GRAMOPHONE, FILM, TYPEWRITER

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INTRODUCTION

Optical fiber networks. People will be hooked to an information channel that can be used for any medium—for the first time in history, or for its end. Once movies and music, phone calls and texts reach households via optical fiber cables, the formerly distinct media of television, radio, telephone, and mail converge, standardized by transmission frequencies and bit format. The optoelectronic channel in particular will be immune to disturbances that might randomize the pretty bit patterns behind the images and sounds. Immune, that is, to the bomb. As is well known, nuclear blasts send an electromagnetic pulse (EMP) through the usual copper cables, which would infect all connected computers.

The Pentagon is engaged in farsighted planning: only the substitution of optical fibers for metal cables can accommodate the enormous rates and volumes of bits required, spent, and celebrated by electronic warfare. All early warning systems, radar installations, missile bases, and army staffs in Europe, the opposite coast,[1] finally will be connected to computers safe from EMP and thus will remain operational in wartime. In the meantime, pleasure is produced as a by-product: people are free to channel-surf among entertainment media. After all, fiber optics transmit all messages imaginable save for the one that counts—the bomb.

Before the end, something is coming to an end. The general digitization of channels and information erases the differences among individual media. Sound and image, voice and text are reduced to surface effects, known to consumers as interface. Sense and the senses turn into eyewash. Their media-produced glamor will survive for an interim as a by-product of strategic programs. Inside the computers themselves everything becomes a number: quantity without image, sound, or voice. And once optical fiber networks turn formerly distinct data flows into a standardized

series of digitized numbers, any medium can be translated into any other. With numbers, everything goes. Modulation, transformation, synchronization; delay, storage, transposition; scrambling, scanning, mapping—a total media link on a digital base will erase the very concept of medium. Instead of wiring people and technologies, absolute knowledge will run as an endless loop.

But there still are media; there still is entertainment.

Today's standard comprises partially connected media links that are still comprehensible in McLuhan's terms. According to him, one medium's content is always other media: film and radio constitute the content of television; records and tapes the content of radio; silent films and audiotape that of cinema; text, telephone, and telegram that of the semi-media monopoly of the postal system. Since the beginning of the century, when the electronic tube was developed by von Lieben in Germany and De Forest in California, it has been possible to amplify and transmit signals. Accordingly, the large media networks, which have been in existence since the thirties, have been able to fall back on all three storage media—writing, film, and photography—to link up and send their signals at will.

But these links are separated by incompatible data channels and differing data formats. Electrics does not equal electronics. Within the spectrum of the general data flow, television, radio, cinema, and the postal service constitute individual and limited windows for people's sense perceptions. Infrared radiations or the radio echoes of approaching missiles are still transmitted through other channels, unlike the optical fiber networks of the future. Our media systems merely distribute the words, noises, and images people can transmit and receive. But they do not compute these data. They do not produce an output that, under computer control, transforms any algorithm into any interface effect, to the point where people take leave of their senses. At this point, the only thing being computed is the transmission quality of storage media, which appear in the media links as the content of the media. A compromise between engineers and salespeople regulates how poor the sound from a TV set can be, how fuzzy movie images can be, or how much a beloved voice on the telephone can be filtered. Our sense perceptions are the dependent variable of this compromise.

A composite of face and voice that remains calm, even when faced during a televised debate by an opponent named Richard M. Nixon, is deemed telegenic and may win a presidential election, as in Kennedy's

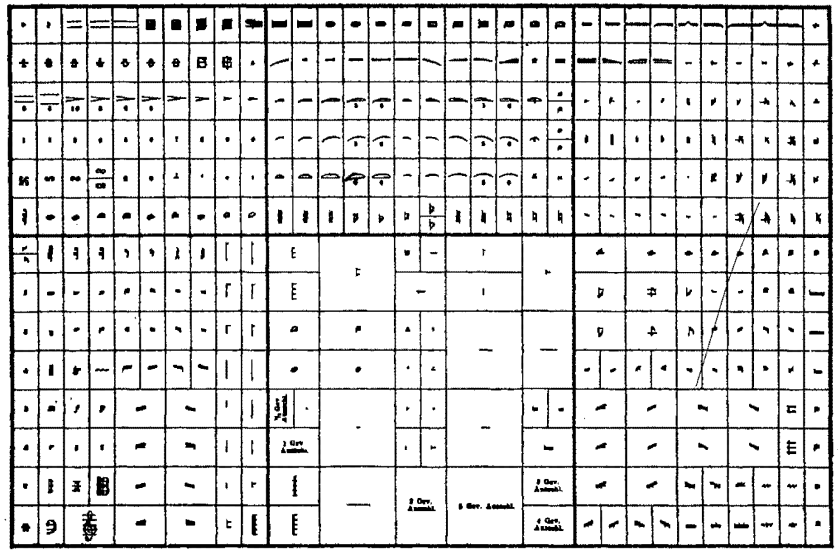
case. Voices that an optical close-up would reveal as treacherous, however, are called radiogenic and rule over the VE 301, the *Volksempfänger* of the Second World War. For, as the Heidegger disciple among Germany's early radio experts realized, "death is primarily a radio topic."[2]

But these sense perceptions had to be fabricated first. For media to link up and achieve dominance, we need a coincidence in the Lacanian sense: that something ceases not to write itself. Prior to the electrification of media, and well before their electronic end, there were modest, merely mechanical apparatuses. Unable to amplify or transmit, they nevertheless were the first to store sensory data: silent movies stored sights, and Edison's phonograph (which, unlike Berliner's later gramophone, was capable both of recording and reproducing) stored sounds.

On December 6, 1877, Edison, lord of the first research laboratory in the history of technology, presented the prototype of the phonograph to the public. On February 20, 1892, the same lab in Menlo Park (near New York) added the so-called kinetoscope. Three years later, the Lumière brothers in France and the Skladanowsky brothers in Germany merely had to add a means of projection to turn Edison's invention into cinema.

Ever since that epochal change we have been in possession of storage technologies that can record and reproduce the very time flow of acoustic and optical data. Ears and eyes have become autonomous. And that changed the state of reality more than lithography and photography, which (according to Benjamin's thesis) in the first third of the nineteenth century merely propelled the work of art into the age of its technical reproducibility. Media "define what really is";[3] they are always already beyond aesthetics.

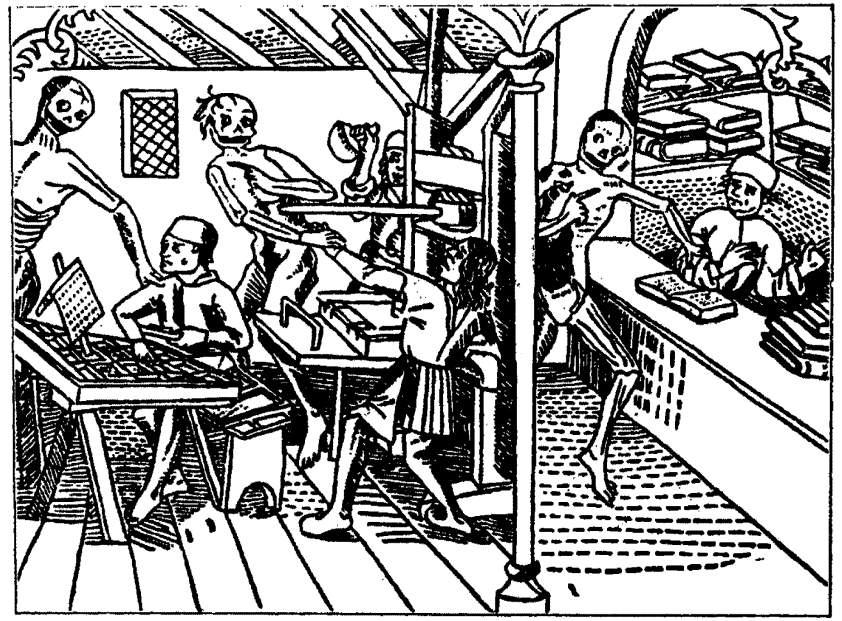
What phonographs and cinematographs, whose names not coincidentally derive from writing, were able to store was time: time as a mixture of audio frequencies in the acoustic realm and as the movement of single-image sequences in the optical. Time determines the limit of all art, which first has to arrest the daily data flow in order to turn it into images or signs. What is called style in art is merely the switchboard of these scannings and selections. That same switchboard also controls those arts that use writing as a serial, that is, temporally transposed, data flow. To record the sound sequences of speech, literature has to arrest them in a system of 26 letters, thereby categorically excluding all noise sequences. Not coincidentally, this system also contains as a subsystem the seven notes, whose diatonics—from A to G—form the basis of occidental music. Following a suggestion made by the musicologist von Hornbostel, it is possible to fix the chaos of exotic music assailing European ears by first



interpolating a phonograph, which is able to record this chaos in real time and then replay it in slow motion. As the rhythms begin to flag and "individual measures, even individual notes resound on their own," occidental alphabetism with its staffs can proceed to an "exact notation."[4]

Texts and scores—Europe had no other means of storing time. Both are based on a writing system whose time is (in Lacan's term) symbolic. Using projections and retrievals, this time memorizes itself—like a chain of chains. Nevertheless, whatever ran as time on a physical or (again in Lacan's terms) real level, blindly and unpredictably, could by no means be encoded. Therefore, all data flows, provided they really were streams of data, had to pass through the bottleneck of the signifier. Alphabetic monopoly, grammatology.

If the film called history rewinds itself, it turns into an endless loop. What will soon end in the monopoly of bits and fiber optics began with the monopoly of writing. History was the homogenized field that, as an academic subject, only took account of literate cultures. Mouths and graphisms were relegated to prehistory. Otherwise, stories and histories (both deriving from *historia*) could not have been linked. All the orders and judgments, announcements and prescriptions (military and legal, religious and medical) that produced mountains of corpses were communicated along the very same channel that monopolized the descriptions of



The oldest depiction of a print shop, 1499—as a dance of death.

those mountains of corpses. Which is why anything that ever happened ended up in libraries.

And Foucault, the last historian or first archeologist, merely had to look things up. The suspicion that all power emanates from and returns to archives could be brilliantly confirmed, at least within the realms of law, medicine, and theology. A tautology of history, or its calvary. For the libraries in which the archeologist found so much rich material collected and catalogued papers that had been extremely diverse in terms of addressee, distribution technique, degree of secrecy, and writing technique—Foucault's archive as the entropy of a post office.[5] Even writing itself, before it ends up in libraries, is a communication medium, the technology of which the archeologist simply forgot. It is for this reason that all his analyses end immediately before that point in time at which other media penetrated the library's stacks. Discourse analysis cannot be applied to sound archives or towers of film rolls.

As long as it was moving along, history was indeed Foucault's "wave-like succession of words."[6] More simply, but no less technically than tomorrow's fiber optic cables, writing functioned as a universal medium—

Telephone lines, New York, 1888.

in times when there was no concept of medium. Whatever else was going on dropped through the filter of letters or ideograms.

"Literature," Goethe wrote, "is a fragment of fragments; only the smallest proportion of what took place and what was said was written down, while only the smallest proportion of what was written down has survived."[7]

Accordingly, oral history today confronts the historians' writing monopoly; accordingly, a media theoretician like the Jesuit priest Walter J. Ong, who must have been concerned with the spirit of the Pentecostal mystery, could celebrate a primary orality of tribal cultures as opposed to the secondary orality of our media acoustics. Such research remained unthinkable as long as the opposite of "history" was simply termed (again

following Goethe) "legend."[8] Prehistory was subsumed by its mythical name; Goethe's definition of literature did not even have to mention optical or acoustic data flows. And even legends, those oralized segments of bygone events, only survived in written format; that is, under pretechnological but literary conditions. However, since it has become possible to record the epics of the last Homeric bards, who until recently were wandering through Serbia and Croatia, oral mnemotechnics or cultures have become reconstructible in a completely different way.[9] Even Homer's rosy-fingered Eos changes from a Goddess into a piece of chromium dioxide that was stored in the memory of the bard and could be combined with other pieces into whole epics. "Primary orality" and "oral history" came into existence only after the end of the writing monopoly, as the technological shadows of the apparatuses that document them.

Writing, however, stored writing—no more and no less. The holy books attest to this. Exodus, chapter 20, contains a copy of what Yahweh's own finger originally had written on two stone tablets: the law. But of the thunder and lightning, of the thick cloud and the mighty trumpet which, according to scripture, surrounded this first act of writing on Mount Sinai, that same Bible could store nothing but mere words.[10]

Even less is handed down of the nightmares and temptations that afflicted a nomad called Mohammed following his flight to the holy mountain of Hira. The Koran does not begin until the one God takes the place of the many demons. The archangel Gabriel descends from the seventh heaven with a roll of scripture and the command to decipher the scroll. "Rejoice in the name of the Lord who created—created man from clots of blood. Recite! Your Lord is the Most Bountiful One, who by pen taught man what he did not know."[11]

Mohammed, however, answers that he, the nomad, can't read; not even the divine message about the origin of reading and writing. The archangel has to repeat his command before an illiterate can turn into the founder of a book-based religion. For soon, or all too soon, the illegible scroll makes sense and presents to Mohammed's miraculously alphabetized eyes the very same text that Gabriel had already uttered twice as an oral command. Mohammed's illuminations began, according to tradition, with this 96th sura—in order then to be "memorized by the faithful and written down on primitive surfaces such as palm leaves, stones, wood, bones, and pieces of leather, and to be recited, again and again, by Mohammed and select believers, especially during Ramadan."[12]

Writing therefore merely stores the fact of its authorization. It cele-

brates the storage monopoly of the God who invented it. And since the realm of this God consists of signs that only nonreaders can't make sense of, all books are books of the dead, like the Egyptian ones with which literature began.[13] The book itself coincides with the realm of the dead beyond all senses into which it lures us. When the Stoic philosopher Zeno asked the oracle at Delphi how he should best lead his life, he was given the answer "that he should mate with the dead. He understood this to mean that he should *read* the *ancients*."[14]

The story of how the divine instructions to use quills extended beyond Moses and Mohammed and reached simpler and simpler people is a lengthy one that nobody can write, because it would be history itself. In much the same way, the storage capacities of our computers will soon coincide with electronic warfare and, gigabyte upon gigabyte, exceed all the processing capacities of historians.

Suffice it to say that one day—in Germany, this may have already been the case during the age of Goethe—the homogenous medium of writing also became homogenous in the social sphere. Compulsory education engulfed people in paper. They learned a way of writing that, as an "abuse of language" (according to Goethe), no longer had to struggle with cramped muscles and individual letters, but rather proceeded in rapture or darkness. They learned to read "silently to one's self," a "sorry substitute for speech"[15] that consumed letters without effort by bypassing oral organs. Whatever they emitted and received was writing. And because only that exists which can be posted, bodies themselves fell under the regime of the symbolic. What is unthinkable today was once reality: no film stored the movements they made or saw, no phonograph, the noise they made or heard. For whatever existed failed before time. Silhouettes or pastel drawings fixed facial expressions, and scores were unable to store noise. But once a hand took hold of a pen, something miraculous occurred: the body, which did not cease not to write itself, left strangely unavoidable traces.

> I'm ashamed to tell of it. I'm ashamed of my handwriting. It exposes me in all my spiritual nakedness. My handwriting shows me more naked than I am with my clothes off. No leg, no breath, no clothes, no sound. Neither voice nor reflection. All cleaned out. Instead, a whole man's being, shriveled and misshapen, like his scribble-scrabble. His lines are all that's left of him, as well as his self-propagation. The uneven tracings of his pencil on paper, so minimal that a blind man's fingertips would hardly detect them, become the measure of the whole fellow.[16]

Today, this shame, which overcomes the hero of Botho Strauss's last love story, *Dedication*, whenever he sees his handwriting, is no more than an anachronism. The fact that the minimal unevenness between stroke and paper can store neither a voice nor an image of a body presupposes in its exclusion the invention of phonography and cinema. Before their invention, however, handwriting alone could guarantee the perfect securing of traces. It wrote and wrote, in an energetic and ideally uninterrupted flow. As Hegel so correctly observed, the alphabetized individual had his "appearance and externality"[17] in this continuous flow of ink or letters.

And what applied to writing also applied to reading. Even if the alphabetized individual known as the "author" finally had to fall from the private exteriority of handwriting into the anonymous exteriority of print in order to secure "all that's left of him, as well as his self-propagation"—alphabetized individuals known as "readers" were able to reverse this exteriorization. "If one reads in the right way," Novalis wrote, "the words will unfold in us a real, visible world."[18] And his friend Schlegel added that "one believes to hear what one merely reads."[19] Perfect alphabetization was to supplement precisely those optical and acoustic data flows that, under the monopoly of writing, did not cease not to write themselves. Effort had been removed from writing, and sound from reading, in order to naturalize writing. The letters that educated readers skimmed over provided people with sights and sounds.

Aided by compulsory education and new alphabetization techniques, the book became both film and record around 1800—not as a media-technological reality, but in the imaginary of readers' souls. As a surrogate of unstorable data flows, books came to power and glory.[20]

In 1774 an editor by the name of Goethe committed handwritten letters or *Sorrows of Young Werther* to print. The "nameless throng" (to quote the dedication of *Faust*), too, was to hear an "early song" that, like "some old half-faded song," revived "old griefs" and "old friends."[21] This was the new literary recipe for success: to surreptitiously turn the voice or handwriting of a soul into Gutenbergiana. In the last letter he wrote and sealed but did not send off before committing suicide, Werther gave his beloved the very promise of poetry: during her lifetime she would have to remain with Albert, her unloved husband, but afterwards she would be united with her lover "in the sight of the Infinite One in eternal embraces."[22] Indeed: the addressee of handwritten love letters, which were then published by a mere editor, was to be rewarded with an immortality in the shape of the novel itself. It alone was able to create the

"beautiful realm"[23] in which the lovers of Goethe's *Elective Affinities*, according to the hope of their narrator, "will waken together once more."[24] Strangely enough, Eduard and Ottilie had one and the same handwriting during their lifetime. Their death elevated them to a paradise that under the storage monopoly of writing was called poetry.

And maybe that paradise was more real than our media-controlled senses can imagine. Reading intently, Werther's suicidal readers may well have perceived their hero in a real, visible world. And the lovers among Goethe's female readers, like Bettina Brentano, may well have died with the heroine of his *Elective Affinities* only to be "reborn in a more beautiful youth" through Goethe's "genius."[25] Maybe the perfectly alphabetized readers of 1800 were a living answer to the question with which Chris Marker concludes his film essay *Sans Soleil*:

> Lost at the end of the world on my island, Sal, in the company of my dogs strutting around, I remember that January in Tokyo, or rather I remember the images I filmed in Tokyo in January. They have now put themselves in place of my memory, they *are* my memory. I wonder how people who do not film, take photos, or record tapes remember, how humankind used to go about remembering.[26]

It is the same with language, which only leaves us the choice of either retaining words while losing their meaning or, vice versa, retaining meaning while losing the words.[27] Once storage media can accommodate optical and acoustic data, human memory capacity is bound to dwindle. Its "liberation"[28] is its end. As long as the book was responsible for all serial data flows, words quivered with sensuality and memory. It was the passion of all reading to hallucinate meaning between lines and letters: the visible and audible world of Romantic poetics. And the passion of all writing was (in the words of E. T. A. Hoffmann) the poet's desire to "describe" the hallucinated "picture in one's mind with all its vivid colors, the light and the shade," in order to "strike [the] gentle reader like an electric shock."[29]

Electricity itself put an end to this. Once memories and dreams, the dead and ghosts, become technically reproducible, readers and writers no longer need the powers of hallucination. Our realm of the dead has withdrawn from the books in which it resided for so long. As Diodor of Sicily once wrote, "it is no longer only through writing that the dead remain in the memory of the living."

The writer Balzac was already overcome by fear when faced with photography, as he confessed to Nadar, the great pioneer of photography. If (according to Balzac) the human body consists of many infinitely thin

Spirit photography, 1904.

layers of "specters," and if the human spirit cannot be created from nothingness, then the daguerreotype must be a sinister trick: it fixes, that is, steals, one layer after the other, until nothing remains of the specters and the photographed body.[30] Photo albums establish a realm of the dead infinitely more precise than Balzac's competing literary enterprise, the *Comédie humaine*, could ever hope to create. In contrast to the arts, media do not have to make do with the grid of the symbolic. That is to say, they reconstruct bodies not only in a system of words or colors or sound intervals. Media and media only fulfill the "high standards" that (according to Rudolf Arnheim) we expect from "reproductions" since the invention of photography: "They are not only supposed to resemble the object,

but rather guarantee this resemblance by being, as it were, a product of the object in question, that is, by being mechanically produced by it—just as the illuminated objects of reality imprint their image on the photographic layer,"[31] or the frequency curves of noises inscribe their wavelike shapes onto the phonographic plate.

A reproduction authenticated by the object itself is one of physical precision. It refers to the bodily real, which of necessity escapes all symbolic grids. Media always already provide the appearances of specters. For, according to Lacan, even the word "corpse" is a euphemism in reference to the real.[32]

Accordingly, the invention of the Morse alphabet in 1837 was promptly followed by the tapping specters of spiritistic seances sending their messages from the realm of the dead. Promptly as well, photographic plates—even and especially those taken with the camera shutter closed—furnished reproductions of ghosts or specters, whose black-and-white fuzziness only served to underscore the promise of resemblance. Finally, one of the ten applications Edison envisioned for his newly invented phonograph in the *North American Review* (1878) was to record "the last words of dying persons."

It was only a small step from such a "family record,"[33] with its special consideration of revenants, to fantasies that had telephone cables linking the living and the dead. What Leopold Bloom in *Ulysses* could only wish for in his Dublin graveyard meditations had already been turned into science fiction by Walter Rathenau, the AEG chairman of the board and futurist writer.[34] In Rathenau's story "Resurrection Co.," the cemetery administration of Necropolis, Dacota/USA, following a series of scandalous premature burials in 1898, founds a daughter company entitled "Dacota and Central Resurrection Telephone Bell Co." with a capital stock of $750,000. Its sole purpose is to make certain that the inhabitants of graves, too, are connected to the public telephone network. Whereupon the dead avail themselves of the opportunity to prove, long before McLuhan, that the content of one medium is always another medium—in this concrete case, a *déformation professionelle*.[35]

These days, paranormal voices on tape or radio, the likes of which have been spiritistically researched since 1959 and preserved in rock music since Laurie Anderson's 1982 release *Big Science*,[36] inform their researchers of their preferred radio wavelength. This already occurred in 1898, in the case of Senate President Schreber: when a paranormal, beautifully autonomous "base or nerve language" revealed its code as well as its channels,[37] message and channel became one. "You just have to

choose a middle-, short-, or long-wave talk-show station, or the 'white noise' between two stations, or the 'Jürgenson wave,' which, depending on where you are, is located around 1450 to 1600 kHz between Vienna and Moscow."[38] If you replay a tape that has been recorded off the radio, you will hear all kinds of ghost voices that do not originate from any known radio station, but that, like all official newscasters, indulge in radio self-advertisement. Indeed, the location and existence of that "Jürgenson wave" was pinpointed by none other than "Friedrich Jürgenson, the Nestor of vocal research."[39]

The realm of the dead is as extensive as the storage and transmission capabilities of a given culture. As Klaus Theweleit noted, media are always flight apparatuses into the great beyond. If gravestones stood as symbols at the beginning of culture itself, our media technology can retrieve all gods. The old written laments about ephemerality, which measured no more than distance between writing and sensuality, suddenly fall silent. In our mediascape, immortals have come to exist again.

War on the Mind is the title of an account of the psychological strategies hatched by the Pentagon. It reports that the staffs planning the electronic war, which merely continues the Battle of the Atlantic,[40] have already compiled a list of the propitious and unpropitious days in other cultures. This list enables the U.S. Air Force "to time [its] bombing campaigns to coincide with unpropitious days, thus 'confirming' the forecasts of local gods." As well, the voices of these gods have been recorded on tape to be broadcast from helicopters "to keep tribes in their villages." And finally, the Pentagon has developed special film projectors capable of projecting those gods onto low-hanging clouds.[41] A technologically implemented beyond . . .

Of course the Pentagon does not keep a handwritten list of good and bad days. Office technology keeps up with media technology. Cinema and the phonograph, Edison's two great achievements that ushered in the present, are complemented by the typewriter. Since 1865 (according to European accounts) or 1868 (according to American ones), writing has no longer been the ink or pencil trace of a body whose optical and acoustic signals were irretrievably lost, only to reappear (in readers' minds) in the surrogate sensuality of handwriting. In order to store series of sights and sounds, Old Europe's only storage technology first had to be mechanized. Hans Magnus Malling Hansen in Copenhagen and Christopher Latham Sholes in Milwaukee developed mass-producible typewriters. Edison commented positively on the invention's potential when Sholes visited him in

Newark to demonstrate his newly patented model and to invite the man who had invented invention to enter a joint venture.[42]

But Edison declined the offer—as if, already in 1868, the phonograph and kinetoscope preoccupied their futnre inventor. Instead, the offer was grabbed by an arms manufacturer suffering from dwindling revenues in the post–Civil War slump. Remington, not Edison, took over Sholes's disconrse machine gun.

Thus, there was no Marvelous One from whose brow sprang all three media technologies of the modern age. On the contrary, the beginning of our age was marked by separation or differentiation.[43] On the one hand, we have two technological media that, for the first time, fix unwritable data flows; on the other, an "'intermediate' thing between a tool and a machine," as Heidegger wrote so precisely about the typewriter.[44] On the one hand, we have the entertainment industry with its new sensualities; on the other, a writing that already separates paper and body during textual production, not first during reproduction (as Gutenberg's movable types had done). From the beginning, the letters and their arrangement were standardized in the shapes of type and keyboard, while media were engulfed by the noise of the real—the fuzziness of cinematic pictures, the hissing of tape recordings.

In standardized texts, paper and body, writing and soul fall apart. Typewriters do not store individuals; their letters do not communicate a beyond that perfectly alphabetized readers can subsequently hallucinate as meaning. Everything that has been taken over by technological media since Edison's inventions disappears from typescripts. The dream of a real visible or audible world arising from words has come to an end. The historical synchronicity of cinema, phonography, and typewriting separated optical, acoustic, and written data flows, thereby rendering them autonomous. That electric or electronic media can recombine them does not change the fact of their differentiation.

In 1860, five years before Malling Hansen's mechanical writing ball (the first mass-produced typewriter), Gottfried Keller's "Misused Love Letters" still proclaimed the illusion of poetry itself: love is left with the impossible alternatives of speaking either with "black ink" or with "red blood."[45] But once typing, filming, and recording became equally valid options, writing lost such surrogate sensualities. Around 1880 poetry turned into literature. Standardized letters were no longer to transmit Keller's red blood or Hoffmann's inner forms, but rather a new and elegant tautology of technicians. According to Mallarmé's instant insight, literature is made up of no more and no less than twenty-six letters.[46]

Lacau's "methodological distinction"[47] among the real, the imaginary, and the symbolic is the theory (or merely a historical effect) of that differentiation. The symbolic now encompasses linguistic signs in their materiality and technicity. That is to say, letters and ciphers form a finite set without taking into account philosophical dreams of infinity. What counts are differences, or, in the language of the typewriter, the spaces between the elements of a system. For that reason, Lacan designates "the world of the symbolic [as] the world of the machine."[48]

The imaginary, however, comes about as the mirror image of a body that appears to be, in terms of motor control, more perfect than the infant's own body, for in the real everything begins with coldness, dizziness, and shortness of breath.[49] Thus, the imaginary implements precisely those optical illusions that were being researched in the early days of cinema. A dismembered or (in the case of film) cut-up body is faced with the illusionary continuity of movements in the mirror or on screen. It is no coincidence that Lacan recorded infants' jubilant reacnons to their mirror images in the form of documentary footage.

Finally, of the real nothing more can be brought to light than what Lacan presupposed—that is, nothing. It forms the waste or residue that

neither the mirror of the imaginary nor the grid of the symbolic can catch: the physiological accidents and stochastic disorder of bodies.

The methodological distinctions of modern psychoanalysis clearly coincide with the distinctions of media technology. Every theory has its historical a priori. And structuralist theory simply spells out what, since the turn of the century, has been coming over the information channels.

Only the typewriter provides writing as a selection from the finite and arranged stock of its keyboard. It literally embodies what Lacan illustrated using the antiquated letter box. In contrast to the flow of handwriting, we now have discrete elements separated by spaces. Thus, the symbolic has the status of block letters. Film was the first to store those mobile doubles that humans, unlike other primates, were able to (mis)perceive as their own body. Thus, the imaginary has the status of cinema. And only the phonograph can record all the noise produced by the larynx prior to any semiotic order and linguistic meaning. To experience pleasure, Freud's patients no longer have to desire what philosophers consider good. Rather, they are free to babble.[50] Thus, the real—especially in the talking cure known as psychoanalysis—has the status of phonography.

Once the technological differentiation of optics, acoustics, and writing exploded Gutenberg's writing monopoly around 1880, the fabrication of so-called Man became possible. His essence escapes into apparatuses. Machines take over functions of the central nervous system, and no longer, as in times past, merely those of muscles. And with this differentiation—and not with steam engines and railroads—a clear division occurs between matter and information, the real and the symbolic. When it comes to inventing phonography and cinema, the age-old dreams of humankind are no longer sufficient. The physiology of eyes, ears, and brains have to become objects of scientific research. For mechanized writing to be optimized, one can no longer dream of writing as the expression of individuals or the trace of bodies. The very forms, differences, and frequencies of its letters have to be reduced to formulas. So-called Man is split up into physiology and information technology.

When Hegel summed up the perfect alphabetism of his age, he called it Spirit. The readability of all history and all discourses turned humans or philosophers into God. The media revolution of 1880, however, laid the groundwork for theories and practices that no longer mistake information for spirit. Thought is replaced by a Boolean algebra, and consciousness by the unconscious, which (at least since Lacan's reading) makes of Poe's "Purloined Letter" a Markoff chain.[51] And that the symbolic is called the world of the machine undermines Man's delusion of possessing a "quality" called "consciousness," which identifies him as something other and better than a "calculating machine." For both people and computers are "subject to the appeal of the signifier"; that is, they are both run by programs. "Are these humans," Nietzsche already asked himself in 1874, eight years before buying a typewriter, "or perhaps only thinking, writing, and speaking machines?"[52]

In 1950 Alan Turing, the practitioner among England's mathematicians, gave the answer to Nietzsche's question. He observed, with formal elegance, that there is no question to begin with. To clarify the issue, Turing's essay "Computing Machinery and Intelligence"—appearing in, of all places, the philosophical periodical *Mind*—proposed an experiment, the so-called Turing game: A computer *A* and human *B* exchange data via some kind of telewriter interface. The exchange of texts is monitored by a censor *C*, who also only receives written information. *A* and *B* both pretend to be human, and *C* has to decide which of the two is simulating and which merely is Nietzsche's thinking, writing, and speaking machine. But the game remains open-ended, because each time the machine gives itself away—be it by making a mistake or, more likely, by not making any—it will refine its program by learning.[53] In the Turing game, Man coincides with his simulation.

And this is, obviously, already so because the censor *C* receives plotter printouts and typescripts rather than handwritten texts. Of course, computer programs could simulate the "individuality" of the human hand, with its routines and mistakes, but Turing, as the inventor of the universal discrete machine, was a typist. Though he wasn't much better or skilled at it than his tomcat Timothy, who was allowed to jump across the keyboard in Turing's chaotic secret service office,[54] it was at least somewhat less catastrophic than his handwriting. The teachers at the honorable Sherborne School could hardly "forgive" their pupil's chaotic lifestyle and messy writing. He got lousy grades for brilliant exams in mathematics only because his handwriting was "the worst . . . ever seen."[55] Faithfully, schools cling to their old duty of fabricating individuals (in the literal sense of the word) by drilling them in a beautiful, continuous, and individual handwriting. Turing, a master in subverting all education, however, dodged the system; he made plans for an "exceedingly crude" typewriter.[56]

Nothing came of these plans. But when, on the meadows of Grantchester, the meadows of all English poetry from the Romantics to Pink

Floyd, he hit upon the idea of the universal discrete machine, his early dreams were realized and transformed. Sholes's typewriter, reduced to its fundamental principle, has supported us to this day. Turing merely got rid of the people and typists that Remington & Son needed for reading and writing.

And this is possible because a Turing machine is even more exceedingly crude than the Sherborne plan for a typewriter. All it works with is a paper strip that is both its program and its data material, its input and its output. Turing slimmed down the common typewriter page to this little strip. But there are even more economizations: his machine doesn't need the many redundant letters, ciphers, and signs of a typewriter keyboard; it can do with one sign and its absence, 1 and 0. This binary information can be read or (in Turing's technospeak) scanned by the machine. It can then move the paper strip one space to the right, one to the left, or not at all, moving in a jerky (i.e., discrete) fashion like a typewriter, which in contrast to handwriting has block caps, a back spacer, and a space bar. (From a letter to Turing: "Pardon the use of the typewriter: I have come to prefer discrete machines to continuous ones.")[57] The mathematical model of 1936 is no longer a hermaphrodite of a machine and a mere tool. As a feedback system it beats all the Remingtons, because each step is controlled by scanning the paper strip for the sign or its absence, which amounts to a kind of writing: it depends on this reading whether the machine keeps the sign or erases it, or, vice versa, whether it keeps a space blank or replaces it with a sign, and so on and so forth.

That's all. But no computer that has been built or ever will be built can do more. Even the most advanced Von Neumann machines (with program storage and computing units), though they operate much faster, are in principle no different from Turing's infinitely slow model. Also, while not all computers have to be Von Neumann machines, all conceivable data processing machines are merely a state *n* of the universal discrete machine. This was proved mathematically by Alan Turing in 1936, two years before Konrad Zuse in Berlin built the first programmable computer from simple relays. And with that the world of the symbolic really turned into the world of the machine.[58]

Unlike the history to which it put an end, the media age proceeds in jerks, just like Turing's paper strip. From the Remington via the Turing machine to microelectronics, from mechanization and automatization to the implementation of a writing that is only cipher, not meaning—one century was enough to transfer the age-old monopoly of writing into the

omnipotence of integrated circuits. Not unlike Turing's correspondents, everyone is deserting analog machines in favor of discrete ones. The CD digitizes the gramophone, the video camera digitizes the movies. All data streams flow into a state *n* of Turing's universal machine; Romanticism notwithstanding, numbers and figures become the key to all creatures.

GRAMOPHONE

"Hullo!" Edison screamed into the telephone mouthpiece. The vibrating diaphragm set in motion a stylus that wrote onto a moving strip of paraffin paper. In July 1877, 81 years before Turing's moving paper strip, the recording was still analog. Upon replaying the strip and its vibrations, which in turn set in motion the diaphragm, a barely audible "Hullo!" could be heard.[1]

Edison understood. A month later he coined a new term for his telephone addition: phonograph.[2] On the basis of this experiment, the mechanic Kruesi was given the assignment to build an apparatus that would etch acoustic vibrations onto a rotating cylinder covered with tinfoil. While he or Kruesi was turning the handle, Edison once again screamed into the mouthpiece—this time the nursery rhyme "Mary Had a Little Lamb." Then they moved the needle back, let the cylinder run a second time—and the first phonograph replayed the screams. The exhausted genius, in whose phrase genius is 1 percent inspiration and 99 percent perspiration, slumped back. Mechanical sound recording had been invented. "Speech has become, as it were, immortal."[3]

It was December 6, 1877. Eight months earlier, Charles Cros, a Parisian writer, bohemian, inventor, and absinthe drinker, had deposited a sealed envelope with the Academy of Sciences. It contained an essay on the "Procedure for the Recording and Reproduction of Phenomena of Acoustic Perception" (*Procédé d'enregistrement et de reproduction des phénomènes perçus par l'ouïe*). With great technological elegance this text formulated all the principles of the phonograph, but owing to a lack of funds Cros had not yet been able to bring about its "practical realization." "To reproduce" the traces of "the sounds and noises" that the "to

and fro" of an acoustically "vibrating diaphragm" leaves on a rotating disk—that was also the program of Charles Cros.[4]

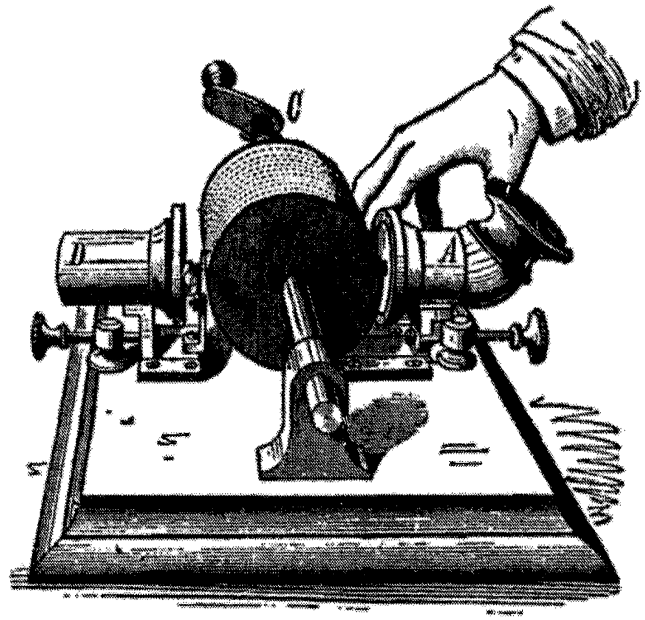
But once he had been preceded by Edison, who was aware of rumors of the invention, things sounded different. "Inscription" is the title of the poem with which Cros erected a belated monument to honor his inventions, which included an automatic telephone, color photography, and, above all, the phonograph:

> Comme les traits dans les camées
> J'ai voulu que les voix aimées
> Soient un bien qu'on garde à jamais,
> Et puissent répéter le rêve
> Musical de l'heure trop brève;
> Le temps veut fuir, je le soumets.
>
> Like the faces in cameos
> I wanted beloved voices
> To be a fortune which one keeps forever,
> And which can repeat the musical
> Dream of the too short hour;
> Time would flee, I subdue it.[5]

The program of the poet Cros, in his capacity as the inventor of the phonograph, was to store beloved voices and all-too-brief musical reveries. The wondrously resistant power of writing ensures that the poem has no words for the truth about competing technologies. Certainly, phonographs can store articulate voices and musical intervals, but they are capable of more and different things. Cros the poet forgets the noises mentioned in his precise prose text. An invention that subverts both literature and music (because it reproduces the unimaginable real they are both based on) must have struck even its inventor as something unheard of.

Hence, it was not coincidental that Edison, not Cros, actually built the phonograph. His "Hullo!" was no beloved voice and "Mary Had a Little Lamb" no musical reverie. And he screamed into the bell-mouth not only because phonographs have no amplifiers but also because Edison, following a youthful adventure involving some conductor's fists, was half-deaf. A physical impairment was at the beginning of mechanical sound recording—just as the first typewriters had been made by the blind for the blind, and Charles Cros had taught at a school for the deaf and mute.[6]

Whereas (according to Derrida) it is characteristic of so-called Man and his consciousness to hear himself speak[7] and see himself write, media



The first talking machine, built by Kruesi.

dissolve such feedback loops. They await inventors like Edison whom chance has equipped with a similar dissolution. Handicaps isolate and thematize sensory data streams. The phonograph does not hear as do ears that have been trained immediately to filter voices, words, and sounds out of noise; it registers acoustic events as such. Articulateness becomes a second-order exception in a spectrum of noise. In the first phonograph letter of postal history, Edison wrote that "the articulation" of his baby "was loud enough, just a bit indistinct . . . not bad for a first experiment."[8]

Wagner's *Gesamtkunstwerk*, that monomaniacal anticipation of modern media technologies,[9] had already transgressed the traditional boundaries of words and music to do justice to the unarticulated. In *Tristan*, Brangäne was allowed to utter a scream whose notation cut straight through the score.[10] Not to mention *Parsifal*'s Kundry, who suffered from a hysterical speech impairment such as those which were soon to occupy the psychoanalyst Freud: she "gives a loud wail of misery, that sinks gradually into low accents of fear," "utters a dreadful cry," and is reduced to "hoarse and broken," though nonetheless fully composed, garbling.[11] This labored inception of language has nothing to do with operas and dramas

that take it for granted that their figures can speak. Composers of 1880, however, are allied with engineers. The undermining of articulation becomes the order of the day.

In Wagner's case this applies to both text and music. The *Rhinegold* prelude, with its infinite swelling of a single chord, dissolves the E-flat major triad in the first horn melody as if it were not a matter of musical harmony but of demonstrating the physical overtone series. All the harmonics of E-flat appear one after the other, as if in a Fourier analysis; only the seventh is missing, because it cannot be played by European instruments.[12] Of course, each of the horn sounds is an unavoidable overtone mixture of the kind only the sine tones of contemporary synthesizers can avoid. Nevertheless, Wagner's musico-physiological dream[13] at the outset of the tetralogy sounds like a historical transition from intervals to frequencies, from a logic to a physics of sound. By the time Schoenberg, in 1910, produced the last analysis of harmony in the history of music, chords had turned into pure acoustics: "For Schoenberg as well as for science, the physical basis in which he is trying to ground all phenomena is the overtone series."[14]

Overtones are frequencies, that is, vibrations per second. And the grooves of Edison's phonograph recorded nothing but vibrations. Intervals and chords, by contrast, were ratios, that is, fractions made up of integers. The length of a string (especially on a monochord) was subdivided, and the fractions, to which Pythagoras gave the proud name *logoi*, resulted in octaves, fifths, fourths, and so on. Such was the logic upon which was founded everything that, in Old Europe, went by the name of music: first, there was a notation system that enabled the transcription of clear sounds separated from the world's noise; and second, a harmony of the spheres that established that the ratios between planetary orbits (later human souls) equaled those between sounds.

The nineteenth century's concept of frequency breaks with all this.[15] The measure of length is replaced by time as an independent variable. It is a physical time removed from the meters and rhythms of music. It quantifies movements that are too fast for the human eye, ranging from 20 to 16,000 vibrations per second. The real takes the place of the symbolic. Certainly, references can also be established to link musical intervals and acoustic frequencies, but they only testify to the distance between two discourses. In frequency curves the simple proportions of Pythagorean music turn into irrational, that is, logarithmic, functions. Conversely, overtone series—which in frequency curves are simply integral multiples of vibrations and the determining elements of each sound—soon explode the diatonic music system. That is the depth of the gulf separating Old European alphabetism from mathematical-physical notation.

Which is why the first frequency notations were developed outside of music. First noise itself had to become an object of scientific research, and discourses "a privileged category of noises."[16] A competition sponsored by the Saint Petersburg Academy of Sciences in 1780 made voiced sounds, and vowels in particular, an object of research,[17] and inaugurated not only speech physiology but also all the experiments involving mechanical language reproduction. Inventors like Kempelen, Maelzel, and Mical built the first automata that, by stimulating and filtering certain frequency bands, could simulate the very sounds that Romanticism was simultaneously celebrating as the language of the soul: their dolls said "Mama" and "Papa" or "Oh," like Hoffmann's beloved automaton, Olympia. Even Edison's 1878 article on phonography intended such toy mouths voicing

the parents' names as Christmas presents.[18] Removed from all Romanticism, a practical knowledge of vowel frequencies emerged.

Continuing these experiments, Willis made a decisive discovery in 1829. He connected elastic tongues to a cogwheel whose cogs set them vibrating. According to the speed of its rotation, high or low sounds were produced that sounded like the different vowels, thus proving their frequency. For the first time pitch no longer depended on length, as with string or brass instruments; it became a variable dependent on speed and, therefore, time. Willis had invented the prototype of all square-curve generators, ranging from the bold verse-rhythm experiments of the turn of the century[19] to *Kontakte*, Stockhausen's first electronic composition.

The synthetic production of frequencies is followed by their analysis. Fourier had already provided the mathematical theory, but that theory had yet to be implemented technologically. In 1830, Wilhelm Weber in Göttingen had a tuning fork record its own vibrations. He attached a pig's bristle to one of the tongues, which etched its frequency curves into sooty glass. Such were the humble, or animal, origins of our gramophone needles.

From Weber's writing tuning fork Edouard Léon Scott, who as a Parisian printer was, not coincidentally, an inhabitant of the Gutenberg Galaxy, developed his phonautograph, patented in 1857. A bell-mouth amplified incoming sounds and transmitted them onto a membrane, which in turn used a coarse bristle to transcribe them onto a soot-covered cylinder. Thus came into being autographs or handwritings of a data stream that heretofore had not ceased not to write itself. (Instead, there was handwriting.) Scott's phonautograph, however, made visible what, up to this point, had only been audible and had been much too fast for ill-

equipped human eyes: hundreds of vibrations per second. A triumph of the concept of frequency: all the whispered or screamed noises people emitted from their larynxes, with or without dialects, appeared on paper. Phonetics and speech physiology became a reality.[20]

They were especially real in the case of Henry Sweet, whose perfect English made him the prototype of all experimental phonetics as well as the hero of a play. Recorded by Professor F. C. Donders of Utrecht,[21] Sweet was also dramatized by George Bernard Shaw, who turned him into a modern Pygmalion out to conquer all mouths that, however beautiful, were marred by dialect. To record and discipline the dreadful dialect of the flower girl Eliza Doolittle, "Higgins's laboratory" boasts "a phonograph, a laryngoscope, [and] a row of tiny organ pipes with a bellows."[22] In the world of the modern *Pygmalion*, mirrors and statues are unnecessary; sound storage makes it possible "to inspect one's own speech or discourse as in a mirror, thus enabling us to adopt a critical stance toward our products."[23] To the great delight of Shaw, who saw his medium or his readability technologically guaranteed to all English speakers,[24] machines easily solve a problem that literature had not been able to tackle on its own, or had only been able to tackle through the mediation of pedagogy:[25] to drill people in general, and flower girls in particular, to adopt a pronunciation purified by written language.

It comes as no surprise that Eliza Doolittle, all of her love notwithstanding, abandons her Pygmalion (Sweet, a.k.a. Higgins) at the end of the play in order to learn "bookkeeping and typewriting" at "shorthand schools and polytechnic classes."[26] Women who have been subjected to phonographs and typewriters are souls no longer; they can only end up in musicals. Renaming the drama *My Fair Lady*, Rodgers and Hammerstein will throw Shaw's *Pygmalion* among Broadway tourists and record labels. "On the Street Where You Live" is sound.

In any event, Edison, ancestor of the record industry, only needed to combine, as is so often the case with inventions. A Willis-type machine gave him the idea for the phonograph; a Scott-type machine pushed him toward its realization. The synthetic production of frequencies combined with their analysis resulted in the new medium.

Edison's phonograph was a by-product of the attempt to optimize telephony and telegraphy by saving expensive copper cables. First, Menlo Park developed a telegraph that indented a paraffin paper strip with Morse signs, thus allowing them to be replayed faster than they had been

transmitted by human hands. The effect was exactly the same as in Willis's case: pitch became a variable dependent on speed. Second, Menlo Park developed a telephone receiver with a needle attached to the diaphragm. By touching the needle, the hearing-impaired Edison could check the amplitude of the telephone signal. Legend has it that one day the needle drew blood—and Edison "recognized how the force of a membrane moved by a magnetic system could be put to work." "In effect, he had found a way to transfer the functions of his ear to his sense of touch."[27]

A telegraph as an artificial mouth, a telephone as an artificial ear—the stage was set for the phonograph. Functions of the central nervous system had been technologically implemented. When, after a 72-hour shift ending early in the morning of July 16, 1888, Edison had finally completed a talking machine ready for serial production, he posed for the hastily summoned photographer in the pose of his great idol. The French emperor, after all, is said to have observed that the progress of national welfare (or military technology) can be measured by transportation costs.[28] And no means of transportation are more economical than those which convey information rather than goods and people. Artificial mouths and ears, as technological implementations of the central nervous system, cut down on mailmen and concert halls. What Ong calls our secondary orality has the elegance of brain functions. Technological sound storage provides a first model for data streams, which are simultaneously becoming objects of neurophysiological research. Helmholtz, as the perfecter of vowel theory, is allied with Edison, the perfecter of measuring instruments. Which is why sound storage, initially a mechanically primitive affair on the level of Weber's pig bristle, could not be invented until the soul fell prey to science. "O my head, my head, my head," groans the phonograph in the prose poem Alfred Jarry dedicated to it. "All white underneath the silk sky: They have taken my head, my head—and put me into a tea tin!"[29]

Which is why Villiers de l'Isle-Adam, the symbolist poet and author of the first of many Edison novels, is mistaken when, in *Tomorrow's Eve*, he has the great inventor ponder his delay.

> What is most surprising in history, almost unimaginable, is that among all the great inventors across the centuries, not one thought of the Phonograph! And yet most of them invented machines a thousand times more complicated. The Phonograph is so simple that its construction owes nothing to materials of scientific composition. Abraham might have built it, and made a recording of his calling from on high. A steel stylus, a leaf of silver foil or something like it, a cylinder of copper, and one could fill a storehouse with all the voices of Heaven and Earth.[30]

This certainly applies to materials and their processing, but it misses the historical a priori of sound recording. There are also immaterials of scientific origin, which are not so easy to come by and have to be supplied by a science of the soul. They cannot be delivered by any of the post-Abraham candidates whom Villiers de l'Isle-Adam suspects of being able to invent the phonograph: neither Aristotle, Euclid, nor Archimedes could have underwritten the statement that "The soul is a notebook of phonographic recordings" (but rather, if at all, a tabula rasa for written signs, which in turn signify acts of the soul). Only when the soul has become the nervous system, and the nervous system (according to Sigmund Exner, the great Viennese neurophysiologist) so many facilitations (*Bahnungen*), can Delboeuf's statement cease to be scandalous. In 1880, the philosopher Guyau devoted a commentary to it. And this first theory of the phonograph attests like no other to the interactions between science and technology. Thanks to the invention of the phonograph, the very theories that were its historical a priori can now optimize their analogous models of the brain.

JEAN-MARIE GUYAU, "MEMORY AND PHONOGRAPH" (1880)

Reasoning by analogy is of considerable importance to science; indeed, in as far as it is the principle of induction it may well form the basis of all physical and psychophysical sciences. Discoveries frequently start with metaphors. The light of thinking could hardly fall in a new direction and illuminate dark corners were it not reflected by spaces already illuminated. Only that which reminds us of something else makes an impression, although and precisely because it differs from it. To understand is to remember, at least in part.

Many similes and metaphors have been used in the attempt to understand mental abilities or functions. Here, in the as yet imperfect state of science, metaphors are absolutely necessary: before we *know* we have to start by *imagining* something. Thus, the human brain has been compared to all kinds of objects. According to Spencer it shows a certain analogy to the mechanical pianos that can reproduce an infinite number of melodies. Taine makes of the brain a kind of print shop that incessantly produces and stores innumerable clichés. Yet all these similes appear somewhat sketchy. One normally deals with the brain at rest; its images are perceived to be fixed, *stereotyped*; and that is imprecise. There is nothing finished in the brain, no real images; instead, we see only virtual, potential images waiting for a sign to be transformed into actuality. How this transformation into reality is really achieved is a matter of speculation. The greatest mystery of brain mechanics has to do with dynamics—not with statics. We are in need of a comparative term that will allow us to see not only how an object receives and stores an imprint, but also how this imprint at a given time is reactivated and produces new vibrations within the object. With this in mind, the most refined instrument (both receiver and motor in one) with which the human brain may be compared is perhaps Edison's recently invented phonograph. For some time now I have been wanting to draw attention to this comparison, ever since I came across a casual observation in Delboeuf's last article on memory that confirmed my intentions: "The soul is a notebook of phonographic recordings."

Upon speaking into a phonograph, the vibrations of one's voice are transferred to a point that engraves lines onto a metal plate that correspond to the uttered sounds—uneven furrows, more or less deep, depending on the nature of the sounds. It is quite probable that in analogous ways, invisible

lines are incessantly carved into the brain cells, which provide a channel for nerve streams. If, after some time, the stream encounters a channel it has already passed through, it will once again proceed along the same path. The cells vibrate in the same way they vibrated the first time; psychologically, these similar vibrations correspond to an emotion or a thought analogous to the forgotten emotion or thought.

This is precisely the phenomenon that occurs when the phonograph's small copper disk, held against the point that runs through the grooves it has etched, starts to reproduce the vibrations: to our ears, these vibrations turn back into a voice, into words, sounds, and melodies.

If the phonographic disk had self-consciousness, it could point out while replaying a song that it remembers this particular song. And what appears to us as the effect of a rather simple mechanism would, quite probably, strike the disk as a miraculous ability: memory.

Let us add that it could distinguish new songs from those already played, as well as new impressions from simple memories. Indeed, a certain effort is necessary for first impressions to etch themselves into metal or brain; they encounter more resistance and, correspondingly, have to exert more force; and when they reappear, they vibrate all the stronger. But when the point traces already existing grooves instead of making new ones, it will do so with greater ease and glide along without applying any pressure. The *inclination* of a memory or reverie has been spoken of; to pursue a memory, in fact: to smoothly glide down a slope, to wait for a certain number of complete memories, which appear one after the other, all in a row and without shock. There is, therefore, a significant difference between impressions in the real sense and memory. Impressions tend to belong to either of two classes: they either possess greater intensity, a unique sharpness of outline and fixity of line, or they are weaker, more blurred and imprecise, but nevertheless arranged in a certain order that imposes itself on us. To *recognize* an image means to assign it to the second class. One *feels* in a less forceful way and is aware of this emotion. A memory consists in the awareness, first, of the diminished intensity of an impression, second, of its increased ease, and third, of the connections it entertains with other impressions. Just as a trained eye can see the difference between a copy and the original, we learn to distinguish memories from impressions and are thus able to recognize a memory even before it has been located in time and space. We project this or that impression back into the past without knowing which part of the past it belongs to. This is because a memory retains a unique and distinguishing character, much like a sensation coming from the stomach differs from an acoustic or visual impression. In a similar manner, the phonograph

is incapable of reproducing the human voice in all its strength and warmth. The voice of the apparatus will remain shrill and cold; it has something imperfect and abstract about it that sets it apart. If the phonograph could hear itself, it would learn to recognize the difference between the voice that came from the outside and forced itself onto it and the voice that it itself is broadcasting and which is a simple echo of the first, following an already grooved path.

A further analogy between the phonograph and our brain exists in that the speed of the vibrations impressed on the apparatus can noticeably change the character of the reproduced sounds or recalled images. Depending on whether you increase or decrease the rotation of the phonographic disk, a melody will be transposed from one octave to another. If you turn the handle faster, a song will rise from the deepest and most indistinct notes to the highest and most piercing. Does not a similar effect occur in the brain when we focus our attention on an initially blurred image, increasing its clarity step by step and thereby moving it, as it were, up the scale? And could this phenomenon not be explained by the increased or decreased speed and strength of the vibrations of our cells? We have within us a kind of scale of images along which the images we conjure up and dismiss incessantly rise and fall. At times they vibrate in the depths of our being like a blurred "pedal"; at times their sonic fullness radiates above all others. As they dominate or recede, they appear to be closer or farther away from us, and sometimes the length of time separating them from the present moment seems to be waning or waxing. I know of impressions I received ten years ago that, under the influence of an association of ideas or simply owing to my attention or some change of emotion, suddenly seem to date from yesterday. In the same way singers create the impression of distance by lowering their voice; they merely need to raise it again to suggest the impression of approaching.

These analogies could be multiplied. The principal difference between the brain and the phonograph is that the metal disk of Edison's still rather primitive machine remains deaf to itself; there is no transition from movement to consciousness. It is precisely this wondrous transition that keeps occurring in the brain. It remains an eternal mystery that is less astonishing than it appears, however. Were the phonograph able to hear itself, it would be far less mystifying in the final analysis than the idea of our hearing it. But indeed we do: its vibrations really turn into impressions and thoughts. We therefore have to concede the transformation of movement into thought that is always possible—a transformation that appears more likely when it is a matter of internal brain movement than when it comes from the outside. From this point of view it would be neither very imprecise nor very disconcerting to define the brain as an infinitely perfected phonograph—a conscious phonograph.

It doesn't get any clearer than that. The psychophysical sciences, to which the philosopher Guyau has absconded, embrace the phonograph as the only suitable model for visualizing the brain or memory. All questions concerning thought as thought have been abandoned, for it is now a matter of implementation and hardware. Thus memory, around 1800 a wholly "subordinate inner power,"[31] moves to the fore eighty years later. And because Hegel's spirit is thereby ousted from the start, the recently invented phonograph, not yet even ready for serial production, is superior to all other media. Unlike Gutenberg's printing press or Ehrlich's automatic pianos in the brain metaphors of Taine and Spencer, it alone can combine the two actions indispensable to any universal machine, discrete or not: writing and reading, storing and scanning, recording and replaying. In principle, even though Edison for practical reasons later separated recording units from replaying ones, it is one and the same stylus that engraves and later traces the phonographic groove.

Which is why all concepts of trace, up to and including Derrida's grammatological *ur*-writing, are based on Edison's simple idea. The trace preceding all writing, the trace of pure difference still open between reading and writing, is simply a gramophone needle. Paving a way and retracing a path coincide. Guyau understood that the phonograph implements memory and thereby makes it unconscious.

It is only because no philosopher, not even one who has abandoned philosophy for psychophysics, can rid himself of his professional delusions that Guyau attempts to crown or surpass the unconscious mnemonic capabilities of the phonograph at the end of his essay by contrasting them with conscious human abilities. But consciousness, the quality that Guyau ascribes to the brain in order to celebrate the latter as an infinitely perfected phonograph, would result in an infinitely inferior one. Rather than hearing the random acoustic events forcing their way into the bell-mouth in all their real-time entropy, Guyau's conscious phonograph would attempt to understand[32] and thus corrupt them. Once again, alleged identities or meaning or even functions of consciousness would come into play. Phonographs do not think, therefore they are possible.

Trademark, "Writing Angel."

Guyau's own, possibly unconscious example alludes to the imputation of consciousness and inner life: if a phonograph really possessed the consciousness attributed to it and were able to point out that it remembered a song, it would consider this a miraculous ability. But impartial and external observers would continue to see it as the result of a fairly simple mechanism. When Guyau, who had observed the brain simply as a technical apparatus, turns his experimental gaze inward, he falls short of his own standards. It was, after all, an external gaze that had suggested the beautiful comparison between attention and playback speed. If the focusing of blurred mental images by way of attention amounts to nothing more or less than changing the time axis of acoustic events by increasing playback speed or indulging in time axis manipulation (TAM), then there is no reason to celebrate attention or memory as miraculous abilities. Neither gramophone needles nor brain neurons need any self-consciousness to retrace a groove faster than it was engraved. In both cases it boils down to programming. For that reason alone the diligent hand of the phonograph user, who in Edison's time had difficulties sticking to the correct time while turning the handle, could be replaced by clockworks and electronic motors with adjustable speed. The sales catalogues of American record companies warned their customers of the friend who "comes to you and claims that your machine is too slow or too fast. Don't listen to him! He doesn't know what he is talking about."[33]

But standardization is always upper management's escape from technological possibilities. In serious matters such as test procedures or mass

entertainment, TAM remains triumphant. The Edison Speaking Phonograph Company, founded two months after Edison's primitive prototype of December 1877, did its first business with time axis manipulation: with his own hand the inventor turned the handle faster than he had during the recording in order to treat New York to the sensational pleasure of frequency-modulated musical pieces. Even the modest cornet of a certain Levy acquired brilliance and temperament.[34] Had he been among the delighted New Yorkers, Guyau would have found empirical proof that frequency modulation is indeed the technological correlative of attention.

Of course Europe's written music had already been able to move tones upward or downward, as the term "scale" itself implies. But transposition doesn't equal TAM. If the phonographic playback speed differs from its recording speed, there is a shift not only in clear sounds but in entire noise spectra. What is manipulated is the real rather than the symbolic. Long-term acoustic events such as meter and word length are affected as well. This is precisely what von Hornbostel, albeit without recognizing what distinguished it from transposition, praised as the "special advantage" of the phonograph: "It can be played at faster and slower speeds, allowing us to listen to musical pieces whose original speed was too fast at a more settled pace, and accordingly transposed, in order to analyze them."[35]

The phonograph is thus incapable of achieving real-time frequency shifts. For this we need rock bands with harmonizers that are able to reverse—with considerable electronic effort—the inevitable speed changes, at least to deceivable human ears. Only then are people able to return simultaneously and in real time from their breaking voices, and women can be men and men can be women again.

Time axis reversal, which the phonograph makes possible, allows ears to hear the unheard-of: the steep attack of instrumental sounds or spoken syllables moves to the end, while the much longer decay moves to the front. The Beatles are said to have used this trick on "Revolution 9" to whisper the secret of their global success to the tape freaks among their fans:[36] that Paul McCartney had been dead for a long time, replaced on album covers, stage, and in songs by a multimedia double. As the Columbia Phonograph Company recognized in 1890, the phonograph can be used as machine for composing music simply by allowing consumers to play their favorite songs backwards: "A musician could get one popular melody every day by experimenting in that way."[37]

TAM as poetry—but poetry that transgresses its customary boundaries. The phonograph cannot deny its telegraphic origin. Technological

media turn magic into a daily routine. Voices that start to migrate through frequency spectra and time axes do not simply continue old literary word-game techniques such as palindromes or anagrams. This letter-bending had become possible only once the primary code, the alphabet itself, had taken effect. Time axis manipulation, however, affects the raw material of poetry, where manipulation had hitherto been impossible. Hegel had referred to "the *sound*" as "a disappearing of being in the act of being," subsequently celebrating it as a "saturated expression of the manifestation of inwardness."[38] What was impossible to store could not be manipulated. Ridding itself of its materiality or clothes, it disappeared and presented inwardness as a seal of authenticity.

But once storage and manipulation coincide in principle, Guyau's thesis linking phonography and memory may be insufficient. Storage facilities, which according to his own insight are capable of altering the character of the replayed sounds (thanks to time manipulation), shatter the very concept of memory. Reproduction is demoted once the past in all its sensuous detail is transmitted by technical devices. Certainly, hi-fi means "high fidelity" and is supposed to convince consumers that record companies remain loyal to musical deities. But it is a term of appeasement. More precise than the poetic imagination of 1800, whose alphabetism or creativity confronted an exclusively reproductive memory, technology literally makes the unheard-of possible. An old Pink Floyd song spells it out:

> When that old fat sun in the sky's falling
> Summer ev'ning birds are calling
> Summer Sunday and a year
> The sound of music in my ear
> Distant bells
> New mown grass smells
> Songs sweet
> By the river holding hands.
> And if you see, don't make a sound
> Pick your feet up off the ground
> And if you hear as the wall night falls
> The silver sound of a tongue so strange,
> Sing to me sing to me.[39]

The literally unheard-of is the site where information technology and brain physiology coincide. To make no sound, to pick your feet up off the ground, and to listen to the sound of a voice when night is falling—we all do it when we put on a record that commands such magic.

And what transpires then is indeed a strange and unheard-of silver

noise. Nobody knows who is singing—the voice called David Gilmour that sings the song, the voice referred to by the song, or maybe the voice of the listener who makes no sound and is nonetheless supposed to sing once all the conditions of magic have been met. An unimaginable closeness of sound technology and self-awareness, a simulacrum of a feedback loop relaying sender and receiver. A song sings to a listening ear, telling it to sing. As if the music were originating in the brain itself, rather than emanating from stereo speakers or headphones.

That is the whole difference between arts and media. Songs, arias, and operas do not rely on neurophysiology. Voices hardly implode in our ears, not even under the technical conditions of a concert hall, when singers are visible and therefore discernible. For that reason their voices have been trained to overcome distances and spaces. The "sound of music in my ear" can exist only once mouthpieces and microphones are capable of recording any whisper. As if there were no distance between the recorded voice and listening ears, as if voices traveled along the transmitting bones of acoustic self-perception directly from the mouth into the ear's labyrinth, hallucinations become real.

And even the distant bells that the song listens to are not merely signifiers or referents of speech. As a form of literature, lyric had been able to provide as much and no more. Countless verses used words to conjure up acoustic events as lyrical as they were indescribable. As rock songs, lyric poetry can add the bells themselves in order to fill attentive brains with something that, as long as it had been confined to words, had remained a mere promise.

In 1898, the Columbia Phonograph Company Orchestra offered the song "Down on the Swanee River" as one of its 80 cylinders. Advertisements promised Negro songs and dances, as well as the song's location and subject: pulling in the gangplank, the sounds of the steam engine, and, 80 years before Pink Floyd, the chiming of a steamboat bell[40]—all for 50 cents. Songs became part of their acoustic environment. And lyrics fulfilled what psychoanalysis—originating not coincidentally at the same time—saw as the essence of desire: hallucinatory wish fulfillment.

Freud's "Project for a Scientific Psychology" (1895) saw the state of "being hallucinated [illegible] backward flow of Q to ϕ and also to ω."[41] In other words: impermeable brain neurons occupied by memory traces rid themselves of their charge or quantity by transferring them onto permeable neurons designed for sensory perception. As a result, data already stored appear as fresh input, and the psychic apparatus becomes its own sim[illegible]

Über neuere Wechselbeziehungen zwischen Mediengeschichte und Kulturgeschichte," in *Materialität der Kommunikation*, eds. Hans Ulrich Gumbrecht and K. Ludwig Pfeiffer (Frankfurt: Suhrkamp, 1988), esp. 429–33.

66. For a detailed study of the literary imagery surrounding and glorifying the German engineer, see Harro Segeberg, *Literarische Technik-Bilder: Studien zum Verhältnis von Technik- und Literaturgeschichte im 19. und frühen 20. Jahrhundert* (Tübingen: Niemeyer, 1987).

67. For related texts, see Anton Kaes, Martin Jay, and Edward Dimendberg, eds., *The Weimar Republic Sourcebook* (Berkeley and Los Angeles: Univ. of California Press, 1994), 393–411.

68. Jeffrey Herf, *Reactionary Modernism: Technology, Culture, and Politics in Weimar and the Third Reich* (Cambridge: Cambridge Univ. Press, 1984), 3.

69. For a critical assessment of these influences see Richard Wolin, *Labyrinths: Explorations in the Critical History of Ideas* (Amherst: Univ. of Massachusetts Press, 1995).

PREFACE

1. Benn, April 10, 1941, in Benn 1941 / 1977–80, 1: 267.

2. Concerning the precision of Benn's "Take stock of the situation!" see Schnur 1980, which makes clear that the poetic maxim immediately following—"Reckon with your defects, start with your holdings, not with your slogans" (Benn 1959–61, 2: 232)—simply rewrites Germany's logistical problems with distributing raw materials during the war.

3. See Schwendter 1982.

4. See Lorenz 1985, 19.

5. Heidegger 1950, 272.

6. Hitler, January 1945, in Schramm 1982, 4: 1652. See also Hitler, May 30, 1942, in Picker 1976, 491, where the fragment from Heraclitus appears as the eternally true and "profoundly serious statement of a military philosopher." But as Jünger (1926/1993, 128) observed, world wars, rather than continuing to fight in the "prevailing mode," depend on innovation as such.

7. See Pynchon 1973, 606.

INTRODUCTION

1. Under the title "*Nostris ex ossibus:* Thoughts of an Optimist," Karl Haushofer, "the main representative, . . . though not the originator, of the term 'geopolitics'" (November 2, 1945, in Haushofer 1979, 2: 639), wrote: "After the war, the Americans will appropriate a relatively wide strip of Europe's western and southern coast and, at the same time, in some shape or fashion annex England, thus realizing the ideal of Cecil Rhodes from the opposite coast. In doing so, they will act in accordance with the age-old ambition of any sea power to gain control of the opposite coast(s) and rule the ocean in between. The opposite coast

is at least the entire eastern rim of the Atlantic and, in order to achieve domination over all 'seven seas,' possibly the entire western rim of the Pacific. Thus, America wants to connect the outer crescent to the 'axis'" (October 19, 1944, in Haushofer 1979, 2: 635)

2. W. Hoffmann, 1944, in Hay 1975b, 374.
3. Bolz 1986, 34.
4. Abraham and Hornbostel 1904, 229.
5. See Campe 1986, 70–71.
6. Foucault 1963/1977, 66.
7. Goethe 1829/1981, 122.
8. Goethe, "Geschichte der Farbenlehre" (1810), in idem 1976, 14: 47. [The oral nature of this "opposite" to written history is underscored by the use of Goethe's word *Sage*, "legend," which derives from *sagen*, "to say."—Trans.]
9. See Ong 1982, 27 and (more reasonably) 3.
10. See Exodus 24:12–34:28.
11. Koran, sura 96, vv. 1–6.
12. Winter 1959, 6.
13. See Assmann and Assmann 1983, 68.
14. Nietzsche, "Geschichte der griechischen Literatur" (1874), in idem 1922–29, 5: 213.
15. Goethe 1811–14 / 1969, 3: 59.
16. Strauss 1977/1979, 15–16.
17. Hegel 1807/1977, 190.
18. Hardenberg (Novalis), 1798–99 / 1960–75, 3: 377.
19. Schlegel 1799/1958ff, 8: 42.
20. See Kittler 1985/1990, 108–23.
21. Goethe 1797/1987, 3. For reasons why a fully alphabetized literature in particular simulated orality, see Schlaffer 1986, 7–20.
22. Goethe, *Werther* (1774), in Goethe 1990, 109.
23. Benjamin 1924–25 / 1972–85, 1: 1, 200.
24. Goethe, *Elective Affinities* (1809), in idem 1990, 342.
25. Brentano 1835/1959–63, 2: 222.
26. Marker 1983, 23–24.
27. See Deleuze 1965, 32. "The alternative is between two purities; the false and the true; that of responsibility and that of innocence; that of memory and that of forgetting. . . . Either one remembers words but their meaning remains obscure, or one apprehends the meaning, in which case the memory of the words disappears."
28. Leroi-Gourhan, quoted in Derrida 1967/1976, 333n.
29. E. T. A. Hoffmann 1816/1969, 148 (translation modified).
30. Nadar 1899/1978, 9.
31. Arnheim 1933/1977, 27.
32. See Lacan 1978/1988b, 278.
33. Edison, 1878, quoted in Gelatt 1977, 29. Phonographic recordings of last words are based on the recognition that "physiological time is not reversible," and that "in the province of rhythm, and of time in general, there is no symmetry" (Mach 1886/1914, 256).

34. See Joyce 1922/1969, 113. See also Brooks 1977, 213–14. ["AEG" refers to the Allgemeine Elektrizitäts-Gesellschaft, one of the leading German electronics corporations. It was originally founded in 1883 by Emil Rathenau as the German Edison Society for Applied Electricity.—Trans.]
35. Rathenau 1918–29, 4: 347. Two examples of *déformation professionelle* among the dead of Necropolis: "A writer is dissatisfied with his epitaph. An employee of the telephone company uses short and long intervals, a kind of Morse alphabet, to ring in a critique of his sucessor." King Alexander, the hero of Bronnen's *Ostpolzug*, says everything there is to say about telephonitis and Hades while, according to the stage directions, the "telephone is buzzing": "Oh, you black beast growing on fatty brown stems, you flower of untimeliness, you rabbit of dark rooms! Your voice is our hereafter, and it has crowded out heaven" (Bronnen 1926/1977, 133).
36. The song "Example #22" actually combines the announcement and sound of "example no. 22" ("Hier spricht Edgar" / "Edgar speaking" [Schäfer 1983, 11]), which, strangely enough, must have migrated on a paranormal cassette-to-book from Freiburg to the United States.
37. See Lacan 1966/1977, 184.
38. Schäfer 1983, 2.
39. Ibid., 3.
40. See Gordon 1981, *passim*.
41. Watson 1978, 26, 410.
42. See Walze 1980, 133.
43. See Luhmann 1985, 20–22.
44. Heidegger 1942–43/1992, 86.
45. Keller 1865/1974: 41.
46. See Mallarmé 1893/1945, 850.
47. Lacan 1966, 720.
48. Lacan 1978/1988b: 47.
49. See Lacan 1966/1977, 1–7.
50. See Lacan 1975, 53, 73.
51. See Lacan 1978/1988b: 191–205.
52. Nietzsche 1873–76/1990, 110.
53. See Turing 1950, 441–42; Hodges 1983, 415–17.
54. Hodges 1983, 279.
55. Ibid., 30.
56. Ibid., 14.
57. J. Good, September 16, 1948, quoted in ibid., 387.
58. See Zuse, June 19, 1937, in idem 1984, 41: "Decisive thought, 19 June 1937 / Realization that there are elementary operations to which all computing and thinking operations may be reduced. / A primitive type of mechanical brain consists of storage unit, dialing system, and a simple device that can handle conditional chains of two or three links. / With such a form of brain it must be possible to solve all operations of the mind that can be dealt with mechanically, regardless of the time involved. More complex brains are merely a matter of executing those operations faster."

GRAMOPHONE

1. Chew 1967, 2. When Kafka's captured ape delivers his "Report to an Academy," the scene depicting his animal language acquisition quotes both Edison's "Hullo" and his storage technology: On board the ship "there was a cele-

bration of some kind, a gramophone was playing"; the ape drank the schnapps bottle "that had been carelessly left standing" in front of his cage; and, "because I could not help it, because my senses were reeling, [I] called a brief and unmistakable 'Hallo!' breaking into human speech, and with this outburst broke into the human community, and felt its echo: 'Listen, he's talking!' like a caress over the whole of my sweat-drenched body" (Kafka 1917/1948, 162).

2. Three months later (and independently of Edison) the same word appeared in an article on Charles Cros. See Marty 1981, 14.

3. *Scientific American*, 1877, quoted in Read and Welch 1959, 12.

4. Cros 1877/1964, 523–24.

5. Cros 1908/1964, 136; trans. Daniel Katz, in Kittler 1990, 231.

6. See Cros 1964, x.

7. See Derrida 1967/1976, 240.

8. Bruch 1979, 21.

9. See the documents from the *Gründerzeit* in Kaes 1978, 68–69, 104 (the scriptwriter H. H. Ewers on Wagner as "teacher").

10. See Friedheim, 1983, 63: "Wagner is probably the first dramatist to seriously explore the use of scream."

11. Wagner 1882/1986, 101.

12. Wagner, *Das Rheingold* (1854), mm. 11–20.

13. See Wagner 1880/1976, 511–12.

14. Jalowetz 1912, 51.

15. See Rayleigh 1877–78, 1: 7–17.

16. Lévi-Strauss 1964/1969, 23.

17. See Kylstra 1977, 7.

18. See Bruch 1979, 26, and Kylstra 1977, 5.

19. See Stetson 1903.

20. See Marage 1898.

21. See Bruch 1979, 3–4. Ong (1982, 5) even hailed Sweet (1845–1912) as the progenitor of Saussure's phoneme concept.

22. Shaw 1912/1972, 684.

23. Lothar 1924, 48–49.

24. See Shaw 1912/1972, 659–64.

25. For details, see Kittler1985/1990, 27–53.

26. Shaw 1912/1972, 795. [*My Fair Lady* is by Lerner and Loewe.—Trans.]

27. Lothar 1924, 12, and Kylstra 1977, 3, respectively.

28. See Knies 1857, iii.

29. Jarry 1895/1975, 4: 191.

30. Villiers 1886/1982, 19.

31. "Hähnische Litteralmethode" 1783/1986, 156–57.

32. On understanding as a measurable source of noise parallel to hearing, see Gutzmann 1908.

33. Lothar 1924, 51–52.

34. See Gelatt 1977, 27–28.

35. Abraham and Hornbostel 1904, 229.

36. On rock music and secret codes, see Kittler 1984b, 154–55.

37. Gelatt 1977, 52.

38. Hegel 1830/1927–40, 10: 346.

39. Pink Floyd 1976, 10–11.

40. Gelatt 1977, 72.

41. Freud, "Project for a Scientific Psychology," in idem 1895/1962, 1: 381.

42. Ibid., 1: 295.

43. Freud, *Beyond the Pleasure Principle*, in idem 1920/1962, 18: 24.

44. See Derrida 1967/1978, 221–31.

45. Abraham and Hornbostel 1904, 231. Hornbostel's superior, the great music physiologist Carl Stumpf, concluded that it was necessary to establish a phonographic archive in Berlin, as well (which was realized soon thereafter). His criticism of the exclusion of optics led another participant in the discussion to argue that it should be linked to a film archive (ibid., 235–36). See Meumann 1912, 130.

46. Hirth, 1897, 38. Sabina Spielrein proves that psychoanalysts didn't think any differently. According to her, the "treatment of hysteria" consists in "bringing about a transformation of the psychosexual components of the ego (either by way of art or simple reactions—whichever you prefer: in this way the component is progressively weakened like a playing [*sic*] gramophone record)." Spielrein 1906/1986, 224.

47. Rilke 1910/1949, 146.

48. Sachs 1905, 4.

49. See Flechsig 1894, 21–22.

50. See Hamburger 1966, 179–275.

51. Rilke 1910/1949, 185 (translation modified).

52. Lothar 1924, 58.

53. Ibid., 59–60.

54. See Rilke 1925/1957, 339–40.

55. Moholy-Nagy 1923, 104.

56. Ibid.

57. Ibid., 105.

58. Zglinicki 1956, 619.

59. Lothar 1924, 55.

60. Moholy-Nagy 1923, 104.

61. Pynchon 1973, 405.

62. See Andresen 1982, 83–84.

63. See Hodges 1983, 245–46.

64. See ibid., 287–88.

65. Marinetti 1912/1971, 87.

66. See Valéry 1937/1957–60, 1: 886–907.

67. Parzer-Mühlbacher 1902, 107.

68. See Ribot 1882, 114. For agony snapshots, see also Villiers's story "Claire Lenoir" and the commentary in S. Weber 1980, 137–44.

69. See Kafka, January 22–23, 1913, in Kafka 1974, 167–68.

70. Ibid., 166.

71. See G. Neumann 1985, 101–2.

72. See Cocteau 1930/1951, 28.

73. Kafka, January 22–23, 1913, in Kafka 1974, 168.

74. Campe 1986, 69.

75. See Kakfa 1935/1950, 93, and Siegert 1986, 299, 324–25.

76. See Kafka, January 17–18, 1913, in Kafka 1974, 158, and Campe 1986, 86.

77. See Campe 1986, 72.

78. See Lacan 1973/1978, 174ff.

79. See Wetzel 1985.

80. Dahms 1895, 21.

81. M. Weber 1928, 9.

82. Wellershoff 1980, 212–14.

83. Kafka, January 22–23, 1913, in Kafka 1974, 168.

84. See Wagner 1880/1976, 512.