Reseau/Resonance: Connective Processes and Artistic Practice

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feels like I’m falling into this stream of sound / going back and coming forward / backwards and forwards, caught on the wave of a wave

—Jeff Noon, Needle in the Groove

INTO THE WIRE

Resonance is, first and foremost, a phenomenon of sound. The acoustic instruments that we know, from the flute and the trumpet to the guitar and the piano, use the resonance activated by blowing into them or hitting their strings to bring forth their sounds. The sounds of the guitar are the waves effected in the body of the guitar by the vibrating strings that have been struck or plucked by the player. These vibrations transform into the rich and full-bodied sound of the acoustic guitar.

An art project that articulates the notion of resonance in relation to the Internet is Global String, a recent project by Paris-based artist Atau Tanaka and his colleague Kaspar Toeplitz [1]. Tanaka has explored the performative and acoustical qualities of network structures in many performances of the Sensorband, in which he is joined by sound artists Edwin van der Heide and Zbigniew Karkowski. Global String is a network installation that consists of two steel strings, up to 12 m in length, placed in two separate locations that are linked through an Internet connection. Each of the strings ends in an interface that is able to pick up the vibration of the string and transform it into a signal that can be sent across the Internet. There is also a magnetic actuator that can activate the string at the other end according to the signal received from the other string, with a corresponding rhythm, strength and duration. The two parts of Global String can thus be thought of as the two ends of a single string, connected to each other through the virtual space of the network. The signal traveling from one end to the other is not transmitted in its pure form but is modulated by the number of hops it has to take through the Net’s server space, the amount of traffic it encounters on the server nodes and the delay time that it experiences on its journey. The parameters chosen for the modulation of the sound are defined by these technical conditions. As in a physical, acoustic instrument, the physical technological infrastructure of the Internet modulates the sound that can be heard at one end of the string when it is hit or plucked at the other end. Global String uses the Net and its infrastructure as a tuned resonant body and is thus both an interactive, telematic installation and an electroacoustic instrument.

One of the aims of this essay is to ascertain to what extent the notion of resonance can, beyond such a literal application of the concept of resonance in the network, function as a useful metaphor and concept for describing specific aspects of an aesthetics of network-based art.

MAKING THINGS HUM

The U.S. artist Mark Bain has dealt with the phenomenon of resonance in a most radical way. In his series of “resonant architectures,” Bain seeks out the resonant frequencies of built structures such as houses and bridges. Each structure has its own frequency at which it starts to resonate, making it possible veritably to “play” a building by mechanically exciting it. Thus, the building itself can be made to act as a resonant body, as the body of an oversized acoustical instrument (see Fig. 1).

Bain has studied the properties of resonance in depth. He writes:

The basic idea is that when a system is stimulated with a self-reinforcing method of activation, then a kind of self-propelled resonance can occur. As I’ve described with some of my work on buildings, this resonance becomes a kind of ringing of the architecture; a complex grouping of structural elements coupled to an acoustic activator which feeds the system. A similar concept is the “standing wave,” where all the elements along with the provocative force combine into a stable situation [2].

Fig. 1. Mark Bain, X-Site, Resonant Architecture, installation, Het Paard, Den Haag, 1999. (© Mark Bain)
Bain continues,

Resonance seems to straddle a knife-edge between stability and instability depending on the motivating factors. One element that can’t be left out though is that of the self-referential or feedback. This is where the system is self-sensing or feeling its own output in order to align the proper input and therefore reinforcing the output again. This sensing line back to itself is required for any kind of suitable resonance to occur. As you can see in this arrangement, potentials for things to lose control are great. . . . Essentially though this destabilized form is always looking for stability (imagine atomic and molecular structures), but of course it may have to destroy everything in its path first. Resonance also has a kind of efficiency, which makes it seem that the sum of the parts is much greater than what is put in originally [5].

Much earlier, John Cage pointed out the fact that the human body can also function as a resonant object that produces its own continuous soundscape that envelops us. Cage described trying to find a fully silent space and entering an anechoic room at Harvard University, where, he recalled, “I heard two sounds, one high and one low. When I described them to the engineer in charge, he informed me that one was my nervous system in operation, the low one was my blood circulation. Until I die, there will be sounds” [4].

These examples illustrate that resonance is an intensely analog phenomenon that is immediately tied to the physical properties of an object, body or structure, properties that range from the molecular micro-structure to the overall macro-structure and the configuration of the materials in space. When taken from an electronic source, resonance is the material transformation of the waveform in electronic currents into a physical experience or event. Resonance is the agitated response of matter to the immaterial call of the electronic wave.

The transmutation of electrical currents into material waveforms surprised the early researchers studying electricity in the 18th century, who were exploring the wondrous continuity between the visible and the invisible worlds of the yet scarcely understood phenomenon of electrical current. The Hungarian-German researcher Ernst Florens Friedrich Chladni published in 1787 a book called The Theory of Sound. There he presented his research into the effect of physical excitation on glass plates covered by graphite. Chladni would use the bow of a violin to stroke the sides of these glass plates, discovering that, depending on the material of the plate and the speed of the stroke, the graphite would form very distinct star-shaped patterns that were a re-mediation of the sonic vibration as images. Chladni’s “sound figures” are a visible manifestation of standing wave resonance on the material surface of the glass plate. They illustrate the physical continuum of the waves constituting the experiences of light, sound and matter, whose existence as specific, separate events of perception depend on the perceptive system, which categorizes them as optical, acoustical or material.

Another master of these explorations, Nikola Tesla, performed an experiment that precisely prefigures Mark Bain’s experiments in resonant architecture. Tesla fed back the resonant frequency of a skyscraper in New York to the building until it started vibrating and almost collapsed. Tesla also did extensive research on infrasonic waves [5] and thus laid the basis for later research about acoustic weapons that would target the human body with penetrating sound waves.

Resonance can thus be understood as the medium for sculpting with the hidden acoustic and material potentials of all things material.

**WITH THE FLOW**

The question is to what degree we can speak of electronic network space as a resonant space. Although constituted by material technical objects, the network system is characterized by the discontinuity of its parts and the discreteness of the digital signals that flow through it. In a practical sense, it will hardly be possible to make a network connection hum in the same way a telegraphic wire may hum in the wind, or the way Mark Bain’s Live Room resonated through its walls as well as the bodies of its visitors.

Networks, however, resonate in a different sense of the word that is worth exploring. Philip Sherburne, for instance, describes the increasing liquidity of the digital soundscape:

The digital object seeps between the cracks of matter, spills out of the grooves of the vinyl or aluminium disc and becomes liquid. In this model, a model so nascent we can hardly recognize its true impact, music ceases to be a question of objects and becomes an issue of pure circulation—hence the burgeoning culture of peer-to-peer trading, and also remixes, bootlegs, versions and repackaging underground bits as car commercials and writing concertos for the turntable [6].

This understanding of excitation, liquidity and resonance deparls from a narrow, physical understanding of resonance and its foundation in the trans-mediations between the analog vibration of the string and the digital representations of this vibration through the actuators and their tuned transmissions.

A highly modular, heterogeneous disposition was presented by telecommunication artist Marko Peljhan and sound artist Carsten Nicolai in their installation project POLAR, which was first presented by the now defunct Canon ArtLab in Tokyo [7]. POLAR constitutes a complex interface to the network, which it conceives as a quasi-animated organism of knowledge. Data streams, zones of intensity and information structures are represented by different types of visual and acoustic modules that can be modulated interactively by the visitor. The installation is not concerned with the knowledge stored and represented in the network but with the technical infrastructure of the network, which is the object of this aesthetical investigation. Reminiscent of the intelligent ocean in Andrej Tarkovski’s film Solaris, POLAR speculates about a complex, unbounded, autonomous technoid intelligence into which the visitor is allowed partial insights. Requests sent through the network are fed back as transformed, amplified, fragmented experiences that immerse the visitor in a resonant environment that treats text, sound and technology as a continuous matrix connecting semiotic with self-expressive strata.

In his more recent explorations, Mark Bain is on a similar trail. He writes:

Lately, I have been working with data networks and the adjudication or sonification of data streams. Using “sniffer” agents to capture and listen to pure data signals allows you to hear on a certain base level the activity of a signal without using the usual modes of perception. There are sniffing agents that are also designed to analyze the Internet, showing you peaks and nodes of activity and connection, providing a better understanding of what and where things are happening [8].

The network environment in which these signals travel is made up of machines as much as of the people who use them for all different types of communication and data transfer. Bain continues:

[Sometimes] the Internet feels sluggish and the bits don’t get through, user peak and slow death. But then alternate com-
The material basis of network-based resonance is uninterrupted connectivity, a machinic continuum that has its own properties burnt into processors and software configurations. As in the models of architectural resonance quoted earlier, this digital resonance is based on the generative qualities of software, which allow it to multiply its effects in a favorable network environment where through feedback software can acquire an uncontrollable, at times destructive, dynamic that will lead to a temporary stabilization on another plane. It is this instability that is creatively used by the artists practicing Net activism: The policies of the Net are inseparable from the technological and juridical regimes that rule it. The trick, as in Bain’s resonant architecture, is to find the resonant frequencies that make networked computers hum.

This kind of feedback has featured prominently in the artistic work of Japanese artist Seiko Mikami, who uses the perceptual system of installation visitors to create techno-physiological feedback loops [10]. Similarly, German artist Nicolas Anatol Baginsky [11] has built intricate dispositions in which neural networks cause robotic installations to react with ever more simulated intelligence and precision to a visitor’s presence.

We encounter an even more direct confrontation with the physical efficacy of networked data realities in Ulrike Gabriel’s project Sphere. This project is based on the construction of a data body that is an abstract and externalized representation of the Internet user. This “sphere” can be used as a kind of bomb to shoot down the network terminal of another user. The trajectory of this projectile moves across the IP-space of the Internet, which is mapped back to the geographical coordinates of the globe. On a precisely calculated orbit, the projectile of the data-sphere effects electromagnetic turbulence on the computer it passes along its route, before the sphere forcefully hits its target and temporarily disturbs the electrical fields on computer screens, in projections and in light sources. As in other works by Gabriel, we experience an intense and violent articulation of technology and perception, of cybernetic systems and physiological experience. The network is the site at which digital presence is constituted, mediaised (turned into a medium) and consumed. The mediaisation of this confrontation is the electromagnetic resonance of the data-body on its trajectory through the physical space of the network. The subject of this mediaisation emerges from the sharp, edgy interface between body, information and trajectory, a phylum that resonates at the frequency of fear.

**IN THE GUTS**

When a heavy sound hits us, it reminds us of the physical nature of the sound wave, and of the material presence of our bodies in space. Think of sitting indoors while a truck waiting outside turns the whole building, including oneself, into a resonating instrument. The sound is both disembodied and non-directional, even as it penetrates deep into our guts.

In electronic music and sound art, the relationship between technology, space and the human body as it is sculpted by resonant sounds has been explored in depth. The visually and sonically excessive performances by the group Granular Synthesis overwhelm the viewers and deliberately blur the boundaries between image, sound and body in aggressively immersive spatial configurations. Quite differently, La Monte Young’s long-term installation *Dream House* (1993–2005) [12], at the MELA Foundation in New York, finely sculpts a sonic environment.
that envelopes the visitor and produces a strong sense of space, place and the effect that the viewer’s own movements in the space are having on the sonic conditions of the space.

A set recently played at the Dis•patch Festival in Belgrade, at Cinema REX, 23 October 2003, by Swedish musician Andreas Berthling and a trio called Tape, traveled precisely along the boundary between pure resonance and the coded sound of music. With his computer, Berthling created very lush standing sound waves that turned the performance space into a single continuous sound object, whereas his co-musicians played various acoustic instruments that were able to break the continuous envelope and define time, place and musical meaning through their rhythmic and partly melodic play. The performance oscillated between the disembodied and subjectless experience of the resonant sounds and the structured musical interventions. It was possible to experience music as the representational mode of sound, transcending the purely physiological impact of the sound waves to reach a semiotic level. Resonance is a function of the disposition of space, sounds, technology and bodies into a heterogeneous machine. In contrast, music works with the separation and the decoupling of space, sound and body through rhythm and melodic structures, which subjectify the listener by placing her in a context of semiotic systems and modes of socially meaningful sonic representations.

Is the contrast between resonance and music homologous to that between “becoming machine” and “becoming subject”? The electronically induced resonant wave forces a transgression that can be described as cybergian, as was attempted by British music theorist Kodwo Eshun when he discussed the vocoder as a technico-musical instrument for narrowing the gap between human and technological music machines.

In a very impressive piece of network-based art, the group Knowbotic Research [13] created the installation Anonymous Muttering, which was first presented in Rotterdam in 1996. In their self-developed connective interfaces, Knowbotic Research have, for many years, explored the possibilities and the conditions of networked action and cooperation. Anonymous Muttering is their most radical gesture yet in the direction of a dramatization of the interface in which dislocated subjects resonate in a translocal, technosocial environment. For this installation, the music from DJ events is transmitted, digitized and cut up by a computer into small, granular sound units that are in turn recomposed, according to parameters of probability, into a sound surface that can be likened to felt (i.e. the fabric). These sounds are projected into the installation, which is delimited by two circles of strobeoscopic lights and a loop of loudspeakers. A silicon membrane through which the data flow is placed in the installation. It can be bent, turned and folded by the visitors, who thus fold and modulate the felt of sound. A similar, net-shaped Java interface on the web site of the project can be “pushed” and “pulled” in a similar fashion by visitors, who can thus interact in real time with the same sound events that are also projected into the on-site installation and follow these sound events through a live stream on the Net. The productive tension between local and trans-local possibilities of intervention, between human and technical agents, can be experienced as an irritating and overwhelming oscillation between order and sheer perceptivity, de-subjectified sublimation. Anonymous Muttering sends bodies spinning, with eyes and ears humming and hovering in a space that is all light and sound, without boundaries, resonating in perception.

ON A DIFFERENT NOTE
I would like to end on a note different from this rather fantastic fantasy of immersion and transgression. In their most recent work, Minds of Concern, Knowbotic Research invite gallery visitors to choose from a list of selected nongovernmental organizations whose Internet servers are subsequently port-scanned in order to discover potential security risks on those servers. The results of these port-scans are published in a news ticker on the web site, albeit in encrypted form. The project Minds of Concern seeks to raise awareness around the contested public space of the electronic networks in which the most progressive agents often run the greatest risk, and it aims to point out the dilemma of the enlightened, liberal NGO world: it needs to protect itself and police the technological boundaries of the very zones of liberty that it opens up (see Fig. 2).

In our present context, Minds of Concern is relevant because it rejects a notion of resonance, in which the wires would start to hum, and instead uses the principle of syncopation, the hard rhythm of the exploitation tools scanning and attacking the outer shells of the Internet server. While network resonance is a fascinating and potentially beautiful phenomenon to study, in the urgency of the current political situation, in which the war that was declared in the days after September 11th continues to rage and penetrate deeper and deeper into our lives, we may want to seek not the immersion of resonance but the syncopated subjectivation of port-scan reality.

References

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