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Dis/continuities

Does the Archive Become Metaphorical in Multi-Media Space?

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In this paper, I address (multi) media archaeology in two parts: first, an epistemological reflection on the term "media archaeology" and second, literal case studies. But, before I begin (*arché*), I want to reflect on the term "archaeology of multi-media" itself. Having been trained as a historian, a classicist and an archaeologist (in the disciplinary sense), I have always felt uneasy with the predominance of narrative as the uni-medium of processing our knowledge of the past. Theoretically, works like Michel Foucault's *L'Archéologie du Savoir*[1] and Hayden White's seminal *Metahistory*[2] have helped me express this unease with the rhetoric of historical imagination. It took, however, a new infrastructure of communicating realities—the impact of digital media—to put this critique of historical discourse into media-archaeological terms and practice. But caution: Even when we claim to perform media-archaeological analysis, we easily slip back into telling media stories.

The archaeology of knowledge, as we have learned from Foucault, deals with discontinuities, gaps and absences, silence and ruptures, in opposition to historical discourse, which privileges the notion of continuity in order to re-affirm the possibility of subjectivity. "Archives are less concerned with memory than with the necessity to discard, erase, eliminate."[3] Whereas historiography is founded on teleology and narrative closure, the archive is discontinuous, ruptured. Like all kinds of data banks, "it forms relationships not on the basis of causes and effects, but through networks"; instead of being a medium of cathartic memory, "the archive is traumatic, testimony not to a successful encounter with the past but to what Jacques Lacan has referred to as the 'missed encounter with the real'"[4]—that is, an allegory of the impossible bridging of a gap.

Archaeology, as used by Foucault in a somewhat playful, delusory way, is a term that does *not* imply the search for a beginning; it does *not* relate analysis to a kind of geological excavation. Thus it differs substantially from what the *Oxford English Dictionary* defines as archaeology: "indicating the material or substance of which anything is made or consists." So what happens if we apply this Foucauldian term to the genealogy of media?

Part I: An Epistemological Reflection on the Term "Media Archaeology"
Pre-Histories of the Computer?

So, how does media *archaeology* differ from media *history*?

To answer with an anecdote: Hewlett-Packard has now acquired the garage on which the company based its advertising campaign *The Garage Principle*. This garage is the primal hut of Silicon Valley where, in 1939, Bill Hewlett and David Packard began constructing technical apparatuses, out of which emerged the Eldorado of microchips. This garage is now listed, under the number 976, as a monument of American heritage (inventories count memory, rather than narrate it). The tragedy of this media monument is that, while the garage has survived, the first technical instruments produced by these pioneers have not.[5] That is, the empty frame remains, but the more tricky technological artifacts, which are always just temporary configurations and not tightly coupled things, are lost.[6] This difficulty culminates in the fragile endurance of computer programs, which only recently have become the objects of archives.[7] Media archaeology describes the non-discursive practices specified in the elements of the techno-cultural archive, without simply reducing the archive to its technical apparatuses**.** Media archaeology is confronted with Cartesian objects, which are mathematizable things,[8] and let us not forget that Alan Turing conceived the computer in 1937 basically as a *paper machine* (the most classical archival carrier), not necessarily dependent on its electronic implementation (this is a question of speed in calculating).

The so-called *8-Bit Museum*, the homepage for 8-bit computers and video games, is an example of the computer-based Internet developing an archive of its own genealogy (an unbroken lineage so far), reminding us of the wonderful archaeological époque of the 8-bit computer when "computer" did not automatically equal "Windows-PC":

> In this mythical time before the MByte had been invented, interaction with the computer was somewhat different from today. Valiant users fought through endless listings to glean a few tricks from others, one wrestled mercilessly for every single byte, programs were relentlessly optimized until they could be run even on a 1MHz chip, tragedies unfolded when a cassette with important data stubbornly signalled ?LOAD ERROR, and in general, fighting the computer was not always easy.[9]

Media archaeology is not only about re-discovering the losers in media history for a kind of Benjaminian messianic redemption. Media archaeology is driven by something like a certain German obsession with approaching media in terms of their logical structure (informatics) on the one hand and their hardware (physics) on the other, as opposed to British and U.S. cultural studies, which analyze the subjective effects of media, such as the patriarchal obsession with world-wide order and hierarchies in current hypertext programming languages as opposed to digital options of—female?—fluidity.[10]

"There are no archives for computer games."[11] The real multi-media archive is the *arché* of its source codes; multi-media archaeology is storage and re-reading and re-writing of such programs.[12] As opposed to the copyright on software programs, which extends for 75 years in the U.S., software piracy successively creates a kind of anarchical archive, an *anarchive* of otherwise abandoned software as cultural evidence. Media *history* is not the appropriate medium to confront such an archive and to perform such a re-reading and re-writing. Media history seeks to privilege continuities instead of counting with discontinuities, since any implicit narrative, which is always a linguistic operation, permanently produces connections between heterogeneous parts.

Consider, for example, two examples in current media research: *Renaissance Computers*, edited by Neil Rhodes and Jonathan Sawday, and a Frankfurt *Literaturhaus* conference called *Book Machines*. *Renaissance Computers* expressly draws a parallel between the media revolution from manuscripts to printing in Europe enabled by Johann Gutenberg in 1455 and Martin Luther's use

of printed text for the distribution of Protestant messages (*theses*) in 1517, and the present digital technology era. The symbolic machines of the sixteenth-century "methodizer" Peter Ramus (Pierre de la Ramée) are presented as a *pendant* to the computer of today, and they claim there exists "an indisputable resemblance between the effects of the printing press and those of the computer . . . in the increased volume of information."[13] This claim still thinks media from the vantage point of alphabetical texts, but audio-visual data banks make all the difference. The authors want to "explore the technology of the early printed text to reveal how many of the functions and effects of the modern computer were imagined, anticipated, or even sought after long before the invention of modern digital computing technology,"[14] but computing is not about imagination and texts, but rather the alliance of engineering and mathematics. Here, a well known historiographic trope (*synekdoché*) lurks around the corner: the desire of occidental man to privilege continuity against the experience of ruptures, thus saving the possibility of an unbroken biographical experience. Against such analogies, however, media archaeology insists on differences. In this context, this means highlighting the fact that the Renaissance *ars combinatorial*, unlike the universal discrete machine named the computer, was not able to calculate on its own, even less store data in random access memories or registers. The coupling of machine and mathematics that enables computers occurs as a mathematization of machine, not as a mechanization of mathematics. While the book has, for half a millennium, been the dominant medium of storing and transmitting knowledge, the computer is able, for the first time, to *process* data as well. What separates technological chance in the fifteenth century from the digital époque is the computer's genesis in World War II, driven by the need for fast number crunching; the difference is between the symbolic (in Lacan's sense: writing, letters) and the mathematical real (computing).

In 1999, Frankfurt *Literaturhaus* organized a conference on *Book machines* (a term coined by Thomas Hettche). On this occasion, the media archaeologist Friedrich Kittler pointed out the differences rather than the continuities between memory media: he argued that analogue broadcast media, which are linear-sequential and base their storage on the principle of the tape, should be afraid, for they will be swallowed by the Internet. According Kittler, books, however, share with the computer "the deep quality of being discrete media." Both are combinatoric machines; the only difference is that books are resident memories, while the computer can automatically read and write.[15] On the Internet texts are, for a while, not falling silent, which is why "Internet archaeology" is necessary (Denis Scheck). But who is responsible for this kind of documentation? Classical archives and libraries do this kind of documentation only exceptionally; for the new kind of memory there are not fixed *lieux de mémoire* any more, not in the sense of institutions, but rather rhizomes within the net itself. While the stability of memory and tradition was formerly guaranteed by the printed text, dynamic hypertexts—the textual form of the Internet—will turn memory itself into an ephemeral, *passing* drama.

A Forerunner of the Internet?

The historian of science Rolf Sachsse describes Wilhelm Ostwald and his "organisation of organisers" (*Die Brücke* in Munich between 1911 and 1914) as a "multi-mediatic" forerunner of the Internet.[16] So too does Jonathan Sawday, when he asks if our contemporary "idea" of the "net" or "web" was "foreshadowed in the Renaissance, at least as a conception."[17] Does this imply a history of ideas instead of media archaeology? But how can media of the past be addressed? Narratively or by discrete alphanumeric ciphering, such as signatures of documents and objects? These questions are tricky because the answers themselves depend on the very agencies being thematized: the archive, the library and the technical museum. Whatever will be said has already passed a process of selection, transport, inventorization and storage according to classification, a signal processing circle best described in terms of cybernetics and information theory. Significantly, the archaeologist of knowledge itself, Michel Foucault, made the signal-to-noise ratio—the relation between message

and noise—the subject of a talk in 1966, reminding us that "Freud a fait des énoncés verbaux des malades, consideérés jusque´là comme bruit, quelque chose qui devait être traité comme un message."[18] Some of Foucault's own talks have been recorded on tape. In this audio-archive, the signal-to-noise ratio enters the memory of Foucault itself—a kind of techno-corpse with Foucault's recorded voice, which conveys both message and noise because of material corruption. We are dealing with what history calls *tradition* in the sense of transmission of signals, which the media archaeologist sometimes can decipher from noise only when technical filters are applied. At this point, media archaeology replaces philology as the art of deciphering texts.

Sven Spieker (University of California, Santa Barbara) recalls the link between the media archives of the early 20th century avant-garde and its contemporary, the emerging science of psychoanalysis, a connection theorized by Benjamin in his conception of "the optical unconscious." In Benjamin's conception, imaging media are archaeologists of images that could otherwise never be seen by the human eye (ranging from telescope to radiological scans). The unconscious archive, though, is rather close to the computer, as defined by Jacques Lacan ("ça compte," rather than "raconte"):

> The Freudian unconscious … must (also) be understood as a media theory whose centerpiece, the "psychical apparatus," belongs in the same context as other storage media, such as the camera (to which Freud often compared the psyche) or cybernetics (Lacan). Significantly, the Freudian archive-unconscious is capable of storage only to the extent that it crosses out or makes illegible the signatures on other objects stored in its archive, which means that the unconscious is not a machine for remembering but, rather, a machine that continuously erases previous entries in order to replenish its storage capacity.[19]

Multi-Media?

When using the term *multi-media*, we have to remember that we are already victim to a discourse inaugurated by the Microsoft Corporation when it started to release its *Windows* aesthetics. Multi-media describes the way or method of production, the forms of its transport, not its object or content.[20] While a printed letter can only carry the meaning of one phonetic unit, one byte can encode 256 different textual, acoustic or visual options.[21] The term multi-media is thus an interfacial betrayal on the computer screen: in digital space: the difference between the aesthetic regimes only exists for the human user, simulating the audio-visual human senses *under one surface*. A close reading of the computer as medium, though, reveals that there is no multi-media in virtual space, only one medium, which basically calculates images, words, sounds indifferently, since it is able to *emulate* all other media. The term multi-media is a delusion. By flattening the difference between print, sound and image and technically sending them in one standard channel only, such as the telephone line (a sequential operation that separates this procedure from spatial bundling), the computer makes these data accessible almost instantaneously. It effaces the resistance to access characteristic of the traditional archive thus far, though in practice there is still delay, caused by a multi-medial multiplication of data transfer resulting in traffic jams. With RealVideo and RealAudio, for example, delayed transfer, which is "tradition" (in Jack Goody's terms) in the age of print, is substituted by the Asynchronous Transfer Mode (ATM), media-archaeological discontinuity in its most technical sense. While we see one part the video on screen, the next part is already loaded in the background—a coupling of storage and transfer in realtime, a flooding of the World Wide Web by the archive itself.

How can the notion of multi-media be applied to the cultural technology of archiving? As in traditional culture, multi-media first requires archival space, a large storage space like an optical disk for audiovisual data to be kept for processing.[22] But multi-media is not just the extension of the textual archive; hyperlinkability, the very virtuality of multi-media as defined by Ted Nelson, involves the interconnectivity of different media. This option is blurred by the notion of hyper*text*,

which just extends what every academic text already does by connecting the textual flow with the apparatus of footnotes. HTML as a protocol means more than just texts.[23] As Nelson says of Vannevar Bush's 1945 design of an associative, micro-film based memory machine, the famous *Memory Extender (MEMEX)*: "Bush rejected indexing and discussed instead new forms of inter-woven documents."[24]

Importantly, Nelson coined the term *docuverse*, which in a way is responsible for the iconic desktop metaphor of current *Windows* interfaces, and which rather than instigating a genuinely media-archaeological thinking of the computer, prolongs the metaphor of archival spatial order. The German media scientist Hartmut Winkler made Nelson's term the basis of his computer-archaeo-logical book *Docuverse*, which took for granted the language-based structure of the Internet. He wrote this a few years before the *pictorial turn* in the Internet took place, a turn made technologi-cally possible by data compression algorithms and broadband-transmission of real audio and real video (streaming). Significantly, downloaded images generated by web-cams are no longer called an *archive* (a term which belongs to paper-based memory), but a *gallery* (the visual realm). That is why the U.S. visionary of digital architectures, David Gelernter, points towards the data flow (*lifestream*) as a future alternative to the current desktop-metaphor of present interfaces that still carry, with file-like icons, an anachronistic archivism dating from old-European times of secretaries and offices, instead of rethinking digital storage space in its own terms. Temporal dynamics will thus replace spatial metaphors and catachrestic uses of terms from architecture. A media archaeology of the file has recently been written by Cornelia Vismann:[25]

> This archaeology of law is at one end framed by predecessors of files like the administra-tive lists in Babylon, at the other end by file-like text administrating systems in computer programs. There it becomes evident that filing technologies have always been the prehistory of the computer as well, which with its *stacks*, *files* and *registers* inherits diverse occidental administration practices.[26]

Emphatic memory (on hard-disks) in Gelernter's scenario is being replaced by a future of the computer as a place of intermediary, passing storage: "The Lifestreams system treats your own private computer as a mere temporary holding tank for data, not as a permanent file cabinet."[27] Future, present and past are but segments, functions of marking differences within a data stream which is time-based rather than space-based.

Fahrenheit 451

An interruption to remind you of another utopia, a film classic which has been probably prema-turely classified as science fiction, François Truffaut's *Fahrenheit 451*. In it, a new medium—film and its techno-allegorical other, TV—takes the burning of its mediatic predecessor, the book, as its object. And indeed, the light points of digital signals on the screen literally efface the classic book format as the dominant storage medium.

Another key element defining multi-media, namely interaction, is an aspect Bertholt Brecht highlighted in the 1920s for the emerging medium radio, insisting that it can be used bi-direction-ally, rather than only being broadcast unilaterally.[28] The unidirectional communication of books still dominated the user experience. The computer, through its possibilities for interactivity, "play" and the creativity of hypertext, is now rapidly undoing that idealization of stability, and returning us to a kind of textuality that may have more in common with the pre-print era. Thus, Vincent Gillespie has argued that the contemporary user's experience of hypertext "…seems…to be similar to a medieval reader's experience of illuminated, illustrated and glossed manuscripts containing different hierarchies of material that can be accessed in various ways."[29] With different *hierarchies*, a network is not a text any more, rather an archi(ve)-tecture. As long as the keyboard of computers

is alphabet-based like a typewriter, the paradigm of printing remains dominant; progressively, though, the mouse-click is replacing the key-stroke as the means of directing the monitor, and the orientation is shifting to visually-perceived information landscapes.

The fundamental difference, though, between a classical print-based archive and multi-media storage is interaction—which at the same time increases the memory capacities of the user, in contrast to just reading or looking at things and commemorating them. The traditional archive has, so far, been a *read only memory*—printed texts reproduced through inscription, not rewritten by reading (a concept still maintained by the CD-ROM). In multi-media space, however, the act of reading, that is the act of re-activating the archive, can be dynamically coupled with feedback.[30]

In multi-media space, sound and images can be shifted, cut, stored, and re-loaded as in word-processing software. Thus, the archival regime is being extended from text to audiovisual data. At the same time, however, and as a kind of revenge by audiovisual data for being subjected to texts, this extension changes and dissolves the very nature of the archival regime. Consider, for instance, the necessity of compressing digital video streams in order to make them storable and transmittable. While in occidental tradition every letter counts in the transmission of an archived text—which is the lot of a whole discipline called philology—by compressing and decompressing digital images subtle amounts of data are lost. This might be almost undetectable to the weak human eye, an organ that has been deceived in its perception since the origin of time-based media like film, but in the world of military target calculations this one bit of absence or difference might lead to fatal errors. Multi-media, then, is for human eyes only.

The Relation between Print and Multi-Media

The usual vantage point from which we talk about the archive—at least from a European cultural point of view—is still the notion of the print-based, paper-formatted archive. The media-archaeological task, then, is to re-think archival terminology in order to embrace a multi-media concept of the archive. The book belongs to the first external memory devices through which culture as memory-based has been made possible,[31] but the book now has lost its privilege as the dominant external memory of alphabetic knowledge. Europa is still book-, that is library- and archive-base-fixated; in contrast, the media cultures in the U.S. have already developed a culture of permanently recycling data, rather than eternally fixed memories.

While traditionally the archive has institutionally, and even legally, sealed off a data bank from immediate access, "there is no ending online. There's no closure, no linear basis. It's about bringing it in, checking it out, constantly evaluating."[32] Thus, the archival media memory is de-monumentalized, just as Erasmus perceived when he put together his *Adages*: "I could add things even during the printing, if anything came to hand which should not be left out"—mobile letters. But then, Sawday's comment falls back on a media-historical analogy, which is inherently teleological or rather symbolic rather than allegorical: "What Erasmus had was the new technology of print. What he already knew he needed was a computer." This anachronism corresponds with what even Rhodes and Sawday must finally admit is a difference between the effects of Renaissance print and contemporary computer technologies: "Print culture tended to produce a concept of the text as a relatively fixed and stable entity: the book. The great, multi-volume, 'standard' editions…stand as monuments…and…are also monuments to a belief in the stability of the printed word, and the possibility of freezing, for all time, that which has been thought and said."[33] This freezing is opposed to the constant dynamic flow of information in cyberspace. So, if archaeology deals with monuments—is it still the right method for analyzing digital topologies?

Of course, there is a constant and permanent movement between the media-archaeological layers of writing. This text of mine has been written and processed on computer, then evidently printed out on paper. This printing gave it, for a moment, the aura of a "final version," and an archival stability and authority against constant re-writing. On the way to Brown University, where

I first gave this paper as a talk, I added a lot of handwritten notes which re-turned it, in part, to a manuscript. The following steps to this publication, the editorial practice, confirmed the recognition that "there is no last word in textual matters."[34] Media-archaeology replaces the concept of a historical development from writing to printing to digital data processing through a concept of mediatic short-circuits; the discreteness of digital data, for example, has started with the ancient Greek alphabet already providing a model of elementary analysis of both speech and writing.[35] Of course, multi-media computing makes the medieval chart re-processible in its multi-media semiotics, no longer reducing it to its literal information by printing the document. In the Renaissance, the media format *book*—and multi-media archaeology is about formats—in contrast to the sequential reading of rolls (*volumen*), offered new options of data retrieval by supplementary tables of contents and indexes,[36] since for the first time, numerical data (page numbers) were combined with discrete text units (the single page), which facilitated rapid alphabetical search (as a classificatory system). In digital space, however, every bit can be addressed on a multi-media level (text - image - sound). Addressing is no longer limited to sentences, words, letters. Images could never be directly addressed by a book retrieval, unless indexed by words. Image- or sound-based retrieval of pictures and music would lead to a genuinely multi-media search engine culture. Maybe, in North America, American Indian culture and the ideological opposition of the first immigrant generations to old literate Europe has preserved a sense of orality which has made it easy for the second-order orality of gramophone, telephone, radio and TV broadcast to spread rapidly. Marshall McLuhan's media utopia of the wired global village could originate only in America, while Europe's book-oriented media culture stays on the side of writing.[37]

For the longest time in cultural history, storage of data and the means of operating them have been kept separately. The symbol-processing machine (the computer in its von-Neumann-architecture) though does not separate data and programs any more; rather both are deposited equally in the working memory of the machine, to be differentiated only in the actual moment of data processing. Suddenly, a psychoanalytic insight becomes technically true—the dialectic of archive and transference: "I think the challenge is to think the two as convergent: as two interdependent and inseparable moments perhaps in a single process."[38] The difference, though, between all old media like the book and the computer lies in the simple evidence that books cannot be (re-)programmed once printed. Thus the computer cannot easily be made compatible with a (media) history; it rather has an *arché*, a (archeo-)logics of its own.

The Silence of the Archive

The invention of printing distances the reader from the text, beholder from the image, creating a kind of "silence of the archive" through the silent reading situation. This situation corresponds to the media-archaeological insistence on confronting absences and silences, as opposed to the multi-media phantasy of a "talking" archive (Leah Marcus). Today, another desire for historical continuity over all discontinuities emerges: "the computer bridges the gap between manuscript and print" again.[39]

An inscription above the entrance to the Vatican Library in Rome demands without ambivalence: *Silentium*. "We associate libraries, collections of knowledge, and systems for memory retrieval with silence and hence with permanence."[40] It is exactly this kind of silence, which the archaeology of knowledge learns to confront while resisting the temptation of turning silence apotropaically into the discourse of historic talk. In ancient and medieval times, reading was performed aloud. The printing press silenced the voice, which returned as an inner hallucination again and again. Milton, for example, "thought of the perusal of printed volumes not as a purely visual activity but as a form of displaced orality—a conversation with kindred spirits who were long dead or at great distance."[41] This corresponds to the archival phantasm of history as a function of printing.

Our attitude towards phonographically-recorded sound sources[42] matches the situation of every historian: both strive to make an archive of (in the broadest sense) scriptural bodies (texts, partitures, wax cylinders) resonate. Activation of the archive in the pre-media age meant an energetic charging by *re-enactment* (Collingwood): Jules Michelet, historian of the French Revolution, believed he heard hallicunatorily the murmuring of the dead in the archive, as if documents were already the logocentric derivate of a gramophone. By his writings, he himself became a resonant body, a *medium* for the voices of the dead. Instead of apparatuses, it was historical discourse that functioned as a drogue of imagination, helping him to this kind of self-perception: "Dans les galeries solitaires des Archives où j'errai vingt années, dans ce profond silence, des murmures cependant venaient à mon oreille."[43] Is this now being replaced by the multi-mediatic interface illusion of the computer? "In recent years, the computer is no longer silent"; audio-visual perception supplements the traditional "reading" of texts—an "assimilation via the ear as well as the eye. Such a multi-leveled"—that is, *multi-media*—"'talking' archive would do more than make a significant number of early books conveniently available for downloading. . . . It would allow us to begin to reenter a mind set that was endemic to the early modern era, even though it has long been lost to us in the era of silent libraries."[44] That means (multi-)media archaeology, no longer "literally," but synesthetically.

Global Memories

While the term "archive" seems to describe all sorts of data banks in the World Wide Web almost universally, it also blurs the dis/similarities between old (print) and new (digital) archives. It is exactly the "multi" of multi-media that separates old from new archives. In contrast to two thousand years of basically written history, the advent of audio-visual recording media has led to genuinely multi-media "global memory" projects like the music-ethnological Berlin gramophone archive (E. M. v. Hornbostel) around 1900 and the film *Archive de la planète* of world cultures (A. Kahn) around 1930, resulting in the *Encyclopaedia Cinematographica* of moving nature (Institute for Scientific Film in Göttingen after WWII), which turns the archive into a discrete matrix of life itself. *Encyclopaedia cinematographica* has been the name of a film project of the German Institute of Scientific Film (Göttingen) which, under the guidance of the behavior studies scholar Konrad Lorenz, attempted to fix the world of moving beings on celluloid (up to 4,000 films). Like the medical films produced at the Berlin hospital Charité between 1900 and 1990 that the media artist Christoph Keller has secured from being thrown away as trash, this visual encyclopedia forms an archive that gains its coherence not from the internal but the external criteria of classification.[45]

As opposed to multi-media aesthetics, digital archaeology tries to get beyond sight and sound, since behind the images and noises we are confronted with "practices in which visual images no longer have any reference to an observer in a 'real,' optically perceived world," but rather refer to electronic mathematical data where abstract visual and linguistic elements coincide and are circulated.[46] Finally, the Human Genome Project reminds us that the apparent multi-media images and sounds of life are being replaced by a strictly numerical archive calculating rather than narrating life; if German a pun may be allowed: *zählen* (counting) instead of *erzählen* (narrating).

Part II: Case Studies in Media-Archaeology:
The Virtual Reactivation of a Lost Sound Storage Medium:
Hornbostel´s *Phonogramm-Archiv*

Occidental phonocentrism has always been striving to find the means to store the human voice in the memory apparatus, be it the "dialogical" hallucinations of speaking with the dead in historical imagination. New technical means since late nineteenth century make it possible to inscribe traces

of the human voice both literally in the already established archival institutions of cultural memory and in the epistemological "archive" (Foucault) as dispositive of cultural (re)cognition.

The notion of the archive is in transition, moving towards the audio-visual. As long as there have been archives, the phantasm of recording the acoustically real (i.e., the non-writable) has generated rhetorical, symbolic and scriptural forms of memorizing sound in supplementary ways. Despite the emergence of the phonograph, this new type of record was still subject to forms of inventorization and administration developed in the context of paper-based archives. (Multi-)Media archaeology seeks to reconstruct phantasms of memorizing sound in a pre-technical age and point out the discontinuities which arose with the invasion of audiovisual records into traditional archives, libraries and museums in the twentieth century. It culminates in a plea for rethinking the options of retrieval under new media conditions—transcending the notion of the archive itself.

In Germany, the invasion of the Edison phonograph into the Gutenberg-galaxy of cultural memory inaugurated a century that, for the first time, was also endowed with an audiovisual memory. In the same year that Sigmund Freud fixed his psychoanalytic interpretation of dreams,[47] the psychologist of acoustic phenomena, Carl Stumpf, and in his steps the music ethnologist Erich Moritz von Hornbostel, founded at the Berlin University a world-wide phonographic archive of wax-cylinder recordings of people threatened with extinction.[48] What appears rather unique, even idiosyncratic in the case of Hornbostel´s ethno-phonographical archive, should be read as part of an overriding multi-media practice of global classification, data processing and information storage, leading to early twentieth century efforts to create a universal science of cultural documentation (like Paul Otlet's *Mundaneum* in Brussels for meta-bibliography). As an example of a cinematographic *global memory*-project striving to make the memory of the world (later UNESCO's obsession) audio-visually recyclable, consider the Parisian banker Albert Kahn's project (died 1940), which from 1910 sent cameramen around the world to register images that might soon vanish.[49] Today, after two World Wars have effaced a lot of these objects, this collection is being preserved in Boulogne-Billancourt as an *Archive de la planète*. This memory, currently being made accessible on digital video disk, addresses a past from which no material archaeological relic has survived.

At the end of the twentieth century, the destiny of von Hornbostel's phonographic archive has been reversed, returning the collection to dissemination once again, and it is difficult to re-assemble this archive scattered by World War II.[50] Frozen voices, banished to analogue and long forgotten storage media, wait for their (digital) de-freezing.[51] At this moment, the fact that technical memory is "audio-visual" for human ears and eyes only manifests itself; the digital processing of such data equalizes the sensoric notion of multi-mediality itself. The Berlin Society for the Enhancement of Applied Informatics has developed a procedure to regain audio signals from the negative tracks in galvanized Edison wax cylinders by opto-analytic deviation: endoscopic recording devices "read" the sound traces graphically, re-translating them into audible sound by algorithmically transforming visual data into sound. Digital memory ignores the aesthetic differences between audio- and visual data and makes one interface (to human ears and eyes) emulate another. For the computer, the difference between sound and image and text, if they counted, would count only as the difference between data *formats*.[52]

When the ethnologist M. Selenka visited the American Indian Wedda tribe in 1907, she made the natives speak or sing into a phonograph, which she instantly played back to the speakers' joyful recognition.[53] With the media mystery of physically real recordings of sound and images, humans receive a multi-media mirror effect (in the Lacanian sense) that sublates the clear-cut difference between presence and absence, present and past. Strangely enough, we can to listen to this play-back today in exactly the same quality as the American Indians could in 1907: an example of the above mentioned opto-electronic archaeology of sound can be appropriately experienced via the World Wide Web.[54] Message or noise? Only the media-archaeological operation of reading the inscribed traces opto-digitally makes the otherwise inaccessible sound recording audible

again. Synesthetically, we can *see* a spectrographic image of sound memory—a look straight into the archive.[55] The opto-digital *close reading* of sound as image, though, dissolves any semantically meaningful unit into discrete blocks of signals. Instead of musicological hermeneutics, the media-archaeological gaze is required here—a reminder of light-based sound inscription in early film.

Retrograd—*Excavating an Archive of Medical Films*

The term "archive" is frequently assumed to cover all activities of storing. "*Yet archives are not . . . collections, and their media-archaeological specificity and reproductive (mnemonic) strategies have to be carefully evaluated.*"[56] What, then, *is* an archive?

An archive is not an arbitrary quantity; not any collection of things can be an archive. The archival regime of memory is not an idiosyncratic choice, but a rule-governed, administratively-programmed operation of inclusions and exclusions that can be reformulated cybernetically, or even digitally.[57] Still, an intended archive can be subject to deformation, as illustrated by the collection of medical films produced at the Berlin hospital Charité from 1900–1990. Once intended as a film archive of general medicine,[58] the lot was not re-assembled and published multi-medially until recently. As a result of German reunification, the film institute of the Charité was closed within three days. Some material was lost, the rest was packed into sacks and placed in the Charité attic. Here, a filmmaker's camera searched for the last piece of evidence of what was once there.[59] Media archaeology, unlike media history, deals with absence. When looking at these films, it becomes apparent that images are weak, since they dissolve into nothing without archival authority.[60] Thus, a Foucauldian archaeological gaze is needed; that is, an active regime of ordering. Buried in analogue media, these images remain irretrievable for the moment; only the website performs this act of memory as media archaeology: we digitally (re-)*move* the cinematographic stills.[61]

This example demonstrates that the archaeology of multi-media no longer takes place in ground archives, but rather in virtual space. Without a fundamental, material support, however, it is no longer *arché*-ology in the classical sense, but rather cybernetic archaeo*logistics*. Consider more closely the QuickTime *movie* of a surgical operation on a shank in the Berlin Charité clinic from 1903.[62] Here the camera gaze allies itself with its object: it doubles the chirurgical gaze;[63] the anatomy of the body corresponds to the discrete, jumping images of early film. The ultimate media-archaeological gaze is opto-technical. The surgical amputation and the filmic cut coincide. Surprisingly, at the end of this short film, the surgeon Professor Bergmann looks and bows at the camera (whose camera-man was Oskar Meßter, later founder of the German UFA film industry) as though he was addressing a theatrical audience.[64] This gesture recalls the arena-like situation of the anatomical theatre established since the Renaissance. Keller's archival time-cut reveals a media-archaeology of medical films, thereby generating a parallel memory not of recordings of past reality, but of the ways images are consciously and apparatively constructed.[65] In the multi-media archive, code and culture coincide.[66]

An off spring of this medical film archive, the secret Nazi medical film project between 1941 and 1945 at the Charité, was later thrown by the SS into lake Stößensee near Berlin when the Red Army approached. There was literally a media-archaeological moment when divers detected these films in 1993 and rescued them; just three of several hundred film rolls could be deciphered at all, one of them showing (on heavily damaged film material) a naked man who performs several movements, apparently directed by outside orders. Correspondingly, a film by the Greek director Angelopoulos called *Ulysses' Gaze* is about a filmmaker who wanders through the Balkans in search of three reels of film from the early 1900s that were never developed. The final scene takes place in the ruins of Sarajevo where the reels of film are magically developed by an archivist, barricaded underground. When the filmmaker finally gets hold of the undeveloped film reels and they are developed, nothing can be seen on them any more, just blank frames.[67]

Media-archaeology deals with gaps and confronts absences. Of course, every film is always already itself an archive of movements, conserving modes of motion. Nevertheless the pioneer of film montage in Russia, Wsewolod Illarionowitsch Pudowkin, who with the Leningrad behaviorist Pawlow did a film in 1928 with the title *Functions of the Brain* insisted, that each object which is being recorded and projected by film is dead, even if it once moved in front of the camera.

Between Reading and Scanning

The computer does not literally read texts any more, but scans them, thus perceiving writing as an image, a cluster of signals (whether or not they may be finally re-composed to the form of a text page or an image). Signal processing replaces pure reading. The computer reduces signals to the smallest possible alphabet; still "the two most important directing signals which link the central processing unit of the computer to external memory are being called READ and WRITE."[68]

The media artist Angela Bulloch uses a key visual, a sequence from Michelangelo Antonioni's film *Blow Up* (1966): the protagonist, a photographer, hiding behind a tree takes photos to discover a murder; but the closer the camera looks in order to identify the spot (of the murder?), the less the photo serves as evidence for an apparent murder. As the German critic Karl Kraus once argued, "the closer one looks at a word, the further it looks back."[69] The artist extends this process of identification by yet another magnification, enlarging the digital scan of this scene in great blocks of single pixels and thus exploding the image within a sequential modular system of her so-called *pixel boxes*, in which one pixel is represented in a 50 × 50 cm monitor, attached to complex RGB lighting systems and which can be generated and programmed with any digital information.[70] This disillusion of the image's betrayal of the human eye reveals the media-archaeological scanner-gaze of the computer looking at a different kind of archive, no longer looking for just letters. The pixel modules also point to the fact that digital images are composed hyper-indexically by pure information, unlike referential images like those of classical photography, which still suggest a pre-discursive real. These modules developed by Angela Bulloch and Holger Friese reveal that multi-media archaeology requires technical skills. A pixel, which is the smallest conceivable picture element, only makes sense semantically when it appears within a group. To discern an image, the distance between the viewer and the group of pixels must be large if the light square made by a single pixel is 50 × 50 cm. In this situation, close reading can be performed only by the computer, and the computer is thus the true media archaeologist.

"I want control over every pixel" (Andreas Menn):

> In digital space the elements of files are discrete states. For digital images this means: There is nothing between one and its adjacent pixel. Discrete states though are unperceivable by human senses; the physiology of human perception and body are being characterized by the analogue, the continually floating. The digital thus arrives with the disappearance of the body therein.[71]

But, at the other end of this expulsion, the body *re-enters*. While interrogating the materiality of the pixel, the media artist Menn media-archaeologically decides to produce each pixel manually with his own body: "I work with my body in front of a digital camera; my appearance in the visual field equals 'one,' my disappearance equals 'zero.' I am being scanned by the camera."[72] From a distance, the writing, performed by pixels based on images of his body, reads: "I only want to work digitally."

What looks like an image on the computer monitor is nothing but a specific actualization of data (*imaging*). The computer thus renders data visible in a time-based way; the static notion of the image is being replaced by a dynamic one:

This variability marks a fundamental chance of imagery. As opposed to classical image media like photography and film in the case of the computer-generated image the visual recording is not fixed invariably on a physical carrier, the negative, but always "fluid".... At any point of time digitally stored "images" can be manipulated, thus making the notion of the "original" state redundant.[73]

Visual Archiving: Sorting and Storing Images[74]

Cultural memory of images has traditionally linked images to texts, terms and verbal indexes. Confronted with the transfer of images into digital storage, non-verbal methods of classification are gradually gaining importance. Rather than the archival question, the search methods used to find pictorial information pose a problem to video memory, for they are still limited to models developed for retreiving text. What new kind of knowledge will exist exclusively in the form of images? What part of traditional knowledge can be transformed into images and what part might just vanish? Techno-image archaeology[75] seeks to rethink the notion of images, considering the process of archiving as organizing all that can be visually accessed as knowledge. In terms of technology, an archive is a coupling of storage media, data format (content) and address structure. Methododically this implies leaving behind the description of single objects in favour of an investigation of data sets.

In his 1766 essay "Laocoön," G. E. Lessing discusses the aesthetic conflict between the logic of language and the logic of images in terms of a genuinely multi-media semiotics: *pictura* is no longer—as declared by Horace—*ut poiesis*; time-based media (like dramatic speech and linear narratives) differ from space-based media (like simultaneous pictures).[76] Walter Benjamin, from a different perspective, reiterates that history appears in sudden images rather than narrative stories. Jules-Étienne Marey and Eadweard Muybridge chrono-photographically transformed an otherwise temporally experienced sequence (movement) into a spatial series (of discrete moments), close to the present aesthetics of the mouse-click. The digitization of images today provides a technical basis of inquiry into this conflict (i.e., the rather simultaneous aesthetics of websites as opposed to the moving image on the TV screen), so that the computer medium can ground that investigation. It would not make sense to retell a teleological story of image processing that finally reaches its aim in digitization; on the contrary, this history of images needs to be revised from the digital point of view. For example, how can archives be related to algorithms of image processing, of pattern recognition and computer graphics?

In sharp contrast to hermeneutics, the media-archaeological investigation of image archives does not take images as carriers of experiences and meanings. The relation between vision and image cannot be taken as the guideline for investigation, since image processing by computers can no longer be re-enacted using the anthropological semantics of the human eye. The methodological starting point is rather an archaeology of multi-media based on Claude Shannon's mathematical theory of communication, as well as the practices and concepts of data-structure oriented programming, amidst the insisting ruins of the Gutenberg galaxy. The *artes memoriae* have been visual techniques of memorization from the rhetorics of Antiquity to the Renaissance. Museums—collections, images of picture galleries, catalogues—since have always dealt with programming material image banks. The struggle for visual knowledge in (literally) the age of enlightenment in the eighteenth century led to visual encyclopedias and their visualizations (like the *planches*, i.e., the visual supplement of the big French *Encyclopédie* edited by Diderot and d'Alambert). Photography then has been the switching medium from perception to technology, creating the first technical image archives, and movies themselves have been archives (Hollywood and the rules of image sequences).

When it comes to (re-)programming image-oriented structures in the digital databases of given image archives, priority has been given to the development of a visually-addressable image archive.

By combining Multiresolutional Image Representation with simple Octree structures, a variable archive module might be applied. This would allow us to test algorithms by creating different visual sequences and neighborhoods. Most operators of image processing and pattern recognition such as filters and invariant transformations can be integrated in the structure of a database in order to make accessible a cluster of images. The next step might be the development of an interactive and visual agent capable of "intelligent" retrieval of images by graphical sketches.

Archival terminology, however, still carries grammato-centristic notions of data storage, but image and sound memories should no longer be subjected to uni-media, text-based retrieval. Usually, a subject index refers to categories that themselves refer to a register that, just like a conventional book library, assigns film titles a catalogue number. The catalogue number in turn refers to an actual film at one particular spot within the corridors of the storeroom, or in virtual space: a *link* refers to an actual website. But the alphabet as guiding indexical order of image and sound inventories today is being replaced by the algorithm—a kind of writing which is not just written language.[77]

It was writing that enabled cultural memory by storing remembrance outside man; at the same time, though, it reduced tradition to one channel of communication. Is this still true for the seemingly polyphonic multi-media age, when audio and visual data can be transmitted without scriptural meta-data? In digital space, when not only every film, but every still in every film, or even more—every pixel in every film frame—can be discretely addressed, titles no longer subject images to words, but alphanumerical numbers refer to alphanumerical numbers. Thus, the archive transforms into a mathematically defined space; instead of being a passive container for memorizable data, the techno-archive (as dispositive) actively defines the memory of images. Digital space is no longer an anthropological prosthesis to man, but a genuinely medially generated form. Whereas kinematographic forms of narrative still conform to human ways of perception by translating themselves into technical operations as instrumental extensions of human senses (eyes and ears), electronics directs images according to its own rules, only remotely connected to human perception.[78] The montage of images is being replaced by invasive digital intervention into the image itself, replacing narrative with calculation. Thus a genuinely image-based image retrieval is possible—an archive beyond icono*logical* semantics, based on computing algorithms which perform similarity-based image sorting. On a new technical level this brings us back to the visual administration of knowledge in the age of similarity (the Renaissance, the Baroque) which in the meantime had been replaced by the age of classification (Enlightenment, Neo-Classicism) as described by Foucault in *Les Mots et les Choses*.

> Clearly, … there is a tension between a system in which bite-sized pieces of information could be manipulated and rearranged and that sense of the "order of things" (the structure of correspondence), which underpinned the world views given a new lease on life by the medium of print. Here again there is a strange resemblance to modern conditions … The early modern version of field theory and chaos theory is Montaigne´s observation that "toutes choses se tiennent par quelque similitude" (similitude binds everything together) and this is where poetry … enters the realm of the Renaissance Computers.[79]

The Renaissance and Baroque curiosity cabinets performed an aesthetics of pre-multi-media collecting, which leads Claire Preston to draw "an analogy between electronic search operations and the methods of the *curiosi* of early modern science and antiquarianism"[80]—with *analogy* itself being a figure of resemblance, as opposed to the Cartesian notion of difference which can be (mathematically) calculated. Collectors in the seventeenth century "imposed structure on the apparent disarray of the phenomenal world by searching for 'matches' … amongst the otherwise jumbled elements of their study." Systems of resemblance—visual patterns that may appear to us entirely fortuitous—were expressed by "horizontal or vertical contiguity" in the cabinets and

illustrations. These efforts were driven by the belief that creation was coherent, and that the task of the scholar was to uncover and display this lost coherence—a kind of theological archaeology of knowledge, based on the assumption that what looks contingent to men, is a hidden coherence, a kind of pattern recognition in God's eye:

> In a world which seemed to present itself as a wilderness of forms, a variety of analogous or synonymous systems could provide the equivalent of a visual search-engine, much as we search a modern electronic database by finding an exact alphabetic or ASCII match for a flagged semantic item.... Dominique du Cange, the sixteenth-century French philologist, suggested (incorrectly) that the words 'musaeum' and 'mosaic' were cognate.... What all the cabinets and their encyclopaedias share is a syntax of resemblance or identity which is nearly always signaturist in its insistence on occluded and idiosyncratically selected likeness; their patterns are to be read as comparative contingencies or juxtapositions, as a system of potential *matches*.[81]

Is the notion of the printed encyclopedia as an alphabetical order of things still useful or is it a hindrance to thinking the cultural image banks of the future? Similarity-based image-retrieval belongs much more to a "senseless formal principle, which is exactly because of its dullness as useful as the alphabet is in a lexicon."[82] The Italian art historian Giovanni Morelli praised such a senseless method of comparing images as scientific, since it was objective; that is why a current image retrieval program is named after him: "Its salient feature is that it matches, sorts and classifies pictures exclusively on their visual characteristics."[83] The characteristics that it uses are derived directly from the process of digitization, and here the system differs from the historical Morelli method: "The automated "Morelli" system is not concerned with establishing authorship. It is concerned with providing an objective means of describing and identifying pictorial characteristics, such as form, configuration, motif, tonality and (ultimately...) colour."[84] Since the comparison of images here is of a simple overlay kind, and points of similarity and difference are recorded during the process of comparison, the central criterion is a simple matching process—a visual equivalent of the well known word search that is a standard feature of every word-processing and database computer software. This process of similarity-based image retrieval is possible only because the digitized image is an image that is stored as a set of quantifiable elements.[85]

René Descartes once criticized the category of resemblance as the fundamental experience and primary form of knowledge, denouncing it as a confused mixture that must be analyzed in terms of identity, difference, measurement, and order. Likewise, the data transfer compression program MPEG-7 tries to establish standards of *content-based* audiovisual retrieval: "The goal of MPEG-7 is to provide novel solutions for audio-visual content description."[86] A multi-media content description interface, though, is no longer a print-based archive. Media-archaeology thus means rethinking the notion of the *archive* subversively, hyper-literally, even at the risk that it might be more useful to replace it media-culturally in favor of agencies of dynamical *transfer*.

The multi-media archive deals with truly *time-based media* (which are images and sound), with every image, every sound only existing for a discrete moment in time. Freezing an electronic image means freezing its refresh-circle. Already, the temporal order of film is an effect of a ranging of discrete, in themselves statical (photographical) series of images one after another, unlike their correlative digital images, which are not simultaneous spatial entities but in themselves already composed by lines, which are refreshed permanently, that is time-based. In both cases, human perception is cognitively betrayed; the better knowledge, though, is on the side of the apparatus. As with the Williams-tube in early computing, where images were used for data storage since the picture elements died with a certain temporal deferral, the effect of an electronic "image" for humans is based on the minimal after-image intermediary memory—turning the image into a slow memory function.

Archival Phantasms (the Internet)

The emergence of multi-media archives has confused the clear-cut distinction between the (stored) past and (the illusion of) presence and thus is more than just an extension or re-mapping of well-known archival practices. The archival phantasms in cyberspace are an ideological deflection of the sudden erasure of archives (both hard- and software) in the digital world. "The twentieth century, the first in history to be exhaustively documented by audio-visual archives, found itself under the spell of what a contemporary philosopher has called 'archive fever,' a fever that, given the World Wide Web's digital storage capacities, is not likely to cool any time soon."[87]

Does the *archive* become metaphorical in multi-media space? This is a plea for archiving the term *archive* itself for the description of multi-media storage processes. Digital archaeology, though, is not a case for future generations, but has to be performed in the present already. In the age of digitalizability, that is, the option of storing all kinds of information, a paradoxical phenomenon appears: Cyberspace has no memory.[88]

Cyberspace is not even a space, but rather a topo-logical configuration. That is why the metaphorical application of the Renaissance *ars memoriae* to Internet memory is a mis-application. There are no *lieux de memoire*, rather there are addresses. In the Internet, the address structure of communication and the address structure of archival holdings merge into one. From place to pure address: Traditionally, "only what has been stored can be located"—and *vice versa*.[89] Today, on the contrary, the Internet generates a "new culture of memory, in which memory is no longer located in specific sites or accessible according to traditional mnemonics, and is no longer a stock to which it is necessary to gain access, with all the hierarchical controls that this entails"[90] (called "archontic" by Derrida).

A necessary precondition for any data retrieval is addressability, the necessity of being provided with an external—or even internal—address. In Plato's dialogue *Meno* "it appears as if the matter of memory is but an effect of the application of techniques of recall"[91]—*is there no memory*? Is the World Wide Web simply a technique of retrieval from a global archive, or does it mark the beginnings of a literally *inventive* relationship to knowledge, a media-archaeology of knowledge that is dissolving the hierarchy traditionally associated with the archive?

As a machinic net of finite automata, the Internet has no organized memory and no central agency, being defined rather by the circulation of discrete states. If there is memory, it operates as a radical constructivism: always just situationally built, with no enduring storage. This invokes the early notion of *museum* as a cognitive and empty, rather than architectural or institutional space: "*Museaeum* was an epistemological structure."[92] Similarly in neurophysiology, memory operates like the imaginary in the formation of mental images: since there is no fixed place for images in the mind (at least not locatable), mental images are generated like images on an electric screen which have to be constantly refreshed. Oswald Wiener asks whether it makes sense at all to speak of mental *images*, if they have to be physiologically scanned in a time-based process, i.e., as a set of discrete (light-) moments in time[93]—in Lessing's sense a shift from visual to temporal indexicality (and *vice versa*, according to Benjamin). Can the Internet itself be separated from the notion of an<->archive at all? If an archive is a hallucination of a comprehensive lot, is then the Internet an archive? The Internet is no archive indeed, but a collection.[94] The function of archives exceeds by far mere storage and conservation of data. Instead of just collecting passively, archives actively define what is at all archivable. In so far as they determine as well what is allowed to be forgotten, since "the archival operation first of all consists of separating the documents. The question is to know what to keep and what to abandon."[95] Such is the difference between a paper-based (state-)archive in the strict, memory-institutional sense, and the Internet: The archive is a given, well-defined lot; the Internet, on the contrary, is not just a collection of unforeseen texts, but of sound and images as well, an anarchive of sensory data for which no genuine archival culture has been developed so far in the occident. I am talking about a truly multi-media archive, which stores images on an

image-based method and sound in its own medium (no longer subject to verbal, i.e., semantical indexing).[96] And finally, for the first time in media history, one can archive a technological dispositive in its own medium.[97]

Dis/order

What separates the Internet from the classical archive is that its mnemonic logic is more dynamic than cultural memory in the printed archive. Although the Internet still orders knowledge apparently without providing it with irreversible hierarchies (on the visible surface), the authoritative archive of protocols is more rigid than any traditional archive has ever been. Traffic overload in the computer networks led the Clinton administration to build a new, separate system—the Internet II, restricted to scientific (and military) communications. Thus the remaining Internet somewhat adopts the so-called *chaotic storage* method in economy: "The World Wide Web and the rest of the Internet constitute a gigantic storehouse of raw information and analysis, the database of all databases....The more serious, longer-range obstacle is that much of the information on the Internet is quirky, transient and chaotically 'shelved'"[98]—leading to archival phantasms of disorder. At the same time, memory in cyberspace is subject to an economy of memory not generous to gaps and absences.

Data transfer is incapable of transmitting non-information, while "in face-to-face interaction, much of what is most valuable is the absence of information, the silence and pauses between words and phrases."[99] Cyberspace is based on the assumption that unused space is economic waste—a result of the scarcity of storage capacity in early computing. Is the Internet really a medium through which self-organization produces the first comprehensive cultural memory?

This anarcho-archive is rather a fluid intermediary Random Access Memory. Who then archives the Internet? "Abandonware Community Triumph" is the name of such an initiative, which archives software and keeps it accessible. However, this quickly leads to a conflict with copyright, as exemplified by the current discussion over access to the most important of all archives: the files of the Human Genome Project. With the print-fixation of the traditional archival terminology, we run the risk of overlooking the fact that a different kind of archive is being built in non-public, proprietary ways by entrepreneurs like Bill Gates with his *Corbis* image bank, which holds the *digital* copyright of a lot of European historical imagery. This image bank, opposed to copyright law and the "legalistic infrastructure"[100] so well developed for textual authorship (the institution of the *dépôt légal* (national libraries), is based on different digital copyrights.[101] Probably two kinds of memories will remain—a radical rupture: Like in Ray Bradbury's *Fahrenheit 451* a new memory burns an old one.[102] This nostalgia is of course a phantasm surviving from the age of print. The alternative is a media culture dealing with the virtual an-archive of multi-media in a way beyond the conservative desire of reducing it to classificatory order again. Data trash is, positively, the future ground for media-anarchaeological excavations.[103]

Notes

1. Michel Foucault, *L'Archéologie du Savoir* (Paris: Gallimard, 1969).
2. Hayden White, *Metahistory* (Baltimore: Johns Hopkins UP, 1973).
3. Sven Spieker, proposal for a research project: *"Archive fever": Storage, Memory, Media* (draft 2000), n.p.
4. Ibid.
5. News reported by Detlef Borcher in his column "Online." In Die Zeit, no. 43, 19th October 2000, 46; on related subjects, see Bruce Sterling's "*Dead Media Project* in the WWW.
6. In a media-genealogical sense, there are no proper media, but rather a constant coming-into-being of media; see Joseph Vogl, *Medien-Werden: Galileis Fernrohr*. In *Archiv für Mediengeschichte* Vol. 1 (Weimar: Universitätsverlag, 2001), pp. 115–123, esp. p. 120.
7. On a proposed "museum" of software programs, see Wolfgang Hagen, "Der Stil der Sourcen. Anmerkungen zur Theorie und Geschichte der Programmiersprachen," In *HyperKult: Geschichte, Theorie und Kontext digitaler Medien*, edited by M. Martin Warnke et al. (Basel / Frankfurt a. M.: Stroemfeld, 1997), 33–68.

8. See Friedrich Kittler, *Eine Kulturgeschichte der Kulturwissenschaft* (München: Fink, 2000), 12th lecture, 228–249; further Richard Dienst, *Still Life in Real Time. Theory after Television* (Durham / London: Duke UP, 1994).

9. http://www.zock.com; last modified: 30th October 2000.

10. On media hardware in Germany, see: Deutsches Technikmuseum Berlin (http://www.dtmb.de/Rundgang/indexJS.html); and Heinz-Nixdorf-Museum (http://www.hnf.de/museum/comp4all.html); in a more global context: Apple History (http://www.apple-history.com), and the rubric "Classic Computing" (http://listings.ebay.de/aw/listings/list/category8086/index.html).

11. Konrad Lischka, "Verlassene Kunst. Softwarepiraten retten das digitale Erbe," *Die Zeit* No. 4, 18 January 2001, 34, referring to the (up to now) only exhibition of computer games archaeology in the Maryland Science Museum, organized by the group Electronic Conservancy (http://www.videotopia.com).

12. Some links to that kind of software (thanks to Tilman Baumgärtel, Berlin): The Abandonware Community Triumph (http://tact.tuol.org); the Altair: http://www.nostalgia.itgo.com/Computer/Altair/Altair8800en.html; the Altair Emulator: http://www.threedee.com/jcm/emu8080/index.html.

13. Neil Rhodes/Jonathan Sawday, "Introduction: Paperworlds. Imagining the Renaissance Computer." In *The Renaissance Computer: Knowledge Technology in the First Age of Print*, edited by Rhodes / Sawday (London / New York: Routledge, 2000): 1–17 (10 and 12).

14. Neil Rhodes/Jonathan Sawday, "Introduction: Paperworlds. Imagining the Renaissance Computer," 13.

15. Sebastian Domsch, "Diskretion ist Maschinensache," *Frankfurter Allgemeine Zeitung* Nr. 259 v. 7. (November 2000): 52.

16. See Rolf Sachsse, "Das Gehirn der Welt: 1912. Die Organisation der Organisatoren durch die Brücke. Ein vergessenes Kapitel Mediengeschichte," *Mitteilungen der Wilhelm-Ostwald-Gesellschaft zu Großbothen e.V.*, 5. Jg., issue 1 (2000): 38–57; the text can—in the best tradition of Ostwald's "global brain" project—be addressed in the Internet—as subject and object of this theme, under: http://www.heise.de/tp/deutsch/inhalt/co/2481/1.html. He calls it multi-mediatc, since it encompasses visual cultural artefacts of communication as well.

17. Jonathan Sawday, "Towards the Renaissance computer." In *The Renaissance computer*: 35.

18. Michel Foucault, "Message ou bruit?" In: *Concours médical*, 88ᵉ année (22 octobre 1966): 6285f (Colloque sur la nature de la pensée médicale); reprinted in: M. F., *Dits et Écrits I* (Paris: Gallimard, 1994): 557–560 (559).

19. Spieker, proposal, n. p.

20. Volker Kahl, "Interrelation und Disparität. Probleme eines Archivs der Künste." In *Archivistica docet: Beiträge zur Archivwissenschaft und ihres interdisziplinären Umfelds*, edited by Friedrich Beck (Potsdam: Verl. f. Berlin-Brandenburg, 1999): 245–258 (252).

21. See Friedrich Kittler, "Von der Letter zum Bit." In Horst Wenzel (ed.), *Gutenberg und die Neue Welt* (Munich: Fink, 1994), pp. 105–117.

22. The computing part of the computer, however, is not storage, but dynamic calculation.

23. See the research project "Hypertext. Theorie und Geschichte," University of Kassel (http://www.uni-kassel.de/fb3/psych/pers/meyer/wz2/httg.htm).

24. Theodor H. Nelson, "As We Will Think." In *From Memex to Hypertext: Vannevar Bush and the Mind´s Machine*, edited by James M. Nyce and Paul Kahn (San Diego/London: Academic Press, 1991), 259 (245 and 253).

25. Though somewhat reducing this claim back to history is the very sequential unfolding of arguments following the format of the book.

26. Cornelia Vismann, *Akten. Medientechnik und Recht* (Frankfurt/M.: Fischer Verlag, 2000) (book jacket text).

27. Our candidate for replacing the desktop is called 'Lifestreams.'" David Gelernter, *Machine Beauty. Elegance and the Heart of Technology* (New York: Basic Books, 1997), 106.

28. Bertolt Brecht, *Der Rundfunk als Kommunikationsapparat. Rede über die Funktion des Radios* (1932). In *Ausgewählte Werke* vol. 6, (Frankfurt/Main: Suhrkamp, 1997), 146–151.

29. Rhodes/Sawday, *The Renaissance Computer*, 12, referring to: Vincent Gillespie, "Medieval Hypertext: Image and Text from York Minste." In *Of the Making of Books: Medieval Manuscripts, Their Scribes and Readers. Essays Presented to M. B. Parkes, Aldershot*, edited by P. R. Robinson and Rivkah Zim (Aldershot, England: Scolar Press, 1997): 208f.

30. We are familiar with this from the technical options of the re-writable magneto-optical disc.

31. "Informationen, die nicht im externen oder internen Speicher einer Datenverarbeitungsanlage abgelegt sind, können überhaupt nicht als Daten verwendet werden. Der Grad der Öffentlichkeit ergibt sich dann aus den Zugriffsmöglichkeiten auf den Speicher." Michael Giesecke, "Als die alten Medien neu waren. Medienrevolutionen in der Geschichte." In Rüdiger Weingarten (ed.), *Information ohne Kommunikation? Die Loslösung der Sprache vom Sprecher* (Frankfurt/Main: Fischer, 1990), 75–98, here: 86.

32. Mark U. Edwards, Jr., *Printing, Propaganda, and Martin Luther* (Berkeley/Los Angeles/London: University of California Press, 1994), 163; see also Neil Rhodes/Jonathan Sawday, *The Renaissance computer*, 12.

33. Rhodes/Sawday, "Introduction: Paperworlds. Imagining the Renaissance Computer," 11.

34. Rhodes/Sawday, "Introduction: Paperworlds. Imagining the Renaissance Computer," 11.

35. See Derrick de Kerckhove, "Die atomare Kommunikation." *Schriftgeburten. Vom Alphabet zum Computer* (München: Fink, 1995), 143–158.

36. See Rhodes/Sawday, *The Renaissance computer*: 7.

37. Heinz Schlaffer, Introduction to: Jack Goody/Ian Watt/Kathleen Gough, *Entstehung und Folgen der Schriftkultur*, transl. Friedhelm Herborth (Frankfurt/M.: Suhrkamp, 1991): 7–23 (7).

38. Samuel Weber, e-mail to the author, 14 October 1998.

39. Leah S. Marcus, "The Silence of the Archive and the Noise of Cyberspace." In Sawday/Rhodes, *The Renaissance computer*, 18.

40. Marcus, "The Silence of the Archive and the Noise of Cyberspace," 24.

41. Marcus, "The Silence of the Archive and the Noise of Cyberspace," 25.

42. For example Erich Moritz von Hornbostel's music-ethnological Berlin *Phonogramm-Archiv* after 1900; see Sebastian Klotz (ed.), *"Vom tönenden Wirbel menschlichen Tuns": Erich M. von Hornbostel als Gestaltpsychologe, Archivar und Musikwissenschaftler* (Berlin / Milow: Schibri, 1998).

43. Jules Michelet, "Histoire de France, preface of 1869." In *Oeuvres Complètes IV*, edited by Paul Viallaneix (Paris: Flammarion, 1974), 24.

44. Leah S. Marcus, "The Silence of the Archive and the Noise of Cyberspace," 27–28.

45. Exhibition at Kunstbank Berlin, May 2000.

46. Jonathan Crary, *Techniques of the Oberserver* (Cambridge, MA: MIT Press, 1990).

47. Sigmund Freud, *Die Traumdeutung (*Leipzig/Wien: F. Deuticke, 1900).

48. See W. E., "Hornbostels Klangarchiv: Gedächtnis als Funktion von Dokumentationstechnik." In Klotz (ed.), *Vom tönenden Wirbel*, 116–131; furthermore the catalogue no. VI (*Wissen*) of the exhibition *7 Hügel. Bilderund Zeichen des 21. Jahrhunderts* in the Berlin Martin-Gropius-Bau, Berlin 2000 (esp. the hypermedia installation "MusikWeltKarte"). See as well the preceedings of the Annual Conference of the International Association of Sound and Audiovisual Archives—IASA—, Vienna, 18–23 September, 1999: *A Century of Sound Archiving.*

49. See Sabine Lenk, "Die *Autochrone-* und Filmsammlung des Albert Kahn." In *Früher Film in Deutschland [= KINtop 1. Jahrbuch zur Erforschung des frühen Films]* (Basel / Frankfurt/M.: Stroemfeld / Roter Stern, 1992), 120–122. Carl Stumpf actually deplored the absence of optical memory in the Berlin Phonogram Archive; see Otto Abraham/Erich Moritz von Hornbostel, "Über die Bedeutung des Phonographen für vergleichende Musikwissenschaft" *Zeitschrift für Ethnologie* 36 (1904): 222–236.

50. Susanne Ziegler, "Das ehemalige Berliner Phonogrammarchiv." In Annegrit Laubenthal (ed.), *Studien zur Musikgeschichte. Eine Festschrift für Ludwig Finscher* (Kassel et al.: Bärenreiter, 1995), 766–772, here: 771.

51. On phonographic metaphors of writing in medieval times *avant la lettre* see Horst Wenzel, "Die 'fließende' Rede und der 'gefrorene' Text. Metaphern der Medialität." In *Poststrukturalismus. Herausforderung an die Literaturwissenschaft*, edited by Gerhard Neumann (Stuttgart/Weimar: Metzler, 1997).

52. See Artur Simon (ed.), *Das Berliner Phonogramm-Archiv 1900–2000. Sammlungen der traditionellen Musik der Welt*, (Berlin: VWB, 2000): 209–215.

53. Quoted in Max Wertheimer, "Musik der Wedda," *Sammelbände der Internationalen Musikgesellschaft* Vol XI, No 2 (January-March 1910), 300–309 (300).

54. http://www.gfai.de/projekte/spubito/index.htm.

55. See the spectrogram of a reconstructed recording of Wedda chants in Ceylon 1907 on the SpuBiTo web page.

56. Spieker, proposal, n. p.

57. For the German case, see Heinz Hoffmann, *Behördliche Schriftgutverwaltung. Ein Handbuch für das Ordnen, Registrieren, Aussondern und Archivieren von Akten der Behörden*, 2. Aufl. (München: Oldenbourg, 2000).

58. See the article by C. Thomalla, "Ein medizinisches Filmarchiv [A medical film archive]," *Berliner Klinische Wochenschrift* No. 44 (1918)

59. Christoph Keller, "Lost/Unfound: Archives As Objects As Monuments." In catalogue *ars viva 00/01 - Kunst und Wissenschaft* for the exhibition by prizewinning artists of Kulturkreis der deutschen Wirtschaft im Bundesverband der Deutschen Industrie e. V (Berlin: M8 Labor für Gestaltung, 2000), n. p.

60. Stefan Heidenreich, "Die Wirklichkeit mag keine Bilder, über die Ausstellung der *Encyclopedia Cinematographica* des Medienkünstlers Christoph Keller in der Kunstbank Berlin, Mai/Juni 1999," *Frankfurter Allgemeine Zeitung* Nr. 126 (Berliner Ausgabe Berlin edition) 31 May 2000, BS8.

61. http://www.medfilm.de.

62. http://www.khm.de/~chrk/medfilm/03.unters.html.

63. Michel Foucault did not only write about the *Birth of the Clinic* as an "archaeology of the medical gaze," but himself defers, by making it a subject of research, his dis/continuity with the three-generation-long tradition of the Foucault family as surgeons.

64. Thanks to Thomas Elsaesser for this precise look at the Quick-Time movie. See as well Christoph Keller, "Lost / Unfound," on the 1900 movie.

65. Presstext – Christoph Keller: "encyclopaedia cinematografica" kunstbank Berlin Mai 2000.

66. Comparatively, see the records on the film-based so-called Institute for Cultural Research (Institut für Kulturforschung/Kulturfilm-Institut), dating from 2nd June 1933 until 4th July 1935, in the Archive for the History of the Max-Planck-Institute, Berlin-Dahlem, I. Abteilung: Kaiser-Wilhelm-Gesellschaft, Repositur 1A: Generalverwaltung der KWG, no. 1041.

67. Thanks to Lisa Parks (University of California, Santa Barbara) for reminding me of this corresponding scene.

68. Friedrich Kittler, "Computeranalphabetismus." In *Literatur im Informations-Zeitalter* (Frankfurt/M/New York: Campus, 1996), 237–251 (239).

69. "Je näher man ein Wort ansieht, desto ferner sieht es zurück": Karl Kraus, *Pro domo et mundo* (Munich: Langen, 1912), 164.

70. Such is the installation *BLOW_UP T.V.* of Angela Bulloch in the gallery Schipper & Krome, Berlin, September to November 2000.

71. Andreas Menn, textual supplement (Cologne, July 2000) to his digital video *Workout* (1999).

72. Ibid.

73. Claudia Reiche, "Pixel. Erfahrungen mit den Bildelementen." *Frauen in der Literaturwissenschaft* Rundbrief 48 (August 1996), 59–64 (59).

74. For co-authoring of this chapter, thanks to Stefan Heidenreich and Peter Geimer (both Berlin).

75. On technical images and the notion of the techno-imaginary, see: Vilem Flusser, *Kommunikologie*, edited by Stefan Bollmann/Edith Flusser (Frankfurt/M.: Fischer, 1998).

76. See Hans Ulrich Reck, "Metamorphosen der Archive/Probleme digitaler Erinnerung." In *Metamorphosen. Gedächtnismedien im Computerzeitalter*, edited by Götz-Lothar Darsow (Stuttgart-Bad Cannstatt: frommann-holzboog, 2000), 195–237 (223).

77. Hartmut Winkler, abstract for his lecture "Theorie und Geschichte der Schrift" at the University of Paderborn, winter term 2000/2001.

78. Knut Hickethier, *Film- und Fernsehanalyse* (Stuttgart: Metzler, 1993), 158.

79. Rhodes / Sawday, *The Renaissance computer*: 13, referring to: Michel de Montaigne, *Oeuvres complètes*, edited by Albert Thibudet and Maurice Rat (Paris: Gallimard, 1962), 1047, and to N. Katherine Hayles, *The Cosmic Web: Scientific Field Models and Literary Strategies in the Twentieth Century* (Ithaca, NY: Cornell UP, 1984).

80. Claire Preston, "In the Wilderness of Forms: Ideas and Things in Thomas Browne's Cabinets of Curiosity." In Rhodes/Sawday, *The Renaissance computer*: 170–183 <abstract, 170>.

81. Claire Preston, "In the Wilderness of Forms: Ideas and Things in Thomas Browne's Cabinets of Curiosity," 174f.

82. *"Image retrieval* und visuelles Wissen," Lecture by Stefan Heidenreich at EVA conference in Berlin, 13 November 1997.

83. William Vaughan (Birkbeck College, University of London), "Automated Picture Referencing: A Further Look at 'Morelli,'" *Computers and the History of Art* Vol. 2 (1992): 7–18 (7).

84. Vaughan, "Automated Picture Referencing: A Further Look at 'Morelli'": 8.

85. Vaughan, "Automated Picture Referencing: A Further Look at 'Morelli'": 9.

86. http://www.ircam.fr/produits/techno/multi-media/Cuidad/mpeg7_info.html.

87. Draft Sven Spieker (n. p.), referrring to: Jacques Derrida, *Mal d´archive. Une impression freudienne* (Paris: Galilée, 1995).

88. Christoph Drösser, "Ein verhängnisvolles Erbe," *Die Zeit* (23 June 1995): 66.

89. Harriet Bradley, "The seductions of the archive: voices lost and found," *History of the Human Sciences* Vol. 12 No. 2 (1999): 107–122 (113).

90. Howard Caygill, "Meno and the Internet: between memory and the archive" *History of the Human Sciences* Vol. 12 No. 2 (1999): 1–11 (10).

91. Caygill, "Meno and the Internet: between memory and the archive": 2.

92. Paula Findlen, "The Museum: its classical etymology and renaissance geneaology" *Journal of the History of Collections* 1, no. 1 (1989): 59–78, *abstract.*

93. See the Documentary film by Matthias Brunner and Philipp Pape (Berlin), *Am Anfang war die Machine* [At the beginning, there was the machine], Germany 1999, in program of International Video Festival X, Bochum, May 2000.

94. See, though, the *Open Archive* Movement and http://www.archive.org.

95. Arlette Farge, *Le goût de l´archive* (Paris: Seuil, 1989), 87.

96. See, for example, Adaweb (http://adaweb.walkerart.org).

97. For these somewhat auto-poetic links in the Internet thanks to Tilman Baumgärtel once more: http://www.0100101110101101.ORG; http://www.dejavu.org, announcing: "Experience the history of the web! Go to the emulator to re-live an era in the history of the web! Or go to the timeline to read about the old times!" See as well: http://www.w3history.org.

98. Editorial: "The Internet. Bringing order from chaos," *Scientific American* vol. 276 no. 3 (March 1997), 494 (49).

99. Steven G. Jones, "Understanding Community in the Information Age." *Cybersociety. Computer-mediated Communication and Community,* edited by Steven G. Jones (Thousand Oaks 7 London/New Delhi: 1995), 10–35 (28).

100. Rhodes / Sawday 2000, "Introduction: Paperworlds. Imagining the Renaissance Computer," 12.

101. See Thomas Hoeren, "Urheberrecht in der Informationsgesellschaft" *GRUR* issue 12/1997. On the technical regulations of cyberspace beyond legalism see Lawrence Lessig, *Code and other laws of cyberspace* (New York: Basic Books, 1999).

102. Sebastian Handke, "Die neue Flüchtigkeit. Wer archiviert das Internet? Archivwissenschaftler und Medienarchäologen diskutierten in der Mikrolounge des WMF über die Zukunft der Erinnerung," *taz* <Berlin> no. 6264 (7 October 2000), 26.

103. Links to recycling: the Redundant Technology Initiative (http://www.lowtech.org) and Mark Napier's www.potatoland.org. On the term "anarchaeology," see Siegfried Zielinski, *Archäologie der Medien* (Reinbek: Rowohlt, 2002).