MACHINE LANGUAGES:
THE DIGITIZATION OF THE SOCIAL

by

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Abstract

Machine Languages is an interdisciplinary project encompassing work in computer music, dance and digital video, and featuring an immersive eight-channel loudspeaker configuration, video projection and live performance. The five pieces that make up the project call upon conventions of soundscape composition and "glitch" computer music to both highlight their own technological constructedness and refer to a broader, real-world context. Referring to spaces as diverse as Latvia, Turkey and Burnaby Mountain, and relating to a broad range of technologies including the human body and the new digital machines of war, *Machine Languages* aims for a critical engagement with technology as well as the configuration of a new "spatial politics" which honours the specificity of particular soundscapes while attempting to avoid exoticism and nostalgia. This project proceeds from the premise that if digital technology plays an increasingly important role in the social and cultural practices of our digitized and networked globality, then these five works can offer an alternative not only to the abstraction and homogenization of space in late capitalist modernity, but also to the technological triumphalism which prevails in "Information Technology" marketing rhetoric as well as in much "new media" and digital culture in general.

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Introduction

The practice of digital art today takes place within the context of what I call "the digitization of the social," which is the steadily increasing role of digital technology in the political, economic, and cultural aspects of social practice. This gradual social digitization has many facets, including the effects of computerization on the production, dissemination, and nature of knowledge in late capitalism (Lyotard 1984); the role of digital technology in the transitions from the industrial, production-oriented, political economies of modernity, to the "postindustrial," information-oriented, political economies of global(ized) postmodernities (Ibid.); new formations of digitized warfare (De Landa 1991) which form an increasingly common and integral part of the new political economy (Hardt and Negri 2000, 2004); "the rise of the network society" (Castells 2000), in which the concept of the network becomes an organizing principle for everything from communications technology to social organization and power relations; as well as the popularization of "new media" within the sphere of cultural production (Manovich 2001), and the move towards a greater role for digital technology in the production and dissemination of culture generally. These passages to a digitized social formation do not fully determine the practice of digital art in the so-called "Information Age," but nor are they fully independent of it. The relations between digital art practice and its digitized, networked social

context are multiplicitous and often conflicted. The purpose of this essay is to explore some of the ways in which my project, *Machine Languages,* interfaces with a social context that is increasingly mediated and shaped by digital technology. Section 1 will develop the idea of the digitization of the social and examine the relation between it and *Machine Languages.* Section 2 will develop the idea of a spatial politics and the ways in which that manifests in two key genres of electroacoustic music – glitch and soundscape composition – that have formed the main influences on *Machine Languages.* Section 3 will summarize the project itself, and describe the main features of each of the five pieces that make up *Machine Languages*, discuss the project's staging, evaluate the success of the project, and suggest some directions for future work. Let us begin by examining *Machine Languages* in relation to what I call "the digitization of the social".

Machine Languages and the Digitization of the Social

The concept of the network has become a central metaphor in the understanding of postmodernity. Foucault, for example, has written extensively on the way in which power relations in the late modern and postmodern period are organized like a network that infuses the social field as a whole (see, for example, Foucault 1990, ch. 2). Deleuze and Guattari's notion of the rhizome as form for the organization of knowledge is also arranged much like certain kinds of network: decentralized, diffuse, a product of assemblage and concatenation rather than of centralized control and hierarchy (Deleuze and Guattari 1987, Introduction).

Alongside these theoretical deployments of the notion of the network, this notion begins to also manifest on a technological level, beginning with Paul Baran's paper "On Distributed Communication" (1964), which advocated a distributed military communications network which could better withstand nuclear attack because of its absence of a single center of command, and later the development of the ARPA network by the US military during the Cold War period (Gere 2002). The rise of the Internet in the 90's, and the corresponding explosion of computing generally, has seen an application of the technology of digital networks to an ever greater number of areas in the social realm, and we are thus witnessing a process which I call "the

digitization of the social," in which the social realm itself is not only increasingly infused by digital technology, but actually reorganized according to the logic of digital technology and distributed networks. Some examples of this are

- the transformation of commerce through the rise of "e-commerce", economic globalization – which, as Castells (2000) points out, is increasingly mediated by digital technologies – and the formation, development, and sustaining of transnational corporations through digital and networked communications technology (Castells 2000);

- the increasingly sophisticated application of computing and digital networking to military technologies which have sometimes transformed the historically centralized chains of military command (DeLanda 1991);

- the Internet as a site for new forms of collectivity and collaborative creation, such as the GNU/Linux operating system (www.linux.org) and "open-source" software generally (www.opensource.org, www.gnu.org), net-based activism such as Indymedia (www.indymedia.org), which provides a generally accessible forum for the publication of alternative media, and the rise of "wikis," "peercasting" and other "social software," which facilitate the collaborative creation and distribution of online content;

- and the rise of "new media" (Manovich 2001), along with the steadily increasing role for digital technology and the Internet in the production and dissemination of culture generally.

On a technological level, none of these "postmodern" developments ultimately constitutes a radical break from modernity. The familiar binaristic reductionism of digital technology, with its Aristotelian heritage, is, after all, what Brady Cranfield (2002) calls "the virtual embodiment of Western rationality," and Charlie Gere (2002, ch. 1) has shown how the technology now in the process of undermining traditional forms of modernity and facilitating the passage to a digitized postmodernity was itself determined by specific socio-historical trajectories of the modern era, such as capitalism, the imperialist warfare of World War II, and the Cold War between the US and the USSR. What is new is that the extent and the nature of the social applications of the technological spawn of modernity are rapidly facilitating the dissolution and disillusion of that very modernity. It should also be noted that "the digitization of the social" is by far an incomplete project. As of yet, networking technology is far too primitive to actually implement its complete infusion into the social realm. However, such developments as the rapid advance of wireless networking technology will most likely tend to make digital networks co-extensive with space itself in the areas where this technology becomes widely available and reliable, and this in turn may enable further social transformations that are at least as radical as those introduced by digital technology so far. And finally, although the "digital divide" will most likely continue to structure the global patterns of access to

digital technology along class lines, one should not imagine that "the digitization of the social" will have no impact on those areas where such access is not widespread. As long as institutions such as the IMF continue to mandate "structural adjustment" and the like for "Third World" countries in order to better service the digitized capitalism of the "First World," even those who have no control over or direct access to "the digitization of the social" will be affected by it in ways which are anything but abstract.

In the sphere of cultural production, the rise of the network and digital technology is having a profound influence on the development of modes of cultural production and dissemination. In recent years, for example, the traditional distinction between computer music and electroacoustic music has begun to break down, as more and more "electroacoustic music" is being produced more or less exclusively with digital technology, given that personal computers have become more affordable (at least for those of us on the right side of the "digital divide"), more powerful, and more pervasive (Truax 2000: 119). Mailing lists and Internet communities provide avenues for cultural producers to share resources and information, and recently, entire genres of electroacoustic music and sound art have sprung up more or less completely in relation to such communities (e.g., "glitch" computer music in relation to the microsound website and corresponding email list at www.microsound.org, and phonography in relation to the phonography website and email list at www.phonography.org). And there is, at least in some circles, an increasing trend towards Internet-based distribution of music in the form of

downloadable sound files and a corresponding trend away from distribution in the form of physical commodities such as CD's.

It is easy to overstate the long-term significance of these trends on music distribution generally. It remains to be seen whether the utopian rhetoric espoused by those who advocate the notion of a "Creative Commons" (www.creativecommons.org) or the supposedly subversive effects of (mostly illegal) "file-sharing" on the corporate music industry will have any lasting effect. These trends are certainly increasingly under siege by political developments such as software patents and technological developments such as "trusted computing" (more aptly termed "treacherous computing" by free software advocate Richard Stallman), both of which aim to increase corporate control over the production and uses of digital technology. The completion of *Machine Languages* would have been largely impossible if such control was more firmly entrenched than it has been up until now, which perhaps amplifies the cultural consequences of what I am calling the digitization of the social.

Machine Languages is located at this juncture of the social and the digital that I have been describing here. Not only is the work itself more or less completely produced through the use of the same kinds of digital technology that are in the midst of transforming other areas of the social sphere, but the source sounds for the pieces are often either directly downloaded from the Internet or were acquired by virtue of email communication with the original recordist. In the case of *Karosta*, for

example, which is discussed in more detail in the last section, the sounds were initially digitally recorded in Latvia by Holland-based sound artist Derek Holzer, and then posted to his website. I downloaded those sounds from his site and, with his permission, used them as source sounds for this piece. Similarly, the piece *Istanbul* derives from sounds digitally recorded in that city by Turkish composer Erdem Helvacioglu. Having long discussed doing a project together, we decided to work on a transnational, Internet-based sound exchange, by which I sent him sounds from Vancouver and he sent me sounds from his city. My piece *Istanbul*, which forms part of the present project, is my half of this exchange. Further, much of the software used in this project is "open-source," meaning that it is collaboratively developed by an open community usually consisting of volunteers, and can be copied and distributed freely, and therefore, much of the production of the work is based on a spirit of sharing and collective production. Though, as Janet Wolff (1993) has argued, all art is collectively produced by virtue of the reliance of artistic production on a pre-existing social framework, *Machine Languages* was deliberately produced with this sociality in mind, and, at its completion, will be available on the Internet and licensed under a Creative Commons license so it can be freely used, copied, and distributed by others as a continuation of this sociality. This is an attempt to harmonize with a particular conception of cultural production and distribution in the context of digitization, and one which implicitly opposes the model advanced by those corporations who advocate "Digital Rights Management" and other such strategies to limit and control the copying and distribution of digital culture.

What I am suggesting is that there are many possible outcomes for the tendency that I am describing as the digitization of the social. It can perhaps lead just as easily to a society in which technology is engaged in the service of the consolidation of power as to a society in which technology is used as a tool for the creation of collectivities, collaborations and coalitions among a globalized citizenry. It is no longer a matter of ignoring or refusing this technology, as leftist Luddisms of the past have been tempted to do. If the digitization of the social is tending towards the remaking of society in the image of the network, then the choice is no longer as to whether or not to join the network, but what to do with one's connection to it. For me, *Machine Languages* is an attempt to respond to the digitization of the social without either uncritically embracing it or naively rejecting it, and I give the name "critical engagement" to the balance between a conscious criticality on the one hand and an engagement with the technology on the other. *Machine Languages* is a critique of certain aspects of the digitization of the social that nevertheless proceeds – indeed, which gains its critical force – precisely by being part of that digitization. The very "digitality" of the work becomes a layer of its meaning (as we'll see in my discussion of glitch in the next section).

If *Machine Languages* is partly an exploration of the way in which the conception and organization of space is becoming increasingly mediated and influenced by digital technology, then it aims to do this by incorporating the insights of two genres of electroacoustic music: "glitch" computer music and soundscape composition. The one seemed to me to offer a way in which

computer music could make explicit its own technological constructedness, and the other offered a way for computer music to relate to a recognizable social context. The next section is a discussion of the influence and confluence of these two genres in my project, along with an analysis of the "spatial politics" of these two genres and how those politics became a part of my work.

Electroacoustic Music and Spatial Politics

Although music (and indeed video and dance) are usually considered time-based art forms, in this section I will be considering the role of space in relation to my project, where by "space" I mean a kind of relational ground for physical and social reality. In particular I would like to examine the notion of what the American anthropologist and geographer Jeremy Crampton (2003) calls "spatial politics":

> Social life is inherently spatial. This does not only mean that our experiences "take place" in a spatial way, but that fundamentally we "are" spatially. As existing beings we live in, open up, shape and are shaped by spaces and places. We cannot be in the first instance without being in space (Crampton 2003: 1).

If there is thus no way to conceive of a social realm without some notion of space, then, as the British geographer Stuart Elden argues, following Heidegger, "there is a politics of space because politics is spatial" (Elden 2001, quoted in Crampton 2003: 63), and indeed, politics and history are rendered thinkable only by virtue of their location in a spatialized context:

> [Elden] recovers from Heidegger the idea of the *polis* as the site of human existence (an idea that was lost when *polis* was simply translated as "city" or "city-state"). The *polis* rather is the site and abode of human history.[...] As a spatialized entity (site, abode) it is what constitutes the political and allows us to rethink it (Crampton 2003: 63).

Similarly, Henri Lefebvre has examined the notion of what he calls "the production of space" (Lefebvre 1991), in which space is seen not as a neutral medium separate from social life, but as a social reality which is always already imbued with power relations, and the organization of which – from the construction of shopping malls to the tragedies of social displacement – proceeds in relation to the exercise of hegemony (Lefebvre 1991: 9-11). For Lefebvre, space is a politically contested terrain, and indeed, a necessary condition for politics itself: "What is an ideology without a space to which it refers, a space which it describes, whose vocabulary and links it makes use of, and whose code it embodies?" (Lefebvre 1991:44).

If, following Crampton and Elden, social life is inevitably spatial, and if, following Lefebvre, space is itself socially produced, in the sense that the organization of space is a function of power relations, then the understanding of the ways in which music relates to its social context can be based on an analysis of the ways in which it relates to space – in other words, its spatial politics. I will thus proceed here with an analysis of the two main influences on this project – "glitch" computer music and soundscape composition – in terms of both their defining characteristics and their spatial politics.

The first major influence on my project, a genre known as glitch, is a movement within the field of digital audio production that emphasizes the glitches, errors, and noises that are inherent in the digital audio medium. Cascone (2000) uses the term "aesthetics of failure" to describe this tendency, and Cranfield (2002) and myself (Thomson 2004) suggest that

these failures can offer an implicit critique of the supposed "perfection" of digital audio technology, as well as a critique of the political economic context in which these technologies exist; if giant entertainment corporations are becoming ever more reliant on digital technology for the delivery of multimedia content, then glitch can potentially provide a valuable critique of the technological triumphalism which is implicit in much of the corporate rhetoric. For this reason, Cascone (2000) situates glitch within a rubric of what he calls "post-digital" tendencies in contemporary computer music, a field which includes both computer music in the historical sense of computer-based music produced in research-based institutions and often (still) informed by a modernist or avant-garde sensibility of experimentation on both the technical and aesthetic levels, as well as experimental producers operating largely outside of an institutional framework, which is where Cascone situates the production of glitch. For Cascone, "post-digital" does not mean "non-digital," but rather refers to a certain spirit of sceptical – or at least ambivalent – and critical engagement with digital technology, an attitude which certainly characterizes much glitch music.

In this critical self-reflexivity, glitch perhaps parallels some structural and material filmmaking (Sitney 1979). These genres of filmmaking sought to problematize the film medium by deliberately rendering it visible, unlike conventional filmmaking, which sought to render it transparent through the use of an editing language which is as seamless as possible and attempts to avoid calling attention to the filmic medium; this is what Mary Ann Doane (in Weis and Belton 1985) refers to as "effacing the work". Structural and

material filmmaking, by contrast, employed such techniques as painting on the film, scraping it, scratching it, separating the colours (red, green, and blue), splitting the screen, employing deliberately out-of-focus images and film loops, and filming images off the screen, all in an effort to call attention to the materiality of the film itself and/or the constraints of the structure of the filmic medium and thus open that medium to critique. Insofar as the critique of the filmic medium was enabled by film itself, there was an element of deconstruction in this genre of filmmaking, in the sense that deconstruction is a mode of critique which can best proceed by making strategic use of precisely what it critiques (Derrida 1997: 24). However, if glitch has often used similar deconstructive strategies to highlight the medium of digital audio as such, it also often runs the risk of complete self-referentiality; if all content is evacuated from the music except for the artifacts of digital noise, then the genre may risk losing its critical edge and may even be open to the charge of a modernist nostalgia for a "pure art" with no reference to anything at all beyond itself, as Australian artist and theorist Ian Andrews points out:

> I don't think that the aspect of the glitch as critique in the form of self-reflexivity is enough to save it from pure art. This is why [in Andrews (2002b); see also Andrews 2002a] I brought up the comparison with structural-materialist film. Those filmmakers sought a political cinema practice concerned with the materiality of the filmic substrate, but ultimately ended up reproducing the same essentialist problematics as [American post-WWII art critic Clement] Greenberg and high modernist painting (Andrews 2002c).

The neo-modernist tendencies of much glitch have implications for the way in which it deals with the sociality of space – in other words, for its

spatial politics. One example of the problematic spatial politics of much recent experimental digital audio is Tetsu Inoue's *Waterloo Terminal* (1999), inspired by Nicholas Grimshaw's Channel Tunnel Railway Terminal at Waterloo, released as part of the Architettura series produced by Caipirinha Productions (Thaemlitz 2002). The album consists of sounds derived from the conversion of digital photographs of the terminal into sound files, which were then arranged and mixed digitally. The liner notes attempt to contextualize this unusual relationship between sound and space:

> It is as if the station itself were given voice, which Tetsu then shaped by altering pitch, timbre, resonance and rhythm, creating a linear collage born from his artistic interpretation of the architecture itself (Caipirinha Productions 1999 in Thaemlitz 2002).

But rather than being given voice, the terminal is, in a sense, silenced in the conflation of this space with its digital representation. There is little, if any, audible relationship between Inoue's work and the original space from which the sounds supposedly derived. Without the context provided by the program notes, one would be hard-pressed to identify the sound sources used in *Waterloo Terminal*, and photos of any other train station, or for that matter, a rose garden or Auschwitz, would generate perceptually indistinguishable sonic results. Thus, Inoue erases the specificity of this social space in this exercise of music composition as format conversion. Though "databending" as a compositional technique (that is, the conversion of raw data into sound on a digital level; see http://groups.yahoo.com/group/databenders/) has potential for a critical compositional practice, there is nothing in Inoue's work

that suggests anything other than a reduction – or more precisely, the abstraction – of social space to a digitized formalism.

Lefebvre has argued that "[i]nasmuch as [the] abstract space [of modernity and capital] tends towards homogeneity, towards the elimination of existing differences or particularities, a new space cannot be born (produced) unless it accentuates differences" (Lefebvre 1991: 52). Thus, if one characteristic of much recent experimental digital audio is to resonate with modernity's tendency towards the abstraction and homogenization of space, or to decline to deal with the sociality of space altogether, then one potentially useful strategy to counteract this tendency is to incorporate the insights of soundscape composition, which offers a model for how the practice of electroacoustic music can tend away from the homogenization of space and emphasize the specificity of real-world social spaces (Truax 1996a, 2002). In soundscape composition, recognizable environmental recordings, being the *sonic identity* of a specific space, are used as the basis for individual works, and the recognizability of these source sounds is maintained on some level throughout the work, even if the sounds undergo processing which is designed to change their character. As a strategy for maintaining source recognizability, soundscape composition tends to use processing techniques that *enhance* rather than *transform* the source sounds. Such techniques include the use of resonators (which can be used to emphasize particular frequencies already present in the source sound) (Truax 1996b), granulation (which stretches the sound in time so that its inner particularities may be more easily heard) (Truax 1992, 1994), and

convolution (which, when a sound is convolved with itself, stretches the sound in time and amplifies its prominent frequency characteristics – in other words, its spectral specificity) (Roads 1996: 419-432, 1997). If soundscape composition works to maintain the recognizability of its source sounds, and if those source sounds tend to constitute in some way the sonic identity of the real-world space being referenced in the work, then this genre of electroacoustic music offers a spatial politics which emphasizes the specificity of actually existing spaces by maintaining a link to the sonic identity of those spaces throughout the work.

An example of soundscape composition that contrasts with the Tetsu Inoue example given above is Barry Truax's *Temple* (2002). In this piece, voice recordings are convolved with an impulse response recording from a specific cathedral in Italy in order to generate the illusion that the voices were recorded in the cathedral itself. In other words, the piece is "set" in that particular real-world space, much as a story or play might be "set" in a particular location, though it is exceedingly unusual for Western music, electroacoustic or otherwise, to be "set" anywhere at all. Thus, though both Inoue's and Truax's pieces make use of specific capabilities of digital technology, there is a pronounced contrast between their respective relations to their real-world spaces. Where Inoue uses an actually existing social space as little more than a pretext for an exercise in digitized abstraction, Truax allows the specificity of his space to add a layer of meaning to the work. This notion of "setting" the work in a particular location is also enhanced and literally amplified by virtue of its being presented in an immersive multi-

speaker environment, which generates the illusion of the listener being right in the centre of this virtual acoustic environment. Truax's link to the social setting of his piece is thus *perceptual*, rather than conceptual, as is largely the case for Inoue's work.

Many soundscape works, such as Truax's *Pendlerdrøm* (1997), situate themselves in real-world spaces through the use of actual recognizable field recordings from those places, and though those recordings may subsequently undergo transformation, they usually remain recognizable by virtue of the kinds of processing used that, as mentioned above, tend to enhance rather than transform them. Often, immersive multi-speaker environments also enhance the perceptual link between soundscape compositions and the location from which their source sounds derive. That is, there is a deliberate relationship set up between the space referenced in the work and the space in which the work is being performed, in that soundscape composers often use multi-speaker environments in a way that creates the illusion that the listener is "really there" in the space referenced in the work. In Truax's *Pendlerdrøm*, for example, the opening section makes use of four distinct and untransformed stereo recordings of a train station heard at once, with each recording located in each of the four pairs of speakers around the listener, thus creating the illusion that the listener is in the middle of that train station. In any case, the spatial politics of soundscape composition differ from that of glitch by virtue of the former's insistence on not only attempting to honour the sonic specificity of the real-world space from which its source

sounds derive, but incorporating that very specificity as an aspect of the work's meaning.

In spite of the foregoing, it would be false, or at least overly binaristic, to situate glitch's spatial politics as "bad" but those of soundscape composition as "good". If soundscape composition attempts to deliberately establish and maintain an audible connection to a real-world context, this emphasis can, at its worst, tend towards exoticism and nostalgia, even if it may also harbour the potential for a spatial politics with the ability to counter the kind of homogenizing tendency which Lefebvre sees as characteristic of spatial production in late modernity. And if glitch often erases or abstracts the specificity of social space in a way that all too easily harmonizes with capitalism's homogenization of space, it can also produce useful understandings and critiques of hegemonic forms of spatial production. *Structural Adjustments*, by Los Angeles-based artist-activists Ultra-Red, is a poignant examination of social displacement and homelessness integrated with glitch beats and breaks, and the theorist Trace Reddell (2003) offers a way to conceive of what he calls "spatial poetics of networked laptop performance" (not all of which is glitch-oriented) with a subtlety which is uncharacteristic of most writing about post-digital audio. Reddell advances the notion of "laptopia" which

> echoes the "non-place" of "utopia" to suggest the role of politicized idealism – in this case a temporary artistic arrangement of persons, technologies and places privileging distributed modes and moments of social organization as a perfected form of consensual government. With moments in galleries, on stages, at abandoned silos, on massive PA-systems

> or over desktop speakers, laptopia stands for the materialized ideal of a spatial production in which points of power – here, zones of artistic production and performance – are dispersed in space and/or time... (Reddell 2003: 12).

But if, these examples notwithstanding, glitch and its post-digital cousins so often fail to properly account for the sociality of space, I would argue that this derives at least in part from the increasingly common role of digital technology in the mediation and production of a particular kind of space which, at the risk of appearing to be somewhat outdated, I will simply refer to as "cyberspace." I would argue that this form of technologized and often "quasi-post-geographical" space, as William Gibson once called it, is still in its infancy, with room to grow and become more attentive to the socio-spatial specificities of "real" space. Although the very essence of the Internet is connectivity between machines in different spatial locations, our current experience of, for example, browsing the web conveys little sense of the relation between where one physically "is" and where one virtually "is," since a web page on a server in Vancouver may not look any different from a web page served from Istanbul, and in neither case is there usually any intentional indication of the relationship between the "real" spatial location of the remote server and the local client machine. Thus, if cyberspace is so often figured as a kind of asocial placelessness, and if glitch's erasure of the sociality and specificity of "real" places is perhaps influenced by the apparent "nowhereness" of what is currently called cyberspace, it is most likely for reasons such as these, which perhaps have more to do with shortcomings of interface design than with cyberspace as such. The tension between soundscape composition and glitch, then, is not between a "good" and a

"bad" spatial politics, but merely of an emphasis on different spaces: in the one case, "real-world" soundscapes, and in the other, the virtual or simulacral networked landscapes of cyberspace.

If I accuse glitch of not adequately dealing with the specificities of social space, I must do so with the caveat that it is not all that surprising when we recall that digital technology in general, which is based on reducing everything to a sequence of zeroes and ones, tends to have a problem with specificity. If there are future surprises in store for us in the relation between digital technology and social space, they will come from a more nuanced understanding of digital technology and its relation to its socio-spatial contexts. If, as I have suggested, there is no space which is not political, then the kinds of virtual space mediated and produced by digital technology are every bit as socially produced as physical space, and further, the relations between these virtual and physical spaces are political as well, as one can perhaps readily see upon examination of, for example, the globality of the digital divide, or the mobility of capital across digital networks when compared to the often severely constrained mobility of any of the world's thousands of refugees.

Although I did not deal directly with these kinds of political issues, part of this project's aim was not only to expand glitch by incorporating the "real-world" spatial politics of soundscape composition, but also to expand the usual domain of soundscape composition by incorporating the critical spirit of glitch, since, as mentioned elsewhere, soundscape composition is a good

model for the incorporation of the social context of electroacoustic music, but in practice it tends to take its technological medium for granted, and often strives to make that medium as transparent as possible. The task I undertook with the present project, then, was to balance glitch's critical self-reflexivity with soundscape composition's spatial politics, and this entailed a careful balancing of different kinds of processing: those which highlight the specificity of the medium (the introduction of clicks, stutters, and digital noises into the source sounds) and those which highlight the specificity of the context in which the source sounds originate (convolution, granulation, and resonators). Thus, *Machine Languages* as a whole is intended to be an interface between two materialities: the materiality of the digital audio medium and the materiality of the social context in which that medium is situated. Not all the works in the project make specific use of "glitchy" processing, but even in these pieces (for example, *Mountain* and *Pas de deux*, both of which are discussed in more detail in the following section), I tend to avoid the naturalism of most soundscape composition, which perhaps serves to foreground the fact that the work is technologically produced. In the next section, I will examine each of the pieces in detail and discuss the ways in which it attempted to integrate these two materialities, briefly mention some issues related to staging, and conclude with an evaluation of the success of this project in achieving what it set out to do.

Project Summary

Machine Languages is divided into five pieces, each of which consists of computer music alone, or computer music with a visual component. In order of presentation, the pieces are:

Mountain (2003-2004) (computer music alone, 9:58): An eight-channel soundscape composition based on sounds recorded on Burnaby Mountain. Sounds from different parts of campus are mapped to speakers in the concert space, so that sounds recorded in the northern part of the mountain are initially heard on the pair of speakers in the northern part of the concert space, sounds recorded in the western part of the campus are initially heard in the speakers in the western part of the concert space, and so on. The concert space thus becomes a sonic map of Burnaby Mountain, and what results is a kind of technologically constructed "bird's ear view" of the place from which the piece's source sounds originate. Processing techniques such as resonators (see Appendix 1 for my implementation of resonators in Csound) and convolution serve to enhance the sounds, build transitions between them, and create new sounds which are evocative of the natural environmental source sounds despite their being produced by digital processing. Though no explicitly "glitchy" techniques are used in this piece, I nonetheless attempted to call attention to the constructedness of the piece through the use of the non-naturalistic and non-illusionistic sonic

perspective, while still maintaining a connection to the context of the soundscape of Burnaby Mountain. Still, this piece is arguably one of the most traditionally "soundscape-like" of the entire set, in that it still often tends towards an "immersive" use of the eight-channel multi-speaker environment, as is the case in most multi-channel soundscape pieces.

The piece begins with "untransformed" recordings of footsteps and the ambience of specific locales on Burnaby Mountain (including sounds which will be heard more distinctly later in the piece) heard in each speaker pair in turn and then in all speakers at once. These "untransformed" footstep recordings are then cross-faded with auto-convolved versions of themselves (auto-convolution being when a sound is convolved with itself, which results in its being time-stretched by a factor of two and having its prominent frequencies emphasized (Roads 1996: 419-432, 1997); the term "auto-convolution" is due to my colleague Galen Elfert), which are not clearly recognizable sound images, but which nonetheless evoke other sounds from natural environments (ocean waves, for example). These auto-convolved sounds are gradually cross-faded with resonated versions of themselves, and these resonated sounds are gradually cross-faded with auto-convolved bagpipe sounds, which recall the well-known, prize-winning Simon Fraser University Pipe Band, whose sonic presence is part of the distinct acoustic environment of Simon Fraser University. These bagpipe sounds are first heard only in one speaker pair, and then in all speakers at once, with different textures in each stereo pair, moving slowly and mostly imperceptibly around the listener in a circle. This gesture perhaps recalls

some pieces of pipe band music that begin with a solo piper who is later joined by the *tutti* ensemble, and the circular movement of the *tutti* section recalls the slow march of a *piobaireachd* player.[1] Just before the bagpipe section begins to fade out, a train recording that has been resonated at some of the key frequencies of the bagpipe section is slowly brought in. A four-part, multichannel canon of auto-convolved train horns ends the piece, each stereo pair in the eight-speaker ring featuring the same stereo recording starting at different times. In the final moment of the piece, an "untransformed" recording of footsteps is heard in the north stereo pair of speakers, which returns the piece to a real-world context after most of the piece has made use of quite abstracted and heavily processed (though mostly still recognizable) soundscape recordings.

Overall, the piece emphasizes smooth transitions between the various sections. Indeed, the piece itself could be said to be one long transition, as the structure of the piece is designed primarily to facilitate transitions from one sound environment into another. In the opening few minutes of the piece, for example, the sequence of "untransformed" and processed sounds is primarily designed to enable the gradual transformation of footsteps into bagpipes. When sounds are resonated, the frequencies that are chosen are usually ones that are shared by two sounds, which serves to facilitate a transition between them, such as the transition between the bagpipes and the resonated train sounds, where the frequencies resonated in the train

[1] *Piobaireachd* is a type of music for the Scottish Highland bagpipes that consists of a slow, rhythmically free melody, called the *Urlar* or ground, followed by a set of variations that increase in complexity, usually over the course of 10-15 minutes. When playing a *piobaireachd*, it is customary for the player to march slowly back and forth.

sound are harmonically related both to the bagpipes and to the train horn. Interestingly, and not entirely intentionally, all the source sounds in the piece have at least some frequencies in common. In one of the footstep recordings that begins the piece, there is a drone from a nearby fan that is evidently driven by an AC motor, and thus vibrates at 60 cycles per second (close to a B-flat). The bagpipes are likewise tuned to a B-flat that is quite close to that of the AC hum, and there are frequencies in common between the melodies played on the chanter of the bagpipes and the train horn that is heard in the following section (the E-flat minor triad used by Canadian Pacific locomotives). Given that I did no "re-tuning" or pitch adjustment on the samples, it was serendipitous that the piece has such a consistent harmonic through-line, based on the North American "keynote" of 60 cycles and its harmonics, which has become familiar through the pervasiveness of AC hum in the North American acoustic environment.

Though this is my first real soundscape composition, there are a few features that set it apart from some of the more usual approaches to soundscape composition. For one thing, although *Mountain* prominently features soundscape recordings that remain more or less recognizable throughout the piece, the organization of those materials is primarily based on their spectral characteristics rather than on their real-world associations. The piece is generally structured in terms of its smooth transitions between related spectra, whereas most soundscape composition organizes its sonic materials in ways that have to do with the real-world associations of the sounds themselves, as for example in a narrative form which places the

sounds in combinations or sequences that parallel the way we might experience those sounds in everyday life. Thus, although the materials and the kinds of processing used on them is in line with most soundscape composition, the language which organizes those materials is somewhat uncharacteristic of soundscape composition, though not unprecedented. Likewise, though the soundscape recordings heard in the piece remain more or less recognizable throughout the piece, the balance between relatively unprocessed sounds and their more processed counterparts is skewed more in favour of the latter than is characteristic in most soundscape composition. After a relatively naturalistic beginning with the "raw" footstep recordings, the piece quickly turns to more processed sounds and sticks with those more or less for the remainder of the piece, or at least until the final return of the footstep sounds at the end, and with the arguable exception of the resonated train sounds in the penultimate section. Arguably, this preponderance of processed sounds serves a similar function as the "glitchy" techniques in other pieces, in reminding the listener of the technological constructedness of the piece. Thus, while *Mountain* belongs firmly to the tradition of soundscape composition, it also incorporates a compositional logic which is perhaps more traditionally associated with acousmatic music, which treats its sound sources primarily as abstract spectral entities and develops a compositional logic around that abstraction.

Pas de deux (2003-2004) (computer music with dance, 7:10): The title of the piece, which was created in collaboration with SFU alumna Sara Coffin, translates to "dance for two," though only one dancer is present

onstage. *Pas de deux* is actually a kind of "duet" in which the live dancer's "partner" is not physically present, but is represented by a soundtrack composed of digitally processed versions of sounds generated by the dancer's body.

In *Pas de deux*, there is a contrast between the physicality of the dancer's body in motion, and the soundtrack, which consists of abstracted and processed versions of sounds generated by the dancer's body. The title suggests a duet between the dancer and the soundtrack, or more generally, between the body and its technological extension. Thus, without specifically incorporating "glitchy" processing, the soundtrack was intended to call attention to itself as a technological construction, though in a way which is different than most of the deployments of glitch techniques in my project as a whole. At the same time, the acoustic spaces in which the source sounds were recorded (the dancer's bedroom and my apartment) are heard untransformed in some parts of the piece, and in other parts, processing techniques such as convolution accentuate the specificity of those environments through the reinforcement of their specific spectral characteristics, and thus connect the piece to the tradition of soundscape composition.

The soundtrack for this piece consists entirely of sounds associated with the body, primarily breath sounds, heartbeats, and the sounds of the dancer's movement. The piece begins with my own breath (which is yet the nearest I've come to incorporating my own voice or body into any of my

compositions for as long as I can remember), mixed with an auto-convolved version of itself and underpinned with auto-convolved heartbeat sounds that form a menacing low rumble. This opening gesture concludes with quick breath sounds heard in left and right speakers in quick alternation. This gesture then repeats from the beginning, this time overlaid with auto-convolved versions of sounds of the dancer's breath and movement. The quick breath sounds that alternate between the two speakers are heard again, this time becoming gradually longer through successive reiterations of auto-convolution (i.e., a sound is convolved with itself and then the resultant output is convolved with itself, and so on). As this gesture plays out, a machine-like sound, which is an actually an auto-convolved version of the sound of a pattern of jumping and breath performed by the dancer, fades in and moves across the stereo field. The processed version of this sound is gradually cross-faded with the original, mixed with a time-delayed version of itself to create a complex contrapuntal passage. This is underpinned by auto-convolved heartbeat sounds that create an ominous low pulsing drone, and this drone then forms the basis for a section featuring an extended recording of a passage of movement by the dancer. This section is mixed with another version of the same recording which has been time-compressed and then time-extended so that the usually unwanted byproducts of this processing become evident and form a counterpoint to the original version. Also featured in this section are some of the breath sounds from the beginning, stripped of their low-frequency components through simple equalization. The opening gesture of the piece is then repeated once more, ending with a

lengthened version of the auto-convolved quick breath sounds from earlier in the piece.

The dance portion of this piece has the dancer interacting with the soundtrack much as she would interact with another dancer. Often the "two dancers" are in sync with each other, performing similar or related gestures, but just as often their movements are distinct from each other, either appearing to be in conflict with each other, or simply unrelated to each other. The dramatic tension in the piece derives from the vastly greater volume of sound coming from the soundtrack when compared to the physical dancer. The breath sounds in the opening section are quite close-miked, which, for some listeners, translates to a sense of imposition and oppressiveness when the sounds are heard in the concert space (though some described their experience as one of intimacy). Similarly, the processed heartbeat sounds, because of their dominant low frequency components, tend to be perceived more as a sign of danger than as a symbol of vitality. Altogether, the soundtrack tends to imply a presence which is dangerous because so much "larger than life," and threatening because invisible. In composing this piece, I was unprepared for the drama that would ensue from the relationship between the physical dancer and the technologized version of herself that served as her partner in this piece, and I originally envisioned a much more equitable relationship between them, though it was always meant to be a relation of opposites (technologized vs. physical, unseen vs. seen, etc.). For various reasons, partly aesthetic but mostly technical, I declined to re-do the piece to fix this relationship, but if I had the piece to do over again, I might

want to explore how to produce a relationship between the "two dancers" which is characterized by a kind of difference which does not produce a sense of danger and oppressiveness. Further, as someone whose sensibility is informed by feminism, I am also somewhat uncomfortable with the implied gender dynamics set up in the piece, in which the female dancer, whose physical body is placed on display for us, and whose only sounds are nonverbal, is apparently menaced by the unseen presence of a technologized (and thus arguably male) body. Though this dynamic was not originally intended, similar gender relationships are so ingrained in our culture that it is easy to reproduce them unintentionally.

Karosta: Memory Address (2003-2004) (computer music alone, 9:58): *Karosta* is a stereo soundscape composition based on sounds collected by Derek Holzer in the Latvian town of Karosta. The piece makes use of some processing techniques which are common to many of the other pieces (such as convolution), but also use more "glitchy" techniques which cause the sound to stutter or become noisy – usually employing software developed by destroyfx (http://destroyfx.smartelectronix.com/), though also often employing samples of actual software failures – and which implicitly offer a metaphor for Karosta's tumultuous history, which covers everything from Czarism to NATO occupancy. Although *Karosta* is not an overtly "political" or "historical" piece, its source sounds nonetheless suggest the specificity of this site.

The piece begins with an "untransformed" recording of an intoning voice at a Christmas Mass in Karosta. Gradually, and mostly imperceptibly, an auto-convolved version of this recording is cross-faded with the original, so that the distinctness of the original recording gradually bleeds into a single drone that is more continuous than that which could be produced by a human voice. Various pitch-shifted versions of this drone are layered with the original, in a manner that evokes the quality of some Baltic vocal music. Gradually this artificial "choir" begins to break up, with various layers dropping out intermittently (this effect was created by sampling an actual software failure), and finally the texture as a whole begins to stutter violently. In the midst of this chaos, short fragments of ice sounds start to come in, beginning as short clicks which are undifferentiable from the clicks of the stuttering vocal texture, but gradually lengthening to form a smooth and distinct sonic texture of the sounds of ice fragments being manipulated, and this forms the basis of the next section once the fragmented vocal sounds have faded out. The sounds of ice from the nearby Baltic sea being handled and "played" are mixed with auto-convolved versions of themselves, as well as a subtle texture of high-frequency clicks and pure tones which enhance the "iciness" of the image. After several minutes, this section is cross-faded with an auto-convolved version of a choir, which is derived from the same Christmas Mass as the recording that forms the basis of the first section. This processed choir sound has noticeable glitches in it, and gradually degenerates into a still beautiful but nonetheless digitally distorted version of itself. As this texture of digitally distorted, quasi-angelic sounds

drop away, the piece ends with a fragile gossamer cloud of delicate high-pitched clicks.

As is the case for *Mountain*, *Karosta* is identifiably part of the tradition of soundscape composition in its use of recognizable soundscape recordings and in the fact of its being bound to a specific real-world context, but like *Mountain*, the actual organization of the sounds is based more on abstract spectral qualities of the sounds themselves than on the kinds of associations or symbolism these sounds have in our daily lives. The logic of a structure that starts with voice sounds, transitions to ice sounds, and then goes back to voice sounds is more spectral than symbolic or associative. Thus, here again, as in *Mountain,* the piece incorporates a compositional logic which is perhaps more characteristic of acousmatic or *musique concrète* than most soundscape composition. *Karosta* also departs from soundscape composition in the way it makes use of the ice sounds of the second section, as these sounds don't create as clear an image as is usually desirable in soundscape composition. Indeed, without a program note or some prior clue, the average listener would be hard-pressed to identify the sounds in the second section, let alone their relevance to the site that acts as the setting for the piece, but once informed that the sounds derive from a manipulation of ice from the Baltic Sea, the listener can clearly hear them as such by virtue of their spectral difference from the voice sounds that come before and after.

Machine Visions (2004) (digital video with computer music, 11:07): Made during a directed study with Chris Welsby, this video explores the links

between digital technology and the military, while also envisioning how their relationship could be different. The piece draws upon conventions of structural film, such as looping, iterative processing and filming from the screen, but also re-signifies these conventions in a different technological context (that of digital technology). The piece is structured as a process during which two alternating loops are gradually transformed. One loop starts out as a transient "glitch" in the video and becomes progressively longer and more distinct until it is a recognizable image (backwards footage of a missile launch, which apparently shows the missile "falling" out of the sky and "returning" to its silo), and the loop which begins the video (footage from a flight simulator program used to train military helicopter pilots) becomes progressively shorter and more processed so that it ends up as a blip of light. Along the way, the "glitchy" processing of the video alludes to the potentially catastrophic human consequences of the increasing digitization of military technology (DeLanda 1991). The ending of the piece is cautiously optimistic, since the missile never fully goes back into its silo, but the evolutionary process which structures the video perhaps offers an analogy to the way in which the social use of technology can be changed over time. In this case, the hope expressed by *Machine Visions* is that civilian access to the digital technology originally developed by the US military (computers and the Internet, for example (Ceruzzi 2003, Gere 2002)) may enable us to critique and oppose the increasing global militarization which digital technology was originally designed to facilitate. Indeed, *Machine*

Visions itself, in its use of an originally military technology to critique military technology, is an example of this possibility.

The soundtrack for this piece is minimal and largely uncoordinated with the visuals. It begins with the sound of a helicopter engine, which contextualizes the flight simulator footage (which could just as easily be a video game). As in many of the other pieces, this sound is then gradually cross-faded with auto-convolved versions of itself that then gradually fade away, leaving the piece to end in silence. The other sound that is heard in some parts of the piece is room ambience from the studio in which I was re-filming some images off the screen with a cheap digital camera. The poor sound quality of this cheap camera forms a counterpoint with the richness of the rest of the soundtrack, just as the room ambience and sounds of the camera being handled also contribute spectral diversity to the overall texture of the soundtrack. This spectral counterpoint also corresponds to a difference in the kinds of processing undergone by the two clips. The first clip (the flight simulator/video-game footage) is transformed entirely in the digital domain, whereas the second (the "falling" missile) is processed by being reiteratively filmed off the computer screen.

Istanbul (2004-2005) (computer music alone, 15:16): This piece was composed in collaboration with Turkish composer Erdem Helvacioglu. Helvacioglu sent me sounds from Istanbul which I was to use as the basis for a piece, and I in turn, sent him sounds from the latest Vancouver collection of the World Soundscape Project Library, and each of us was to make a piece

from the others' sounds. Though only my piece on the sounds from Istanbul is included in my project presentation, the collaborative process is documented here as an example of the ways in which digital technology can constructively foster transnational collaborations and new modes of collaborative cultural production which honour rather than erase the specificity of place in a global(ized) context.

The piece begins with a glitchy and resonated version of the traditional Islamic call to prayer (recorded at 5 AM in Gayreteppe, a section of Istanbul). Though unrecognizable at first, the original source recording is slowly cross-faded with the processed version over the course of several minutes, and then the processed version is brought back in. The piece then transitions to a heavily processed (glitched and resonated) version of a recording made in an Istanbul café, which is slowly cross-faded with the original recording. There is then an abrupt cut to an outdoor public space with a musician playing a baglama (stringed instrument) and singing, which gradually blends with an auto-convolved and glitchy version of itself. Crickets are brought in over this, and then pitch-shifted versions of these cricket sounds are layered against themselves, and then a re-processed version of the call to prayer from the beginning is heard, which brings the piece full-circle to its conclusion.

This piece is perhaps one of the more aesthetically successful in its integration of soundscape composition and glitch, the other such piece perhaps being *Karosta. Istanbul*, and *Karosta* to a lesser extent, successfully establishes a continuum of processing techniques, starting with the raw

naturalism of the "untransformed" source recordings, and extending to the abstraction of sounds which are transformed by such soundscape techniques as resonators or convolution in combination with glitchy processing techniques. The latter are never applied directly to raw soundscape recordings, but only to recordings that have already been transformed by techniques borrowed from soundscape composition.

Istanbul is also more like traditional soundscape composition in its organization of its materials. In this case, there is a narrative structure which follows the form of a day in Istanbul: the listener is "awakened" by the morning call to prayer, goes to a café, hears some music in a public square or marketplace, prepares for bed to the sound of crickets chirping, falls asleep and dreams, and is slowly awakened again the next morning by the call to prayer. Though this narrative is not made explicit to the listener in the piece itself, it does offer an organizing principle for the sonic materials that differs from the more abstract syntax of *Karosta* or *Mountain*. I also found that the narrative structure facilitated the construction of a longer piece, and *Istanbul*, at just over fifteen minutes, is the longest piece on the program.

Staging

The staging of the event deserves comment here. Eight loudspeakers surround the audience in a circular fashion, with a screen in the centre of the space onto both sides of which the video (in *Machine Visions*) is projected so as to be seen from either side. During most of the event, the screen is rolled up so as not to interfere with the sound and so that the dance piece (*Pas de*

deux) can be clearly seen. The chairs are arranged in two sections of a few rows each on either side of the screen. The pieces are presented in the sequence mentioned above, alternating between purely aural pieces (*Mountain, Karosta,* and *Istanbul*) and pieces with a visual component (*Pas de deux* and *Machine Visions*).

Mountain is the only eight-channel work on the program, all the others having been produced in stereo, but even the stereo works make use of the eight-channel environment through the use of diffusion, which produces a rather consistently immersive audio environment throughout the evening. *Pas de deux* consists of a solo dance choreographed and performed by the outstanding dancer and choreographer Sara Coffin. The dance, featuring a dramatic and lyrical style, is performed within the ring of speakers and in between the two sections of chairs, which, as mentioned above, are facing each other within the ring of speakers.

It is worth mentioning that the decisions for the staging of this event relate to a long and problematic history of the presentation of electroacoustic music. Much electroacoustic music in which there is no significant performative element, whether tape music or laptop "performance," is thought to suffer from a lack of what Kim Cascone calls "gestural theatre," or the visual interest provided by the presence of a visibly competent, let alone virtuosic performer. Many strategies have been developed to cope with this perceived lack, from the addition of sometimes arbitrary and cobbled-together digital visuals (which often bear an uncanny resemblance to

mediocre screensavers) to a complete and deliberate absence of visuality, as in most presentations of acousmatic tape music, where the audience sits in total darkness for most of the duration of the concert. Further, the enhanced spatial design of many electroacoustic concerts – the development of stereo diffusion, multi-speaker environments, or non-standard deployments of the performance space in order to subvert the proscenium – may stem from a desire to compensate for the supposed lack of visuality in electroacoustic music. At any rate, any presentation or concert of electroacoustic music today has to come to terms not only with the proscenium-oriented conventions of instrumental music performance, which has so conditioned even the most knowledgeable listeners of electroacoustic music, but also with the history of electroacoustic music's responses to these conventions.

For *Machine Languages*, I chose a circular setting for the speakers primarily because *Mountain* is an eight-channel work composed with that deployment in mind. As for the rest of the pieces on the program, although they are all produced in stereo, I wanted to maintain a sense of spatiality in the sound which would remain fairly consistent throughout the evening, hence my decision to do eight-channel diffusion of these stereo works. Arguably, of course, I could have simply presented a stereo mix of *Mountain* along with straight stereo playback of all the other pieces on the show, but I felt this would be a disservice not only to *Mountain*, but also to the potential of stereo diffusion in the presentation of the other works on the program. Appropriate stereo diffusion of these works can significantly enhance their impact on the listener. For example, some of the glitchy sections of a piece

like *Istanbul*, in which the sound moves semi-randomly between the left and right channels, are further enhanced by diffusion in which that random movement was expanded to eight speakers around the audience.

The decision to distribute the chairs in two sections which face each other is partly a concession to an inherent problem in the performance space itself: namely the two posts in the middle of the studio, which have always disrupted lines of sight at any concert which I have ever attended at Video In Studios. Using those posts as the support for the two-sided screen upon which *Machine Visions* is projected is perhaps one way to circumvent this issue. If one theme of *Machine Languages* is an attentiveness to the specificity of space, then this is my attempt to be attentive to the specificity of the *performance* space, and to use the particularity of that space as an aspect of the work itself. Further, the problem of "lines of sight" arguably helps to make staging decisions doubly difficult: if this project were presented as a purely aural experience, I would only have to worry about creating a clear field of audibility, and the posts would be a relative non-issue. The staging plan I describe here is what I hope is the most satisfactory solution to the collection of problems posed by the presentation of this project in this space.

Final Thoughts

One main motivation for this project was to integrate soundscape composition and glitch, or at least to integrate the "real-world" emphasis of soundscape composition with what I identified as the critical spirit of glitch.

In retrospect, I think I mostly succeeded, though, based on the feedback of some of those who engaged with the work in various stages of its development, the incorporation of "glitchy" modes of processing didn't always come across as a critique of the medium of digital audio or a disruption of audio naturalism as such. Put another way, what I attempted to *conceptually* embed in the work was not always exactly conveyed *perceptually*. Rather, the "glitchy" processing is heard in a variety of ways: for example, some sections of *Karosta* may come across as a break-up of an audio signal, and perhaps also as a metaphor for social upheaval, which is certainly appropriate in light of Karosta's own tumultuous history. In many cases, too, the glitches may be so aestheticized and perhaps even domesticated that they lose something of their critical edge and become somewhat "beautiful" instead (though there is perhaps no necessary opposition between criticality and beauty). I think this sort of problem can be put down to the difficulty in attempting to integrate two very different sensibilities into one project; perhaps with more time for development, I could have more successfully integrated two paradigms which are, after all, quite different, if not somewhat oppositional. For at least some listeners, however, my hope is that the incorporation of glitches will read on some level as an incorporation of the medium into the work itself in order to disrupt the attempts at "seamlessness" which characterize much soundscape composition.

I view *Machine Languages* as the first arc in a broader trajectory in my work. The desire to incorporate references to a social context in my work,

while still making explicit the technological medium and avoiding naturalism, is something I intend to pursue further. Some ideas for future projects consist of real-time networked performance consisting of soundscape recordings broadcast over the Internet (via Shoutcast or similar technology). Such a work would truly be a transnational undertaking, involving artists from all over the world broadcasting soundscape recordings from their local acoustic environment to be mixed and manipulated by other artists on the network, and perhaps articulating an alternative to the often oppressive ways in which digital technology is used in the service of globalization. A map and collection of clocks from different time zones, or similar visuals, projected on or behind the performers could serve as a concrete reminder of the physicality of an otherwise technologically mediated virtual experience. This project could also experiment with the sound of network feedback as a means of incorporating the technology itself as a layer of meaning in the work. I'm eager to hear what a feedback loop between, say, Tokyo and Vancouver would sound like!

One advantage of such an approach is that it could be more multi-centred than the current project, and could thus better resonate conceptually with the multi-centredness of the Internet itself, as well as a global society, which is increasingly modelled on it. If this work were put on as an extended performance (and thus allowing for the different time zones in each locale), audiences in each city could witness completely different works that were specific to each locale and time.

But whatever future directions I take, my attempt here was to incorporate soundscape composition's contextuality with glitch's ability to make obvious its technological medium as a response to the ways in which the production of social space is being increasingly mediated, managed, and pervaded by digital technology. From this perspective, for what I set out to do, I consider *Machine Languages* a success.

Appendix 1

Csound code for stereo Karplus-Strong waveguide resonator

```
<CsoundSynthesizer>
<CsInstruments>
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
;	Stereo resonator.
;	Originally based on code by Barry Truax (Nov 00).
;	First version Jul 03.
;	Re-implemented Sep 04 using streson.
;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;	Introductory comments: This Csound project is similar to the ones
used in many parts of my Master of Fine Arts Graduating Project,
entitled _Machine Languages_. It takes an input (in this case, a sound
file, but this code could be altered so as to use live audio input
streams or whatever) and resonates it at a particular frequency using
the Karplus-Strong algorithm (as encoded in the Csound opcode
"streson"). Resonators can be "stacked" in order to create resonated
"chords" in the input audio. The feedback level can be adjusted to
taste, thus altering the amount of resonance in the output sound file or
audio stream, and the balance of "wet and dry" signals can be tweaked as
well.

;	Initialize global variables.

sr		=	44100
kr		=	4410
ksmps		=	10
nchnls		=	2

;	Begin defining instrument 1.

instr 1

;	Define p-fields.

idur		=	p3
iamp		=	p4
kfrL		=	p5
ifdL		=	p6
kfrR		=	p7
ifdR		=	p8
kbal		=	p9
kcutL		=	4*kfrL
kcutR		=	4*kfrR

;	Sound input. Here it's a sound file used with soundin, but you
could use ins or whatever.

aoL,aoR		soundin		p10
```

```
;       Amplitude scaling of sound input.

aL              =               aoL*p4
aR              =               aoR*p4

;       Resonator, left channel.

arL             streson         aL, kfrL, ifdL

;       Resonator, right channel.

arR             streson         aR, kfrR, ifdR

;       Low-pass filter for the resonated output.
;       Cutoff freq is set low to make a less "twangy" resonator (see
definition of kcut* as a multiple of kfr* above; you can make this
whatever multiple you want, or even a constant). The part of the code
which defines the the iterative filtering can be commented out if no
filtering is desired, or you can change the number of iterations or
whatever, but whatever you do, remember to change the definition of
"outs" below.

af1L            butlp           arL, kcutL
af1R            butlp           arR, kcutR

af2L            butlp           af1L, kcutL
af2R            butlp           af1R, kcutR

af3L            butlp           af2L, kcutL
af3R            butlp           af2R, kcutR

af4L            butlp           af3L, kcutL
af4R            butlp           af3R, kcutR

;       Stereo output, with balance between "wet" and "dry" signals
determined by kbal (p9).

                outs    (aL*(1-p9))+(af4L*p9)/2,(aR*(1-p9))+(af4R*p9)/2

endin
</CsInstruments>
<CsScore>
;       i1      =       instrument 1, defined in <CsInstruments>
;       st      =       start time
;       dur     =       duration of instrument
;                               (should be set to length of input
;                               plus a few seconds for the resonator effect
;                               to die out)
;       amp     =       multiplier of input amplitude; tweak as necessary
;       frL     =       frequency at which the left channel will be resonated
;       fdL     =       feedback level for left channel
;       frR     =       resonant freq of right channel
;       fdR     =       feedback level for right channel
;       bal     =       balance between "wet" and "dry" signals;
;                               1 is dry signal only, and 0 is no effect
;       filcod=         path to input sound file,
;                               or name of input audio stream

;       st      dur     amp     frL     fdL     frR     fdR     bal     filcod
i1      0       205     0.85    312     0.9     312     0.9     0.9     "/path/to/file"
```

```
e
</CsScore>
</CsoundSynthesizer>
```

Appendix 2

Guide to accompanying multimedia

1) Audio CD, playable in most ordinary audio CD players

Track 1: *Mountain* (stereo mix) 9:56

Track 2: *Pas de deux* 7:10

Track 3: *Karosta: Memory Address* 9:57
(Based on recordings by Derek Holzer)

Track 4: *Istanbul* 15:15
(Based on recordings by Erdem Helvacioglu)

2) DVD, playable in most ordinary DVD players

Machine Visions 11:07
(Based on footage used courtesy of the Computer Chronicles www.computerchronicles.org)

Note: These pieces are also downloadable from www.archive.org, in the "Open Source Audio" and "Open Source Movies" collections respectively.

Bibliography

Andrews, I. (2002a). http://amsterdam.nettime.org/Lists-Archives/nettime-bold-0204/msg01087.html (accessed Jan 2005; original message dated April 30, 2002).

Andrews, I. (2002b). "Post-Digital Aesthetics and the Return to Modernism." Formerly at http://radioscopia.org/postdig.html. Accessed December 2002. From a talk given on November 6, 2002 at the University of Technology Sydney as part of its MAP (Media Arts and Production) series.

Andrews, I. (2002c). Posting to the .microsound email list (based at http://www.microsound.org), dated December 13, 2002. List archive hosted at http://propheticdesire.com/microsound/microsound.html.

Baran, P. (1964). "On Distributed Communications, Rand Corporation Memorandum RM-3420-PR." Now available online at http://www.rand.org/publications/RM/RM3420/.

Caipirinha Productions (1999). Press Release for Tetsu Inoue, *Architettura Series Volume 2: Waterloo Terminal.* US: Caipirinha Productions.

Cascone, K. (2000). "The Aesthetics of Failure: Post-Digital Tendencies in Contemporary Computer Music." *Computer Music Journal* 24(4): 12-18.

Castells, M. (2000). *The Rise of the Network Society.* 2nd edition. Volume 1 of *The Information Age.* Oxford; Malden, MA: Blackwell Publishers.

Crampton, J. (2003). *The Political Mapping of Cyberspace.* Chicago: University of Chicago Press.

Cranfield, B. (2002). "Producing Noise: Oval and the Politics of Digital Audio." *Parachute* 107: 42-51.

DeLanda, M. (1991). *War in the Age of Intelligent Machines.* New York: Zone Books.

Deleuze, G. and Guattari, F. (1987). *A Thousand Plateaus: Capitalism and Schizophrenia.* Translated by Brian Massumi. Minneapolis: University of Minnesota Press.

Derrida, J. (1997). *Of Grammatology*. Translated by Gayatri Chakravorty Spivak. Corrected Edition. Baltimore and London: The Johns Hopkins University Press.

Elden, S. (2001). *Mapping the Present: Heidegger, Foucault, and the Project of a Spatial Politics.* London: Continuum.

Foucault, M. (1990). *The History of Sexuality, Volume 1: An Introduction.* Translated by Robert Hurley. New York: Vintage Books.

Gere, C. (2002). *Digital Culture.* London: Reaktion Books.

Hardt, M. and Negri, A. (2000). *Empire*. Cambridge: Harvard University Press.

Hardt, M. and Negri, A. (2004). *Multitude: War and Democracy in the Age of Empire.* New York: The Penguin Press.

Lefebvre, H. (1991). *The Production of Space.* Translated by Donald Nicholson-Smith. Oxford, OX, UK, and Cambridge Mass., USA. Blackwell.

Lyotard, F. (1984). *The Postmodern Condition: A Report on Knowledge.* Translated by Geoff Bennington and Brian Massumi. Foreword by Frederic Jameson. Minneapolis: University of Minnesota Press.

Manovich, L. (2001). *The Language of New Media.* Cambridge, Mass.: MIT Press.

Reddell, T. (2003). "Laptopia: The Spatial Poetics of Networked Laptop Performance." *Contemporary Music Review* 22(4): 11-22.

Roads, C. (1996). *The Computer Music Tutorial.* Cambridge, Mass.: MIT Press.

Roads, C. (1997). "Sound Transformation by Convolution." In Roads, C. (et al.), eds. *Musical Signal Processing.* Lisse, The Netherlands; Exton, PA. Swets & Zeitlinger.

Thaemlitz, T. (2002). "Operating in Musical Economies of Compromise (or... When Do I Get Paid for Writing This?). *Organised Sound* 7(1): 177-184.

Thomson, P. (2004). "Atoms and Errors: Towards a History and Aesthetics of Microsound." *Organised Sound* 9(2): 207-218.

Truax, B. (1992). "Composing with Time-Shifted Environmental Sound," Leonardo Music Journal 2(1): 37-40.

Truax, B. (1994). "Discovering Inner Complexity: Time-Shifting and Transposition with a Real-time Granulation Technique." *Computer Music Journal* 18(2): 38-48.

Truax, B. (1996a). "Soundscape, Acoustic Communication & Environmental Sound Composition." *Contemporary Music Review*. 15(1): 49-65.

Truax, B. (1996b). "Time-Stretching of Hyper-Resonated Sound Using a Real-Time Granulation Technique," *Proceedings of the International Computer Music Conference*, Hong Kong, Computer Music Association.

Truax, B. (2000) "The Aesthetics of Computer Music: A Questionable Concept Reconsidered." Organised Sound 5(3): 119-126.

Truax, B. (2002). "Genres and techniques of soundscape composition as developed at Simon Fraser University." *Organised Sound* 7(1): 5-14.

Weis, M. and Belton, J. (1985). *Film Sound: Theory and Practice.* New York: Columbia UP.

Wolff, J. (1993). *The Social Production of Art.* Second Edition. Washington Square, New York: New York University Press.