of Language, Netherlands Media Art Institute Amsterdam (2002); Undercover, Museum of Contemporary Art, Roskilde (2003); Radio Revolten, Halle (2006); Copo da Voce, at Museum of Contemporary Art, Niterói (2008); and Tuned City, Berlin (2008). In addition his *Prototypes for the Mobilization and Broadcast of Fugitive Sound* was exhibited at the Enrico Fornello Gallery, Prato (2007). His ongoing project to build a library of radio memories was presented at Casa Vecina, Mexico City in 2008. He also collaborates within the collective working group, Surface Tension, and the working team, e+1.

**Takuro Mizuta Lippit** (JP) performs as dj sniff. He believes in the instrumental autonomy of the turntable and the musicianship of the DJ. He is a turntable musician working in the field of improvised and experimental music. His music focuses on the live reconstruction and narratization of the phonographically amplified – the music, the sound, the technology and the past. To achieve this, he uses a unique setup consisting of handmade hardware interfaces and custom Max/MSP software along with one turntable and DJ mixer. He is also a concert/event curator for electronic music and a researcher of music technology. Since 2005 he has been involved with STEIM's (Studio for Electro-Instrumental Music, Amsterdam) R&D lab. He has been STEIM's artistic director since 2007, curating public events and representing the institution through performances and lectures.

**Marc Maurer** (NL) and Nicole Maurer are Maurer United Architects, an office for architecture, design and media. Their motto is: 'Like children, we play. Not to waste time, but to learn and develop skills until we find a more challenging field to conquer.' Marc Maurer studied architecture at the Eindhoven University of Technology and received a Masters of Science in architecture and urbanism. Since 1998 Marc and Nicole Maurer have received several awards and nominations for their collaborative work. They have taught at several academies and universities in the Netherlands.

**Frank J. Oteri** (US) is the Composer Advocate at the American Music Center and the founding editor of its web magazine *NewMusicBox*. An outspoken crusader for new music and the breaking down of barriers between genres, Oteri has written for publications including *BBC Music*, *Chamber Music*, *Ear Magazine*, *Symphony*, *Time Out New York* and the *Revised New Grove Dictionary of Music and Musicians*, has been a frequent radio and pre-concert speaker, and has served as the host for his own 21st Century Schizoid Music series at the Sidewalk Café. Oteri's musical compositions – which reconcile structural concepts from minimalism and serialism and frequently explore microtonality – span operas and chamber music, solo keyboard works and original bluegrass/old-timey songs. His music has been programmed in venues ranging from Carnegie's Weill Recital Hall and the Theatre Royal in Bath, England to the Knitting Factory and the Bethlehem Musikfest.

**Juhani Uolevi Pallasmaa** (FI) is a Finnish architect and former Professor of Architecture at the Helsinki University of Technology and a former Director of the Museum of Finnish Architecture (1978-1983). He runs his own architect's office Arkkitehtitoimisto Juhani Pallasmaa KY in Helsinki. His exhibitions of Finnish architecture, planning and visual arts have been displayed in more than 30 countries and he has written numerous articles on cultural philosophy, environmental psychology and theories of architecture and the arts. Among Pallasmaa's many books on architectural theory is *The Eyes of the Skin - Architecture and the Senses* (1996), a book that has become a classic of architectural theory.

**Trace Reddell** (US) is a digital media artist and theorist exploring the interactions of sound and the cosmological imagination. Over the past two years, Reddell's live cinema performances and video works have screened at over 30 international venues including galleries and new media festivals in New York, London, Glasgow, Amsterdam, Berlin, Zurich, Sao Paulo, Seoul, Hong Kong, and Tehran. His net art and audio projects have appeared regularly on the Web since 1999. He is Associate Professor of Digital Media Studies at the University of Denver. He founded Denver's first digital media festival, A:D:A:P:T, in Spring 2003 at Denver's Museum of Contemporary Art. Recent publications include articles in *Leonardo Music Journal*, *Leonardo Electronic Almanac*, the *Contemporary Music Review*, the *Electronic Book Review*, *Cybersounds: Essays on Virtual Music Culture* (Peter Lang Publishing, 2006), and 'Ethnoforgery and Outsider Afrofuturism' in Tobias C. van Veen (ed.), *Afrofuturism: Interstellar Transmissions From Remix Culture* (Wayne State University Press, forthcoming).

**Daan Roosegaarde** (NL) is an artist working in Rotterdam, the Netherlands. He studied at the Academy of Fine Arts AKI in Enschede and received a Masters degree at the Berlage Institute, a Postgraduate Laboratory of Architecture in Rotterdam. He is the Creative Director of Studio Roosegaarde, an artistic laboratory for interactive projects. Roosegaarde's work explores the dynamic relation between architecture, people and e-culture. In this interaction his sculptures create situations of tactile high-tech where visitor and (public) space become one. Roosegaarde's interactive projects are exhibited around the world.

**Elizabeth Sikiaridi** (GR) is an architect and a partner in Hybrid Space Lab. Her investigation into the work of Iannis Xenakis is based on interviews with Iannis Xenakis and researching his personal archives.

**TeZ** (Maurizio Martinucci) (I) is an Italian artist and producer living in Amsterdam. He uses technology as a means for exploring synesthesia and the relationship between sound and images. Besides working on generative composition, live cinema and sound installations, he also creates immersive installations and performances. He was the initiator and producer of Optofonica, a project for spatial sound and images. He has collaborated with Evelina Domnitch & Dmitry Gelfand, Honor Harger, Domenico Sciajno, Taylor Deupree, Francisco López and others. He studied computer music and sonology in Rome and Padova.

**Barry Truax** (CA) is a Professor at Simon Fraser University where he teaches courses in acoustic communication and electroacoustic music. He has worked with the World Soundscape Project, editing its *Handbook for Acoustic Ecology*, and has published a book *Acoustic Communication* dealing with all aspects of sound and technology. As a composer, Truax is best known for his work with the PODX computer music system which he has used for tape solo works and those which combine tape with live performers or computer graphics.

**Mitchell Whitelaw** (AU) is an academic, writer and artist with interests in new media art and culture, especially generative systems, audiovisuals, and data aesthetics. Mitchell's writing has appeared in a range of journals including *Leonardo*, *Digital Creativity*, *FibreCulture*, *Photographies*, *Senses and Society* and *Contemporary Music Review*; he is the author of *Metacreation: Art and Artificial Life* (MIT Press, 2004). His current work combines theory, criticism and practice in generative art and design, data visualisation, and digital materiality. Mitchell is currently a Senior Lecturer in the Faculty of Arts and Design at the University of Canberra.

## page 12

1, 2, 3 *Line Describing A Cone*,  
images © Anthony McCall & LUX, London.  
4 *Light Trap*, photo © Greg Pope.  
5 *Conflux*, photo © Yutaka Makino.

## page 13

6 *Light Music*, photo © Lis Rhodes & LUX, London.  
7 *Spacy*, still © Takashi Ito.  
8 *Light Music*, photo © Lis Rhodes & LUX, London.  
9 Frame capture from the film on *Two Holes of Water 3* showing a car parked in front of a rear projection screen with a film of a plane taking off. Robert Whitman, *Two Holes of Water 3*, Nine Evenings, 1966. Photo Robert R. McElroy. Courtesy of E.A.T. – Experiments in Art and Technology.  
10 Overview of *Two Holes of Water 3* by Robert Whitman, Nine Evenings, 1966. Photo Robert R. McElroy. Courtesy of E.A.T. – Experiments in Art and Technology.  
11 *And After Several Rapid Strokes of Their Wings*, photo © Bruce McClure and Robin Martin.

## page 14

1 *Hylozoic Soil*, general view, SIGGRAPH, New Orleans, 2009. Photo © Philip Beesley Architect Inc.  
2 *Hylozoic Soil*, weed layer detail, VIDA 11.0, Matadero, 2009. Photo © Philip Beesley Architect Inc.  
3 *Sound Modulated Light III*, Voltage Festival, Kunsten Centrum BUDA, Kortrijk, Belgium, 2008. Photo © Edwin van der Heide.  
4 *Hylozoic Soil*, canopy detail, VIDA 11.0, Matadero, 2009. Photo © Philip Beesley Architect Inc.  
5 The AlloSphere at the California NanoSystems Institute, UC Santa Barbara. Photo courtesy of Dennis Adderton.

## page 15

6 *Solid Curtain*, photo © Benny Nilsen.  
7 *RyNTH*, image © Paul Prudence.  
8 *Sabulation*, image © Jacob Kirkegaard.  
9 *Labyrinthitis*, image © Jacob Kirkegaard.  
10 *Hand Grenade*, filmstrip © Gill Eatherley.

## page 16

1 *Light Trap*, photo © Greg Pope  
2 *10000 Peacock Feathers in Foaming Acid*, photo courtesy of Evelina Domnitch & Dmitry Gelfand.  
3, 5 *The Light that Generates Space*, optic fibres installation, 18 x 24 x 27 metres, Milan, Palazzo Litta. Photo © Carlo Bernardini.  
4, 6 *SOD*, screen-capture, JoDi.

## page 17

7, 9, 11 *Light work #6: In Soil*, installation, photos © Yoko Seyama.  
8 *UPIC Diffusions Session #9*, photo courtesy of Haswell & Hecker.  
10 *The Pink Noise of Pleasure Yachts in Turquoise Sea*, image from underwater sound and video installation © Yolande Harris.

## page 18

1, 2, 4, 5, 6 *Materia Obscura*  
© Jürgen Reble & Thomas Köner.  
3 Still from the Allobrain Project, the inaugural project for the AlloSphere at the California NanoSystems Institute, UC Santa Barbara. Image courtesy of Marcos Novak.

## page 19

7, 8 *Trees of Syntax, Leaves of Axis*, 35 mm film, still © Daichi Saïto.  
9, 10 *Still in Cosmos*, still © Makino Takashi.  
11 *And After Several Rapid Strokes of Their Wings*, photo © Bruce McClure and Robin Martin.

## page 20

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2 Hildegard Westerkamp, photo © Peter Grant.  
3 Naut Humon at Recombinant Media Labs, photo © Naut Humon.  
4 Mimi Stark Miller and Trisha Brown in front of a mirror for CCTV projection on a large screen during Nine Evenings. Photo Robert R. McElroy. Courtesy of E.A.T. - Experiments in Art and Technology.

## page 21

5 *Sound Modulated Light III*, Voltage Festival, Kunsten Centrum BUDA, Kortrijk, Belgium, 2008. Photo © Edwin van der Heide.  
6 *GAMMAvert in Awake are just the Spirits*, HMKV, Dortmund 2010. Photo © Jan-Peter E.R. Sonntag.  
7 *as if it were the last time*, photo courtesy of Duncan Speakman.  
8 *Liquid Space 6.1*, public, interactive artwork placed on the island Terschelling for Atelier Oerol, 2009. Photo © Studio Roosegaarde.  
9 *GAMMAvert in Awake are just the Spirits*, HMKV, Dortmund 2010. Photo © Jan-Peter E.R. Sonntag.

## page 39

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## pages 44–46

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## pages 68–70

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## The Poetics of Space

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page 176

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