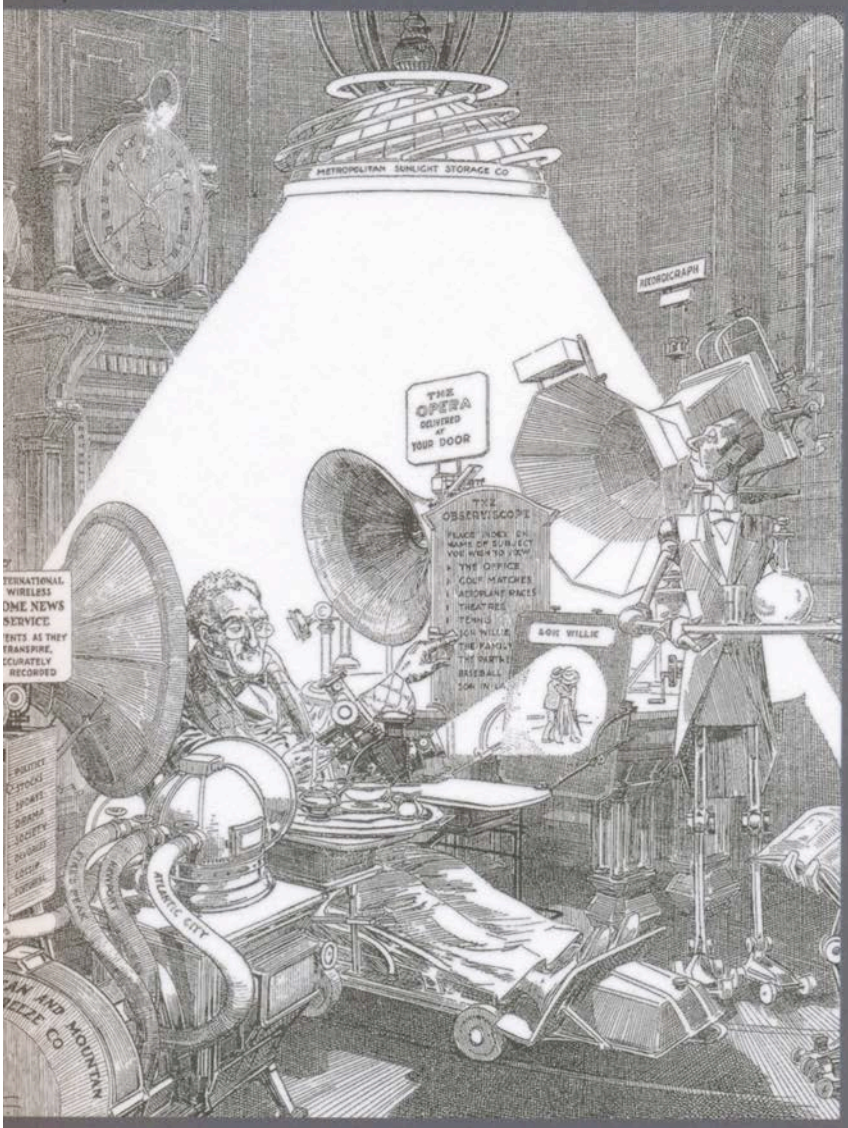
MEDIA ARCHAEOLOGY

Approaches, Applications, and Implications



Edited by Erkki Huhtamo and Jussi Parikka

"The best writings from almost all of the best authors in the field."
—Sean Cubitt, author of *The Cinema Effect*

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Erased Dots and Rotten Dashes, or How to Wire Your Head for a Preservation

Paul DeMarinis

We are the first culture to experience our own archaeology on a daily basis. Consider all the drawers, closets, and garages full of obsolete technological junk that only a few years ago represented a healthy investment and pride of ownership, not to mention an aura of utility. We endure the reek of flopping diskettes, the embarrassing bulge of zip drives, and a plethora of unplayable interactive CD-ROMS. There they rest, undergoing a slow decay—the bleeding out of readability. The codes present on their surfaces require other codes resident in no longer supported mass storage hardware, to be offered up by no longer extant operating systems to software applications that are no longer maintained. These codes are rendered unreadable not only by obsolescence but by contagion. They suffer the unavoidable disease of bit rot, because there isn't any pure information devoid of material. The bits of information are stored as modulations in the structure of material objects—as color, reflectivity, residual magnetism, buried charge—and these materials change form, composition, and position over time, erasing the data stored there.

If we, as the Good Book says, are ashes, then digital memory is rust. This is made palpable by the almost surreal sensation of latency we endure as we play with our digitalia. It is surreal in the sense that we have become accustomed not to notice it. During the interval while we wait for a file to copy or for an Internet download, we experience a nonduration, measured out not in coffee spoons but in accumulated microseconds of denial. Certainly, electrons could travel around the earth millions of times in that interval. So why the wait? Because as data pass through servers and routers, or from one application to another, they are alternately stored as speed-of-light charge packets in semiconductors, wires, and

waves, and then as tiny patches of magnetic flux on iron oxide–coated spinning platters in disk drives—from ether to rust and back again, over and over. Relay, Delay, Memory. In the vast flux of signs going between ether and rust, the moment of transfer from energy to matter is heralded by a click. This primordial sign of the passage of meaning from one phase to another was first defined by the click of the telegraphic relay, and it continues to reverberate in the noise of the digital, in the torrents of state transitions between 0s and 1s. It is this noise, and the potential bridge it offers between seeing and hearing, that emerges as the apotheosis of our age.

In this chapter I will discuss a series of technological devices and several contemporary art practices that forge as well as break links between marks and noises, between physical records and sensations. Therefore of particular interest as a starting point would be the lines drawn among sounds, recordings, and notations. Wittgenstein makes specific reference to a proposed logic: "A gramophone record, the musical idea, the written notes and the sound waves, all stand to one another in the same internal relation of depicting that holds between language and the world. They are all constructed according to a common logical pattern."[1] But this logic begins to break down as soon as we encounter the lossy relations that exist between material and code. The world, Wittgenstein's *Tractatus* proposes, is the totality of facts, not things. The immediate problem that arises is that when facts are encoded as things we must somehow come to terms with the relation between the fact and its material encoding, transmission, and processing. The distinctions among, and connections between, sensation, memory, and physical record stand at the center of our discussion, and a host of philosophical and scientific theories arrange and connect them.

Two paradigms have been posed for encoding and recording, commonly referred to as analogue and digital. Practitioners with unconsciously technofuturist thought habits commonly err when they refer to analogue as "old" and digital as "new." They furthermore imagine the "real" world to be analogue in nature, instead of merely material. Analogue and digital, in historical terms, are two concepts with a common origin, although they have been cast as a contradistinctive pair to make a point about computational methods as applied to machines and also to illustrate how material substances can be made to represent information about position, energy, and sequence.[2]

If memory is linked to neural processing of place sequence, as recent studies of learning within the hippocampal areas of the brain suggest, then either model, digital or analogue, might apply. There is what we could term the Edisonian sort of analogue memory, akin to the phonograph record, with its soft, homogenous, and impressionable wax that offers itself up to receive any impressions in a trace that bends and curves sinuously across its surface. On the other hand, there is the telegraphic type: the digital system of relays, the repetitive measuring of physical

state, followed by the erasure and rewriting of that state, propagating recursively through space and time. In this memory sequence the instant of erasure is a moment of suspension, a thermodynamic inflection of eternity. These two models—the delicate memory we dare not revisit for fear of altering it and the memory we drill into ourselves with repeated practice ("use it or lose it")—resonate well with our inner mental life. They propose alternately a personal and a social model of self-knowledge. It may be that we remember, or know, or locate meaning in the relaying of stimuli from one sense to another. Historic models of the senses asserted that the sense of touch links together the other senses and thereby underlies cognition.[3] This model of memory, more closely allied with the telegraphic, appears to offer some insights into the loss and gain of meaning in digital media.

The artifacts of digital degeneration are by no means newcomers to the content of artworks. Not limited to looping and skipping, accumulated errors and mistranslations, normalization, or mapping of data sets onto a multiplicity of sensory domains, they have become too widespread in artistic practices over the last decade to permit a comprehensive survey of any but the most superficial sort. A historical line from the pixelations of 1968's *Cybernetic Serendipity* through classic works by Vuk Cosic and Gerfried Stocker in the early 1990s to the current plethora of museum-worthy ornaments would attempt to cover too much aesthetic territory and likely bog down in the crosscurrents of cultural intentions.

While these ideas could suggest a point of departure for a discussion of a number of contemporary artists' works, the works of Jocelyn Robert and Yasunao Tone offer good opportunities for a media-archaeological investigation. Both artists employ technological error as a creative tool and in ways that touch directly upon the transformative vulnerability of digital storage. Both use the translative powers of digital systems as a way to navigate oceans of meaning between the shores of marks and noises. They both tickle at the very edges of the media they use and confront the cultural milieus of their presentation and the forms of sensory attention they engender. Though hardly household names, both artists were pioneers in this sort of work and have continually been at the forefront of its development over the last two decades. Moreover, both artists use the media in highly nuanced ways that I believe to stand in full awareness of the historical context of contemporary media technologies. In particular, they understand the position of the textual object as it intersects the two apparently noncongruent planes of image and sound.

Robert's peripatetic practice employs object, sound, video, electronics, and text singly and in combination. His frequent focus on errors, both machine- and manmade, as a generative tool and as a subject of reflection, and his use of existing corpus-objects like pianos and dictionaries as self-referencing lookup tables, pose questions for the viewer that can be answered only by a deep probing into

the nature of the technological materials he treats. Tone's work may be regarded as an almost unbroken line of transfer and evolution of a core set of materials, commencing with a series of eighth-century texts that are translated in turn from sign to image to sound to object and back again, each piece building upon the ashes of the previous. Most importantly, however, both artists use the media to make transfers between sounds and signs in a manner that is highly significant to my understanding of the origins of media technologies.

As a practicing artist myself, I do not pretend to offer a definitive interpretation of the manifold connections and evolving meanings of these artists' works. Although neither artist adheres to a media-archaeological agenda, I think that such a treatment can offer a context for their works, and perhaps the works of others, within a broader history of culture, ideas, and technology. But it first requires a suitable backdrop: in the following exposition of electronic media history I offer an idiosyncratic take on historical facts in the hopes of reaching a conclusion admittedly rife with contradiction, controversy, and unresolved questions but hopefully congruent with the peculiarities of the artworks in question.

The disembodied minds of inspiration floating over this essay are easily named: the inventors Samuel Finley Breese Morse, Thomas Edison, and Raoul Hausmann—two of whom were also artists. The inventions (by which I mean the complex of devices, practices, and expectations) that I will examine are Morse's electric telegraph, Edison's mechanical phonograph, and Hausmann's optophone. As in a media-archaeological context, these distant artifacts are recast as tools to excavate the present. It is my intention to show how these three primary devices are not only related in their technological wherewithal or social setting but intimately connected in the fabric of our media culture—the culture of marks and noises. In the case of the telegraph and the phonograph, the etiology of that connection is well documented if not widely appreciated. But the optophone, a device that has been widely discussed in the context of sensory theory—in large part because of its (admittedly late) adaptation by Hausmann—appears in much critical literature to be a device apart. By tracing its antecedents and its relations to the telegraph and the phonograph, I hope to tap into deeper cultural sources that shed light on contemporary practices in media art.

The telegraph, the optophone, and the phonograph are all devices that perform interchanges between marks and noises. In this interchange the acts of encoding, storage, retrieval, and interpretation exist as stages, acts that are at the whim of unspoken conventions and habits and forms of attention, both human and systemic. When those unrecorded conventions change, the system breaks down. But more important, these unrecorded conventions can serve as a surface for free interplay among the marks and noises, as will be shown in an examination of the works of the artists discussed here. Noise—an immaterial and transient sign—is a precursor of all signals, whether ether waves, pulses of current in a wire, or

photonic flashes, while marks are prototypical of all types of materially encoded data: scratches, magnetic domains, pits in a specular surface.

Another point I will be examining is that, where noises are heralds of a presence—a surplus, so to speak—marks are invariably encoded as material absences. The pits on a CD, even the groove of a record—both of these are sculptural excisions, but more profoundly, the technical fact that telegraphic signals were conveyed by cutting the flow of electricity rather than turning it on may call into question the whole idea of electrical communications as *communication.*

To construct a sufficient technological background for my examination of these artists' works, and one with the right feel for the material, I will embark on an excursion into three key devices that cast light on my artistic subjects. The material covered is fairly canonical and has been treated extensively in histories of technology, but several of the insights I offer are perhaps unique, and these will help me lay out my program and in the end achieve an appropriately unorthodox conclusion.

MEMORIES ARE MADE OF THIS

The electromagnetic relay is among the simplest electrical devices possible: a coil of wire, energized by an electric current, generates a magnetic field and pulls a bar of iron toward it. This bar moves a set of electrical contacts to complete another circuit that energizes the next electromagnet down the line. Aware of this amplifying effect as early as 1837, Morse felt assured from the start that it did not matter if the force of the coil was enough to make a mark. As long as it could make any movement at all, this movement could be amplified by another set of electrical contacts and a local set of batteries. The "relay" system not only acted as a means for amplifying and propagating a signal across space but served as a primitive memory element in the telegraphic system, a dynamic factor that could store the message, however briefly, so that it could be sent the next twenty miles.[4] Imagining the sequential volleys of relays stretching from coast to coast, one might consider it, as it was considered by its contemporaries, to be a nerve network. In some sense, then, the vast terrain traversed by wires and repeater stations becomes part of the known world, perhaps as much as if it had been picked over by teams of botanists, ethnologists, and photographers.

If memory is just a specialized case of delay, then the electromagnetic relay, I propose, is the first instance of a storage medium that shares key properties with subsequent and current forms of computer memory. As such, it offers insights into our electronic media and media art practices. In particular the dynamic nature of these memory technologies is important in arriving at an understanding of the roles of bit rot, loss, preservation, and degradation at play in the works of contemporary artists.

original. Thus in devices like orchestrions and player pianos, codes and mechanisms imitated the performative part of the operation but left the creation of the sound to strings, whistles, and drums. These musical somnabulists posited further that vocal sounds needed mouthlike chambers, wheezing lungs, and rubber lips to make speech sounds audible and that the Edison phonograph being demonstrated must be a fraud perpetrated by clever ventriloquists. The separation into and connection by facts of code, mechanism, and record eliminated the hypothesis of the trace that could recreate itself.

ROBERT

In the early days of computers human error was often cited as the primary source of failure in man-machine systems, probably because of the inability of systems analysis to establish a quantifiable definition of human error. High-profile cases like deaths caused by software glitches in cancer treatment devices continue to surface, and human factors are still invoked—you can't sue a machine. But the last three decades have shown that the sort of generative power of the machine, its remarkable ability to transform data and submit them to the regimes of meaningfulness, suffices to create error of a more varied and interesting sort than we might have ever imagined. Much of the work of the Quebec artist Jocelyn Robert forms around such errors that systems create. Robert's work is as diverse as it is prolific, and this may be no surprise for the work of an artist who completed studies first in pharmacy, then in architecture, before making his first artworks.

Le piano flou (1992–93) is a collection of pieces created for a Yamaha Disklavier—a contemporary revisioning of the player piano.[27] A computer reads MIDI data files and controls a series of electromechanical actuators, one for each key or pedal, to play music. The device itself would appear to be an embodiment of the ideals referred to by the *Tractatus,* linking together seamlessly the music, the score, and the recording, and in itself it could serve as an intellectual companion to that work with regard to the present discussion. Or, by repositioning the complicated relationship between artist, piano, and composition, it may offer the possibilities of loss and gain along the lines previously discussed. Such a program may be seen at work in Jocelyn Robert's work. In *Le piano flou* he designed several short piano phrases and recorded them on the Yamaha Disklavier. Replaying the files actuated the keys of the piano with robotic precision. As the robot played, Robert played along in unison, and each human repetition was also recorded. As the computer program repeated each phrase with increasing tempo, in the manner of piano exercises with a pedantic master, gradually Robert's keyboard technique, unlike Edison's telegraphic performance, began to give way, creating a blur of errors around the original phrase. All the recordings were then normalized back to the original tempo and performed simultaneously with the original

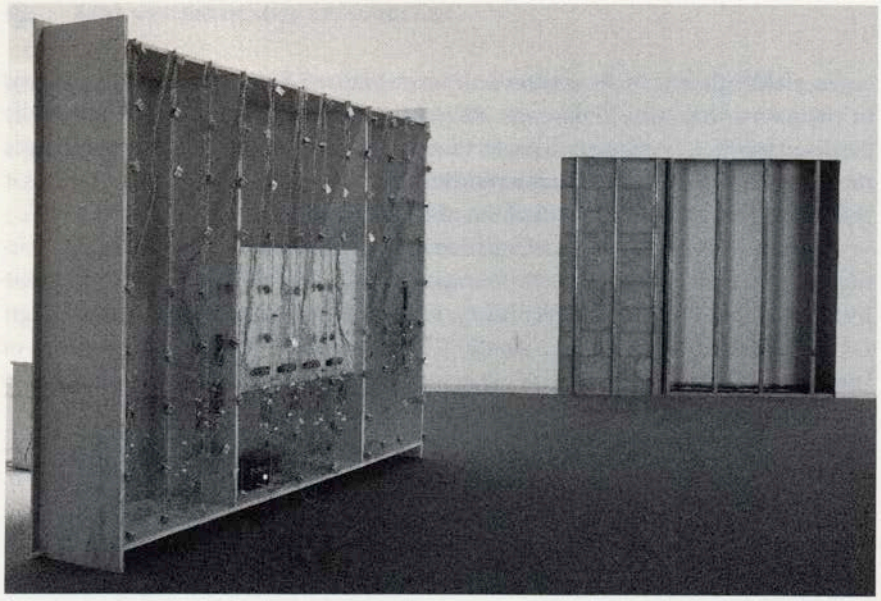
track, yielding a sort of dispassionate impressionism of sound rarely encountered in the piano literature. Unlike the roughly contemporaneous *Winke Winke,* by Gerfried Stocker, *Le piano flou* posits that the generative powers of such processes lie not in the evolution of successive error but rather in the ecology and habitat that result from such a diversification of related species.[28]

Another CD work that summons error as a generative impulse is *Les montagnes brusques* (2000), whose title may well allude to the bumpy ride over the hills and dales of Edisonian recordings as they encounter the terrain of the digital. The diminutive (three-inch) audio CD was released as part of issue no. 77 of the journal *Inter* and contains a piece made by CD-generated errors of another CD. Robert explains:

> I got a MusicWorks CD with the magazine, years ago. But my CD player (I got it for free) was not behaving great, and the CD itself (I was told with the next issue of the magazine) had pressing problems. Both combined, they gave this particular jumping when I played it the first time. Hearing what was happening, I immediately plugged in the tape recorder, and recorded about an hour of it. Then I put it in the drawer to sleep. . . . Later, asked by a magazine for a text on art and accident, I woke up the tape, edited parts of it, mastered it and offered the CD itself in place of a text. I asked for the permission to publish from Judith Cohen, the singer, who agreed after a very serious debate, with the condition that she could publish a text with it. The final project was the CD in an envelope pasted on a card on which her text was on one side, and mine on the other. My text was about "accident" being not what we don't expect to happen but rather what we expect will not happen (the difference being one is unexpected, while the other is expected but denied).[29]

If this recto-verso dialogue of disavowal, accompanied by the mechanical fidelity of the new CD release, makes clear the creative break between Robert's work and Cohen's, the question arises: How will we know, when the material of this CD starts to erode and create errors of its own, that we are still listening to Robert's work? The breaks, skips, and chatters will be of the very same kind and order as those that occurred in the originary mistranslation. Such questions prefigure a host of others that arise when we imagine the conceptual enormous challenges imposed by the very notion of preservation in the digital domain. The element of denial that Robert brings up looms large in discussions of artists' intentions surrounding much discourse on media preservation. Unlike projects based in the analogue mode of memory, like Christian Marclay's *Record without a Cover,* which encourage the user to let the recorded object acquire its own semi-autobiographical collection of unique scratches, Robert's *Les montagnes brusques* posits, in the musical sense of the word, a "cover" without a record.

After a two-year (2001–3) sojourn in Canada's southern neighbor, Robert produced a work that combines the processes of "digital error equals variation plus summation" with optic-otic transfers of data. *State of the Union* is an installation



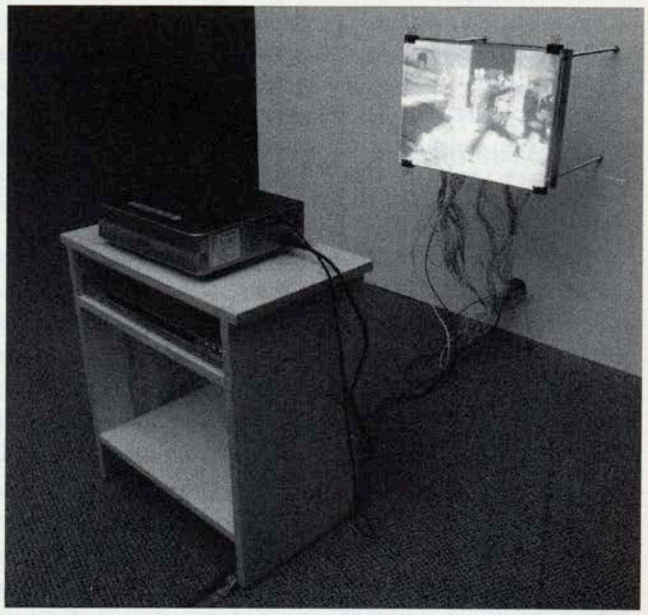


FIGURE 10.7. Jocelyn Robert, *State of the Union*, 2003, rear of installation with relays. Courtesy the artist.

FIGURE 10.8. Jocelyn Robert, *State of the Union*, 2003, detail. The image is projected on an optophonic screen of 108 photosensors.

work that proposes a domestic space for image viewing, suggested by a couch and a small table with a video projector that casts its image onto a screen about the size of a TV set (figures 10.7 and 10.8).[30] We see images of military parades, propeller planes flying in attack formations, tanks and big guns—all in grainy black and white, and all the films are run in reverse, backwards-marching across the diminutive screen, as if to remind us of Hawking's thought example about time's directionality once more. The screen, however, is, as in the optophone, composed of a matrix of photocells, each tuned to respond to a discrete change of light level by activating a small electromagnetic relay. The back of this wall, accessible to gallery visitors, is actually an empty bookcase, and a matrix of 108 relays, one for each photocell, is arranged in a corresponding grid over its surface. As the black-and-white images parade over the screen, the transitioning edges of dark and light trigger and release the relays, producing audible clicks. A squadron of war planes flying past summon a barrage of relay clicks in rapid succession moving spatially over the expanse of the wall, a sound that cannot help but suggest a volley of machine-gun fire. Here the space of history and the space of memory commingle in our imaginations, locked in by the technical associations of the equipment so transparently arrayed. Much recent research in sound has centered on spatial cues. In *State of the Union* the wheres and the whens but not the whats are communicated in the clicking of the terminal relays—the war correspondent has omitted this part of the news in the translation from visual to acoustic.

OVERSHOOT

A wax record may be created *in vacuo,* in some remote site, to be placed as a message in a bottle and ejected into unknown futurity. The gold analogue LP of the Voyager spacecraft cast into interstellar space by Carl Sagan and NASA, containing grooves of B. B. King, J. S. Bach, and Laurie Spiegel, is one such missive. We may well conceive of the sum total of radio-frequency output from our planet to be another. In contrast, though, a telegraph line presupposes an unbroken chain of relay stations, manned by faithful repeaters and fresh batteries, to read, erase, and rewrite the message as it steers toward a destination.

The reception of any transmission is attended with some anxiety. One might imagine Kafka, waiting for a message to arrive by wire. Uncertainty would begin to creep in—Did the sender, as promised, actually transmit the message? Was it held up in a remote relay station by an absent or delinquent telegrapher? Or was the wire cut by bandits or natives? Such uncertainties that early on led to the adoption of an electrical protocol continue to cast their shadow onto our present technologies: the wire is always electrified; the relay is always held tight by the current. To transmit a sign, the current is briefly interrupted by the stroke of the telegrapher's key. Thus each dot or each dash is an absence, a loss, a break

in the circuit that connects us to the source. This persists in our day as mark-space in serial data protocols, the active low of open-collector and open-drain semiconductor circuitry. But it also insinuates its way into the very codes that permit the ruptures of the sort that Robert and Tone are using in the creation of their work. Consider a blank page, covered with white space: any mark upon it, even the vaguest smudge, may serve to state, to define, to fill, or, in juxtaposition with others, to craft a winding line of thought. A blank page, like the soft wax of Edisonian memory or the tabula rasa of Locke, is an underpostulated prairie waiting to become peopled with signs.[31]

But when a computer makes a text there is no white space, no preexisting *mater* waiting for imprint. As we have seen, the system of messaging consists of propagation of absences. Therefore a code must be designated to represent the white space where a mark itself is absent (ASCII symbol 32), another for an erasure (ASCII 8), and so on. It is this coding of nothing that supplies an invitation to the break, the rupture, the little moment of nonbeing that is incurred in faithful reproduction. Here Tone's parasite sneaks in, the noise, the excess. The creative possibilities of this break are of a kind and order totally different from those of the phonographic model.[32]

This may help explain the losses and gains that happen when mediated shifts from one sensory modality to another are made. If a circuit is to be built between seeing and hearing, it cannot fill the gap between them. When a translation occurs, an erasure is inevitable, and that briefest moment of erasure opens a gap. There is the ever present possibility of a break that will engender gains and losses. This further suggests that the complete processes imagined in the optophone are unattainable for material reasons. Reversibility itself is impossible not only on the cosmic scale but even at the local. And hopes for preservation, whether by rote copying or translation, may suffer the same fate of these optic-to-otic shifts, that of a creative afterlife.

NOTES

1. Ludwig Wittgenstein, *Tractatus Logico-Philosophicus* (London: Routledge and Kegan Paul, 1961), sec. 4.014, p. 39.

2. David A. Mindell, *Between Man and Machine* (Baltimore: Johns Hopkins University Press, 2002), 10, 174, 295.

3. Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 1990), 59–64.

4. I do not wish to split hairs about the priority of invention of the electromagnetic relay, a device whose time was ripe, but only wish to point out not only that it was essential to the success of Morse's system but also that in this particular system's application of the binary code the relay further became a device for the translation of marks into noises. Joseph Henry preceded Morse by two years in this application of electromagnetism as a single-stage amplifier in 1835, but rather than con-