15

REALTIME—
Radio Art, Telematic Art, and Telerobotics: Two Examples

Heidi Grundmann

Introduction

It was suggested that with this text I deliver an eyewitness report of *REALTIME*. But while trying to comply with this idea, I realized that my memories of this and many other projects for which I took responsibility as a producer and curator are quite myopic and blurred because I was already busy with other projects during the preparation of *REALTIME* (and the closely connected *CHIP-RADIO*), and I was consumed by the usual horrific anxieties as the helpless curator during the events themselves. So I decided to rely mainly on artists' descriptions of the project and some of its precursors. These descriptions were mostly formulated at the time of the realization of the projects, or shortly thereafter, and should therefore also be interesting examples of the thinking and terminology used at the time.

CHIP-RADIO (1992) and *REALTIME* (1993) are among the most mature and contained projects within a very specific development of radio art during the 1990s. Within this wider development, which from 1994 onward included the extension of the radio space into the World Wide Web and vice versa, those two projects mark high points in what could be described as the exploration of a convergence of telematic art, telerobotics, and radio art.

That it was possible to realize *CHIP-RADIO* and *REALTIME* at all was due to the uniquely Austrian pattern of (mainly institutional) support and access, combined with the configuration of artists involved with the projects, and relationships formed through their experience of earlier art in the electronic space. The strong conceptual grounding of their theoretical and practical expertise in the new technologies and their understanding of the technologies' cultural impact led these artists to the development of elaborate collaborative strategies and the successful application of these strategies in the "occupation" of "found" old and new media spaces and the productive integration of their quite differing personal aesthetical positions and backgrounds.

Institutional Framework

In October 1991, both the Museum of Modern Art in Vienna and the Tiroler Landesmuseum Ferdinandeum in Innsbruck simultaneously served as the site of an international symposium, "The Geometry of Silence."[1] Using the example of radio art, the symposium was dedicated to the theory and practice of an art in the electronic space and included lectures, performances, installations (on site and later in their radio versions) by international artists and theoreticians, among them Robert Adrian X, Roy Ascott, Friedrich

Kittler, Richard Kriesche, Isabella Bordoni and Roberto Paci Dalò, Concha Jerez and Jose Iges, G. X. Jupitter-Larsen, Pool Processing, Mia Zabelka, and, from a much greater distance, Qweck Bure-Soh in Paris and Jon Rose somewhere in Australia. The telephone lines connecting the two museums were provided by the ORF (Austrian Brodcasting Corporation) and by the OPT (Austrian Post and Telecommunications). The ORF support came via the regional studio in Innsbruck and the national cultural channel, Oesterreich 1, with its radio art program *KUNSTRADIO. KUNSTRADIO* also succeeded in persuading the OPT to provide a dedicated digital line linking the two museums, which had to be specially adapted for the new mobile videoconferencing system provided by Siemens for the project. The relentless insistance of one of the participating artists, Mia Zabelka, drove me to persist in the effort to secure such an (at the time) state-of-the-art system. And Mia was right. The videoconferencing system with its unusually large monitor added an important dimension to the connection between the two sites of the symposium and to projects not only by Zabelka herself (figure 15.1), but also by Bordoni and Dalò and others.

Zabelka's teleperformance *Space Bodies*[2] would also have been the first live telematic radio performance using telerobotics in *KUNSTRADIO*'s history—if there had been broadcasting time available at the time of the event. As it was, an adapted radio version was broadcast a few weeks later:

> A fantastic idea: two violins, which are played by one and the same person—and what is more—simultaneously and at a spatial distance: with one of the instruments in her hand, the performer is located at Palais Liechtenstein in Vienna, while the other instrument she is playing, is situated at the Ferdinandeum in Innsbruck.
>
> It was the well known violin—and performance—artist Mia Zabelka who realised this uncanny mise-en-scene. By the artistic use of electronic media she has claimed a new reality. Mia Zabelka describes "Space Bodies" as an "interaction of human being, machine and electronic medium in two distant spaces":
>
> At space 1 (Palais Liechtenstein) the artist herself is performing with her violin, in space 2 (Ferdinandeum) an electropneumatic violin is installed. This violin is handled in a way similar to the handling of modern robots. It is equipped with sensors, which are controlled by a computer. Space 1 and Space 2 are connected to each other by a computer network. The "networked" performer and the "networked" music-machine are interacting at a distance by forming an integrated circuit through the respective control of their playing.[3]

Figure 15.1 Mia Zabelka, performing *CHIP-RADIO* in Salzburg, 1992. Photo: *KUNSTRADIO* Archive, Vienna.

Whereas the cooperation of *KUNSTRADIO* with the museum in Vienna was not continued after "The Geometry of Silence", *KUNSTRADIO*'s cooperation with the Ferdinandeum in Innsbruck resulted in Guenther Dankl (Ferdinandeum media art curator) and myself (producer of *KUNSTRADIO*) acting as principal cofounders of the not-for-profit organization TRANSIT, a unique support structure for the realisation of artistic projects in the electronic space, especially in the space of the mass media radio and television.

TRANSIT was founded in response to the fact that *KUNSTRADIO*, originally meant to be just another late-night "experimental" radio art program had, from its very beginning in 1987, become involved in the organization and production of large-scale international radio art projects and events. Because of *KUNSTRADIO*'s very small budget (appropriate for what was then a forty-five-minute weekly broadcast), this involvement was possible only in ad hoc partnerships with established and well-funded festivals such as the Steirische Herbst in Graz, the Ars Electronica Festival in Linz, or the Wiener Festwochen in Vienna. TRANSIT was an attempt to institutionalize the model of collaboration between partners with financial resources (in this case

provided by national and/or regional cultural ministries) and those with technical resources and infrastructure (in this case the ORF regional studio in Innsbruck).

CHIP-RADIO

> Working in the electronic space, working with contemporary technology entails coming to grips with an environment we are faced with on a daily basis.
>
> —FROM GERFRIED STOCKER'S INTRODUCTION TO THE RADIO VERSION OF *CHIP-RADIO*, BROADCAST ON OCTOBER 1, 1992

CHIP-RADIO was the opening event of TRANSIT. The project had been initiated by Zabelka, and she also brought with her the Swiss sound artist Andres Bosshard, who in turn invited the Polish actor Waldemar Rogojsza. Technical expertise in the use of telcommunications systems, computers, and robotics was supplied by Gerfried Stocker, Hörst Hoertner, and Seppo Gruendler (all from Graz), who had been part of *Puente Telefonico,* the first live telematic radio project produced by *KUNSTRADIO. Puente Telefonico* took place on August 6, 1992, and connected the public interactive sculpture *Sound Poles* by Hoertner and Stocker at Expo'92 in Seville, Spain, with a live radio studio at the ORF Broadcasting House in Vienna. *Sound Poles* consisted of an array of twenty-seven fiberglass poles (up to six meters high) fixed vertically in the floor of the plaza in front of the Austrian pavilion at the exposition. The public was encouraged to "play" the installation, and the resulting movement of the poles was registered by sensors and transmitted to a computer, where it was translated into control signals that triggered sampled sound events that were fed back to the plaza. The installation was connected to a modem so that it could be remotely serviced by the artists via telephone every day from their studio in Graz. The existence of this standing connection made it possible to use the modem for teleconcerts, among them *Puente Telefonico.* For this event, Hoertner, Gruendler, and Josef Klammer were in Sevill and connected via modem with Stocker and his computers, sampler, and sequencers in the live-transmission studio in Vienna. Stocker was able to add new sounds to the sounds triggered from Sevilla in the Vienna studio for the live broadcast and to send his control signals to the *Sound Poles* computer in Spain.

CHIP-RADIO

A simultaneous telematic concert by:

Andres Bosshard, Seppo Gruendler, Gerfried Stocker and Mia Zabelka

October 1, 1992, 10:15 p.m.

Performed live at the regional studios of the ORF in Tyrol, Salzburg, Vorarlberg and broadcast on the programme "Kunstradio–Radiokunst" on Oesterreich 1

Innsbruck/Foyer of the Broadcasting House:

Gerfried Stocker (Sampler)

Waldemar Rogojsza (actor, cues by Andres Bosshard, Dornbirn)

Robot-violin: Martin Riches (played by Mia Zabelka, Salzburg)

Three E-guitars (played by Seppo Gruendler, Salzburg)

Studio 3: Ewald Wabnig: live mix of the "Kunstradio" programme, following a concept by Andres Bosshard

Salzburg/Foyer of the Broadcasting House:

Mia Zabelka (violin, sampler, percussion)

Seppo Gruendler (E-guitar, MIDI saxophone)

Percussion (played by Gerfried Stocker, Innsbruck)

Dornbirn/Foyer of the Broadcasting House:

Andres Bosshard (cassette machinery)

Marimba (played by Gerfried Stocker, Innsbruck)

Synthesizer (played by Seppo Gruendler and Mia Zabelka, Salzburg)

Acoustics: Andres Bosshard

Network Design: Hörst Hoertner

Sound engineers: Ewald Wabnig and Hans Soukup[4]

For *CHIP-RADIO* it was possible to secure three of the regional ORF radio and TV studios as locations. Five of these studios (Graz, Linz, Innsbruck, Dornbirn, and Salzburg) were built from the same plan by architect Gustav Peichl and are architecturally—and therefore acoustically—practically identical. A conspicuous feature of the buildings is a circular foyer three storys high, forming a kind of atrium. The foyer of at least one of these regional studios had already become a "historical" site of telematic events: In 1982 "The World in 24 Hours" (initiated by Robert Adrian X) took place in the Upper Austrian regional studio in Linz. The ORF regional studio foyer has remained a favorite location for networked projects, and

CHIP-RADIO and *REALTIME* each managed to connect three of them in a single project:

The found infrastructure of the data and transmission networks between these locations is occupied by the artists and becomes their most important "instrument," an instrument that facilitates a networked interaction far beyond the parameter of mutual visibility. Each artist can immediately become present at the other locations and exert influence on them. The instantaneous feedback of the telematic activities permits a precise control of the interplay.[5]

The artists used data gloves (Stocker), arm interfaces (Zabelka), a MIDI saxophone (Gruendler), or a graphical interface (Gruendler, Zabelka) to play instruments and robotic devices at other locations. They—and the respective audiences—could see glimpses of the remote participants on video monitors. But what is more, they saw the effects of their movements and actions on the situation at their own space: Marimbas, the violin robot, the drums, the guitars played as if touched by the hands of ghosts. The art historian Romana Froeis wrote in *TRANSIT #1:*[6]

The telematic simultaneous concert CHIP-RADIO rendered processes in the electronic space physically and psychologically perceptible, which per se remain incomprehensible. . Salzburg transmitted its spatial acoustic together with the sounds from Innsbruck, to Dornbirn. There they were enriched by the local spatial acoustic and sent on to Innsbruck and so on. The circulation of the loop of spatial sound could have easily turned into an acoustical feed-back situation, if Andres Bosshard had not programmed it as a very differentiated spatial mix.

A short text written by Hoertner, who had been responsible for the network design of *CHIP-RADIO,* concluded:

The main part of the work on this network was determined by software development and the coordination of the protocols of computers and robots. The main problem was the exchange of quite gigantic quantities of data for the requested behaviour in realtime. . a successful performance and the transmission of the musical events via radio—both of them of captivating quality—were the answers, which the artists were capable to formulate with the help of this (network-) installation.[7]

Artists as Experts

> *CHIP-RADIO* confronts the distributive mass-media radio with the reality of intercommunicative networks in order to—within this field of tension—arrive at a sounding of the potential of both media.
>
> —On-line project description

An important part of the history of electronic music, radio drama, and Ars Acustica was possible only because of the access artists, composers, and authors had to state-of-the-art production studios and to the policy of cultural broadcasting by the national public radios, both in Europe and elsewhere. With their attempt to bring something of the elastic "horizontality" of the networking experience to the rigid, producer-oriented "verticality" of the public-radio institutions, artists began to become interested in gaining access to the administrative and technological infrastructure of transmission itself.[8] This shift also implied a profound change of the relationship between the artists and their counterparts inside the organizations. This relationship required a type of artist/technician/media expert who was capable of motivating engineers, producers, and administrators alike to become allies and/or innovative partners in the realization of art projects, sometimes against considerable resistance by colleagues and superiors. In the first half of the 1990s, these artists often were much more aware of the impact of digitalization on older communication technologies—and on culture and art generally—than most of the professionals inside the big institutions of public broadcasting (or of commercial broadcasting for that matter).

"REALTIME"
December 1, 1993, 11:45 p.m.
A telematic concert-performance in real-time, which takes place simultaneously at the regional studios of the National Austrian Radio and Television (ORF) in Graz, Innsbruck and Linz and is broadcast live on TV and radio.

REALTIME uses all available video-, sound- and data-networks for the interaction of the protagonists present at the three provincial studios. From this interaction the live-broadcasts are produced in real-time. . For this purpose, the three studios are connected by a circular data-network.

REALTIME as broadcast on radio is not the stereo-version of the TV sound and REALTIME on the television-screen is not just the image to the sound. The two

per se autonomous broadcasting spaces form a joint location for the medial representation of what is happening.

Graz:
Isabella Bordini—voice, performance
Gerfried Stocker—sound sampling

Innsbruck:
Andres Bosshard—cassette-machinery, live sound mix
Hörst Hoertner—performance
Mia Zabelka—violin

Linz:
Roberto Paci Dalò—clarinets, electronics
Waldemar Rogojsza—voice, performance
Tamas Ungvary—computer music, computer-animation
Kurt Hentschläger—computer graphics
Michael Kreihsl—lighting, TV-production
x-space: Hörst Hoertner, Gerfried Stocker - network design, interface design
Martin Schitter—programming
Andres Bosshard: sound design
Hans Soukup and others: ORF radio and TV engineering[9]

The artists involved in *CHIP-RADIO* and *REALTIME* came from very different backgrounds. I have already referred to Zabelka's earlier projects and her important role in *CHIP-RADIO,* to which she brought Bosshard, just as she introduced the well-known electroacoustic composer and specialist in composer-machine relations Tamas Ungvary, who was teaching in Vienna at the time, to *REALTIME.*

Bosshard had already realized three huge outdoor sound projects prior to joining the *CHIP-RADIO* team, including *Telefonia* (1991), an intercontinental telematic installation connecting Winterthur, the Saentis mountain (both in Switzerland), and New York (with Ron Kuivila).

Gruendler, could be said to represent a second generation of Austria-based telecommunication artists influenced by Richard Kriesche and his conceptual, deeply critical attitudes toward technology and the definition of the role of art and artists in society, whereas Stocker and Hoertner (working together as x-space since 1990) represented a third generation. In 1992–1993, Stocker (as a cocurator) and Gruendler (as one of the main contribu-

tors) were deeply involved in "ZERO—the Art of Being Everywhere,"[10] a year-long project formulated by curator (and arguably first-generation Austrian-based communications artist) Robert Adrian X.[11]

Kurt Hentschlaeger was already working with Ulf Langheinrich on their ongoing project *GRANULAR SYNTHESIS.* An early version, Model 3.02, performed in December 1992, was a TRANSIT production at the regional ORF studio in Innsbruck with the remote live participation of a dancer at the regional studio in Salzburg. Hentschlaeger, as part of the group Pyramedia, had also been involved in the organization of the Austrian participation in the legendary live TV and network project *Piazza Virtuale* by Van Gogh TV at Documenta 9 (the Austrian group also included Hoertner and Stocker and involved ZERONet, a bulletin board system for artists originally part of "Zero.").

Isabella Bordoni and Roberto Paci Dalò had been pursuing their ongoing project in progress *Giardini Pensili* since 1985 within many media, at many locations, and with the cooperation of many other artists, musicians, and writers. Their multilayered work led them almost automatically into the field of new technologies. By 1993 they were also running the international festival L'Arte dell'Ascolto, which over the years dealt with a changing notion of an extended (networked) radio art under the impact of new technologies: "In the development of art projects in electronic space today, we cannot avoid the beauty of a continuous interchange between old and new technologies."[12]

Problems of Documentation

> Such art-events are unrepeatable, they can only be further generated. That is also why they challenge traditional definitions of concepts such as author, copyright, originality and virtuosity: they lose their authority.
>
> —R. Froeis

It is physically impossible to experience networked projects that are simultaneously produced in separate locations other than as versions: The project as a whole eludes human perception. This aggravates the already serious problems of documentation and interpretation common to all fugitive, process- or time-based art projects, with the unfortunate result that many distributed telematic projects have been insufficiently documented and hardly

interpreted at all. One such project was the seminal *RAZIONALNIK* (1987), which added the phenomenon of telepresence to the exchange models of simultaneously produced and networked art. *RAZIONALNIK* was initiated, organized, and programmed by Gruendler and Klammer in Graz with partners in Budapest (Gabor Plesser), Ljubljana (Lado Jaksa), and Trento (Claudio Carli) (figure 15.2). Just as with many other projects that were realized within the frameworks of festivals or exhibitions, all that remains[13] is a description of the artists' conception in a catalog published before the event:[14]

Acoustic couplers, samplers (digital storage of nature sounds), synthesizers, personal computers and the international telephone network are the means to connect musicians from different countries. These connections make it possible to realize a concert, whose musicians are not in the same space, but realize a collaborative concert from different countries. They use instruments, which are not producing sounds, but so-called MIDI data. These data are either transformed into sounds by sound modules, or they are converted by computers and acoustic couplers into data which can be transmitted via telephone. At the other end of the line these data are again rendered into MIDI data and after that into sounds. The sound material used consists on the one hand of sampled sound quotations, and on the other hand of traditional synthesizer sounds, produced by all of the musicians. The result can be heard live, in Graz as well as in all the participating locations. Due to the data delays, not one of the locations will offer the same sounds simultaneously. In Graz, the computers will additionally manipulate the MIDI data according to certain algorithms, i.e., the computers not only are converting data, but also take on an important role in the structuring of the concert. Each participant, by his personal choice of sounds, is granted the possibility to render the concert at his local site into a very special version by transforming his own or the MIDI data received from Graz.[15]

The installation of *RAZIONALNIK* in the exhibition Entgrenzte Grenzen (Debordered Borders) did not take place exactly as envisioned in the documentation in the exhibition catalog, just as a planned CD of the project could not be produced because, according to the artist; "out of ideological reasons, the sound-engineer in Graz refused to do the arranged recordings."[16] As it turned out, Carli, in Trento, was not able to participate because of a strike of the Italian post office. Before the event, Gruendler and Klammer, who sometimes called themselves "media-musicians" in analogy to the "media-artists" with whom they frequently collaborated, were obliged to travel to

Figure 15.2 Seppo Gruendler (left) and Josef Klammer, performing *RAZIONALNIK* in Graz, 1989. Photo: *KUNSTRADIO* Archive, Vienna.

all the locations of *RAZIONALNIK* to personally brief the participants "due to the newness of the technology. . Because of the Coordinating Committee for Multilateral Export Controls (COCOM) list—which prohibited the import of computers into the East—we also had to smuggle acoustic couplers (300 baud) into Hungary. . As PTO-approved [Post and Telecommunications, Austria] modems were prohibitively expensive in Austria we smuggled German parts into Austria." From these parts the artists built the modems (1200 baud) for their Commodore C64 computers in Graz. The program to convert the modem data into MIDI was written by Gruendler. During the event, "the slow data rate led to big delays, e.g., a chord would turn into a melody; there were great difficulties in keeping the lines up, we had to redial several time. Most people [in the audience at the Kuenstlerhaus in Graz] believed that we were playing in analogue via telephone."[17]

As a result of the efforts of the artists, *CHIP-RADIO* and *REALTIME*, both of which of course owe a great deal to *RAZIONALNIK*, are unusually

well documented. But although the projects took place with several sound engineers on hand, no separate recordings exist of the two separately fed radio-stereo channels of *REALTIME.* Also, in spite of the clear structure of the two projects with their three equal nodes in one country/time zone and the relatively small number of artists involved, the unique opportunity to document how such networked collaborative projects come about was not pursued, even though it was one of TRANSIT's original aims to develop new approaches to the issues of documentation of (as was known from telecommunication art) basically undocumentable (and unrepeatable) projects. However, x-space took on the task of producing a video from the qualitatively uneven visual material from the three different locations of *CHIP-RADIO,* using the radio version as the soundtrack.[18]

It was this video documentation of *CHIP-RADIO* that provoked the artists to think about the possibility of developing a new project that would directly involve not only radio but television, and soon we began to speculate on the possibility of including one of the two Austrian national TV channels as a further extension of such a project and a "window" to its telematic stage.

Simple sound and/or video recordings of such technically complex and physically dispersed events can never reach beneath the acoustic or optic surface to disclose the events' structural depth, but the emergence of the Internet gave reason for hope that this depth might be revealed. When x-space went on line with its Web server in 1994, it immediately discovered the potential of the World Wide Web, not only as a medium for new telematic radio projects, but also for the documentation of their precursors such as *CHIP-RADIO* and *REALTIME.*

REALTIME

> What I remember best is the process of collaboration and the intensive discussions between us as colleagues/friends at long face-to-face meetings most of us had to travel to. This process was as interesting, maybe even more interesting than the result itself.
>
> —Kurt Hentschlaeger, 2002

The preparation of *REALTIME* took more than six intensive months. The artists lived and worked at different locations and were obviously in close con-

tact with each other and also with the ORF technicians allocated to the project, especially Hans Soukoup in Innsbruck. The meetings, some of them over entire weekends, led to the collaborative development of the overall concept and many of its details as well as to a distribution of tasks among the artists. Bosshard took on the acoustic design; Dalò became responsible for the "theatrical" production and Hentschlaeger for the graphic design of the live TV program; x-space again got involved in the network design (Hoertner) and the development of remotely controlled instruments and interfaces (Stocker):

> With the help of a helmet-like apparatus worn by Hörst Hoertner in Innsbruck, the head movements of the artist were registered by a computer which translated them into digital control codes. Via data lines a robot camera in Linz was directed synchronously to the head movements.
>
> Gerfried Stocker in Graz used data gloves to reach through the electronic space to play robot-instruments and computer-controlled sound sculptures distributed in Innsbruck and Linz.
>
> On the ceiling of each of the three studios a rotor with tubes was installed. The speed of the turning of the motors and thus the pitch and structure of the sounds produced by the tubes could be controlled in real-time via the data network by Roberto Paci Dalò in Linz on his clarinet.[19]

Zabelka in Innsbruck used wrist interfaces to interact once again with Martin Riches' violin robot, which was equipped with a network interface.

An additional "level of reality" extended the interaction of Zabelka's violin with the robotic violin as Ungvary, in Linz, not only controlled sequencers in all three studios with his fingertips, but also used his "Sentograf" to activate an animation program to produce virtual violinists who, via video line and "blue box" tricks, joined the "real" Zabelka and the electromechanical violin robot.

The various "instruments" created for *REALTIME*—and the wide scale of different body movements required to activate each instrument—were deliberately intended to enhance the dramatic power of the images visualizing the relationship between the actions of the performers in one location and their results in distant places. The instruments also elaborated on the concept of the wired "space bodies" to which Zabelka had referred in her earlier performances with her shiny skintight suits evoking female figures in popular

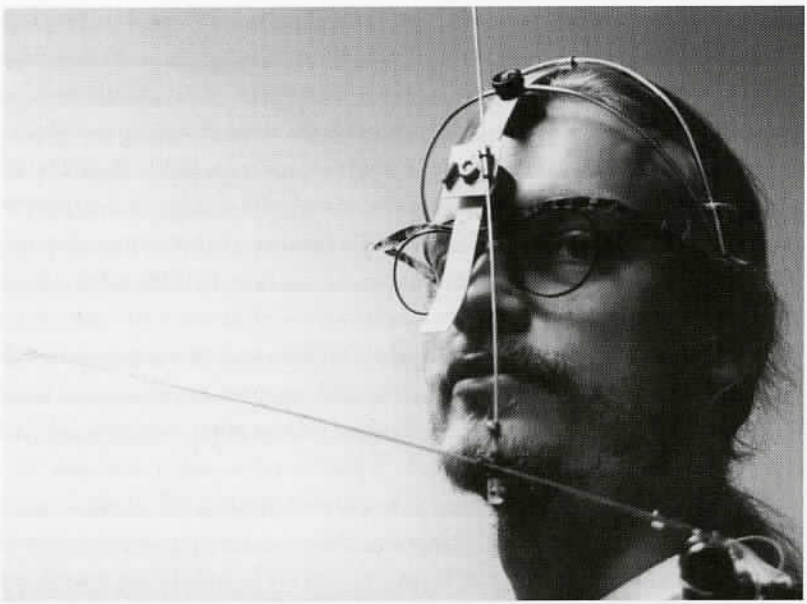

Figure 15.3 Hörst Hoertner, performing *REALTIME* in Innsbruck, 1993. Photo: *KUNSTRADIO* Archive, Vienna.

science fiction. The giant mixing console in front of Bosshard's half-hidden body, Ungvary's assemblage of computers obeying the finest vibrations of his fingertips; the vocoder taped to Bordoni's face that sometimes equipped her with a deep voice, contrasting sharply with the features of her very feminine, almost childlike face; the huge and expressive data gloves at the end of Stocker's arms or Hoertner's "helmet" (figure 15.3)—all had cyborgian qualities. On the other hand, these qualities were ambivalently toned down by the grey retro business suits the male performers wore in response to Dalò's stage instructions:

In REALTIME the image is again not corresponding to the technology. Clearly old fashioned costumes referred to the beginning of television broadcasting, in order to establish a discordance between the image, the sound and the concept as a whole. Roberto Paci Dalò himself, playing the clarinet recalled the old figure of the traditional soloist while the violinist Mia Zabelka with her wired wrists and clad in a waisted dress with a wide skirt acquired a puppet-like quality reminiscent of "The Tales of Hoffmann."

REALTIME

The Transparency of the Medial Space

The great challenge of the project REALTIME lies in the creation of an interface between the different levels and spaces of action, which is equally accessible to the radio, TV and on site-audiences: acoustic and visual entry points for the communication among the protagonists as well as for the intermedia projection of what is happening, into the transmission spaces of radio and TV.

The distributive one-way media radio and TV present special problems:

- the necessity, to represent synchronous parallel processes in real-time,
- to capture the simultaneous collaboration in the three regional studios,
- to condense the constant tele-presence of the performers into a comprehensible tele-representation.[20]

Michael Kreihsl,[21] commissioned by ORF to direct the TV version of *REALTIME,* decided to adhere to a documentary technique to translate the "found facts" of the complex networked events at the three (almost identical) locations onto the TV screen. In his visual narrative he avoided explanatory means: For about half of the program time, the viewers had the impression that what they saw was taking place in only one location. It was only when the director began to use split screens that the three different geographical locations of the protagonists revealed themselves. Kreihsl said he employed this technique because he wanted the viewer "to discover more and more on their own. In this way, s/he is collaborating."[22] Much attention was paid to the lighting of the three studios, which avoided the usual undifferentiated TV atmosphere and worked with high contrasts.

To the layer of "real images" created by Kreihsl's orchestration of the TV cameras, Hentschlaeger added layers of live computer-generated and -controlled "artificial images" as well as graphical elements such as backgrounds, textures, fonts, and masks, thus emphasizing the flat surface character of the screen/window within a much deeper networked architecture of real and virtual spaces. Bosshard navigated the "the complex soundstructure of the event from his own special matrix-mixing-console in Innsbruck via a circular architecture of audio-lines"[23] especially designed by him to link the three locations, to which he added his own spatial loudspeakers to create immersive sound installations for the live audiences in the studios.

He also challenged viewers/listeners to play the role of potential collaborators, in that they were requested to rearrange their TV and radio loudspeakers to realize the full spatial potential of the three audio channels (the mono channel of the TV and the two channels of the stereo radio), which Bosshard fed separately with live sounds:

The atmosphere, the resonance between the three channels creates a space. While on TV only an excerpt can be seen, this space is three-dimensional. Like a hologram. This space-sound evolves, if Oesterreich 1, the radio station is tuned into sstereophonically—for best results in the back, while ORF 1, the TV station, with its one channel sounds in the foreground of the room.[24]

In spite of the innovative nature of *REALTIME* and the project's many new and largely untested elements, the artists, sound engineers and TV crew had only three days (and nights) to prepare the on-site locations, the transmission parameters, and the collaborative virtual network space. After the event, Stocker recalled:

While the TV crew directed by Michael Kreihsl was busy coordinating the positions of the 12 cameras and the lighting of the three entrance halls, and Andres Bosshard, after a process of minute planning, worked—via intercom—and together with sound-engineers of the ORF on the arrangement of loudspeakers and microphones to tune the spaces, the complete level of the interaction of body-interfaces and robots was implemented into the network structure between the studios by Hörst Hoertner, Martin Schitter and myself.

We worked for three days pretty much around the clock and were connected to each other on the different levels of the network. We could hear and see each other at all times, the computers were networked, the software was exchanged and further developed via modem.

A completely unique laboratory-situation evolved. None of us had ever before spent such a long time without interruptions within such a virtual space of immediate tele-presence.[25]

The event itself lasted only thirty minutes, and of course, it was the pressure of TV that dictated such a short (and late) broadcast time (the TV program slot in which *REALTIME* unfolded was)—appropriately—called *Around*

Midnite). The transgression of this dictate of broadcasting times for a series of networked radio projects came a few years later: on air, with the extension of broadcast nodes into different time zones around the globe, which made a twenty-four- or eighteen-hour project framework necessary,[26] and on-line and on site with the streaming technologies of the World Wide Web and their potentially unlimited time frame, as well as the resulting pull from performances to installation-like events.

Although many, like Hentschlaeger, are still awed in retrospect by the networked bandwidth available for *REALTIME*'s visual elements, the project remained essentially outside the traditions of television and especially of so-called multimedia formats. Rather, this and later telematic radio projects reflected the hybridity of networks and mass media, of bodies and machines. And rather than believing in their convergence into one great medium, the artists, just like other specialists in the practice of media, detected an intermedia situation, with processes of constant "remediation" between older and new media—a situation in which each of the loosely and often temporarily collaged channels demands that one pay specific attention to it without losing sight of the channels' essential interconnectivity.

Notes

1. *Die Geometrie des Schweigens* [The Geometry of Silence] (catalog) (Vienna: Museum Moderner Kunst Stiftung Ludwig, 1991).

2. As a precursor to *Space Bodies,* Zabelka had realized *Drahtvenuskoerper* (Wire-Venus-Body, December 1990), a "radio-performance for live-telephone-violin and -voice," in which the artist performed and mixed her material not in the studio from which the program was transmitted, but in a small production studio on a different floor of the broadcasting house in Vienna. Thus, she made use of the wiring between studios in such a building as one part of the infrastructure of her live radio project, which also included telephone lines to transmit the sound of a live violin and/or voices from a distant answering machine. In both performances, as later in *CHIP-RADIO and REALTIME,* the/her body wired/interfaced to machines and networked transmission technology was part of the content of her performance.

3. From the introduction to the radio version of *Space Bodies,* December 12, 1991.

4. From the *CHIP-RADIO* brochure prepared for the Prix Italia, 1993.

5. From the description of *CHIP-RADIO* by Gerfried Stocker. This and other project descriptions can be found at <http://gewi.kfunigraz.ac.at/~gerfried/>, the home page of x-space (Gerfried Stocker/Hörst Hoertner). The x-space homepage is mainly in German; the translations used here are my own.

6. Romana Froeis, "Chipradio," in *TRANSIT #1, Materialien zu einer Kunst im elektronischen Raum,* ed. Heidi Grundmann (Innsbruck, Austria: Haymon Verlag, 1993).

7. Hörst Hoertner, ""Network Design Chipradio" in *TRANSIT #1, Materialien zu einer Kunst im elektronischen Raum,* ed. Heidi Grundmann (Innsbruck, Austria: Haymon Verlag, 1993), 60–61.

8. There are some impressive examples of such a shift toward the use of broadcast transmission technologies prior to the use of computer networks in radio art, among them projects by Max Neuhaus (notably *Radio Net,* 1977) and Bill Fontana. All explored issues of simultaneity and live radio connectivity. s.a.: ZEITGLEICH, German/ English. ed.: TRANSIT a.o., TRITON, Vienna, 1994 and <http://kunstradio.at/ ZEITGLEICH/>.

9. From the announcement of *REALTIME,* a folder sent out by mail that served as an invitation to onsite audiences in the three performance locations as well as to radio and TV audiences.

10. "Zero" included ZEROnet, a bulletin board system for artists, and produced the symposium ON LINE – Kunst im Netz. s.a. ZERO – the Art of Being Everywhere. Ed.: Steirische Kulturinitiative, 1993, Leykam Buchverlagsgesellschaft, Graz. ON LINE – Kunst im Netz. Catalogue of a ZERO- symposium. German/ English Ed: Helga Konrad, Steirische Kulturinitiative. Graz, 1993. ISBN 3-901334-00-9

11. Like that of many other artists, including some of those those involved in *CHIP-RADIO* and *REALTIME,* Robert Adrian X's understanding of the relationship of technology, media, society, and art had been poisoned by the Gulf War.

12. Isabella Bordoni and Roberto Paci Dalò, "Lingua Madre," a paper on opera and digital technology, languages and translation, voice and text and the dangers of radio, in *TRANSIT,* ed. Heidi Grundmann ZEITGLEICH (Vienna: Triton, 1994), p. 111 available at <http://kunstradio.at/ZEITGLEICH>.

13. There is one photograph of the performance in Graz, which was published as an illustration to a text by Richard Kriesche. s. "Im Netz der Systeme," *Kunstforum* 103, (1989). (Catalogue of Ars Electronica Festival, 1989).

14. *RAZIONALNIK* was part of the exhibition/series of events Entgrenzte Grenzen, initiated and curated by Richard Kriesche.

15. Translated from the exhibition catalog: Richard Kriesche, ed., *Entgrenzte Grenzen,* Graz, 1987, "kulturdata", Sackstrasse 22, A 8010 Graz.

16. This and the following quotations in this paragraph are from the transcript of a short conversation in which the two artists tried, in 2002, to recall their project. An e-mail containing the transcript reached me on October 3, 2002.

17. Just as with most of the networked projects of the 1980s and 1990s, what is usually untold is the story of the total self-sacrifice of the artists (and technicians motivated by them) involved in such projects and the resulting exhaustion after the event. With *RAZIONALNIK,* Gruendler and Klammer, who had not slept for four nights, fell asleep at their table at a Graz cafe while having an after-event drink. With *REALTIME,* which I witnessed in the foyer of the regional Broadcasting House in Linz, one of my most lasting impressions is seeing—no doubt in a state of great relief as everything had gone very well—the feet of Martin Schitter, who was asleep on the floor under his computers as soon as the signature tune was played to close off the live event on radio and TV.

18. The audio recording and the video of *CHIP-RADIO* were so impressive that in 1993, the radio version was sent to the prestigeous Prix Italia competition as the official contribution of the ORF in the category of music. The project was also awarded a honorable mention at the Prix Ars Electronica. One year later, in 1994, *REALTIME* was listed second to the Golden Nica for interactive art at the Prix Ars Electronica.

19. The description is a summary of part of the online documentation of REALTIME submitted to the Prix Ars Electronica.

20. This is a quote from the project description of "Realtime" submitted to the Prix Ars Electronica.

21. Kreihsl, at the time a freelance TV producer, in the meantime has become a well-known Austrian theater and film director.

22. Michael Kreihsl, <http://gewi.kfunigraz.ac.at/~gerfried/bio/kreihs2.html>.

23. Andres Bosshard, a quote from the project description of "REALTIME" submitted to the Prix Ars Electronica.

24. Andres Bosshard, in the introduction to the radio version of *REALTIME,* December 1, 1993.

25. Quoted on the x-space Web site <http://gewi.kfunigraz.ac.at/~gerfried>.

26. Horizontal Radio, <http://kunstradio.at/HORRAD/horrad.html>; Rivers and Bridges, <http://kunstradio.at/RIV BRI/index.html>