

MEDIA ARCHAEOLOGY AS SPECIFIC METHOD

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Introducing Media archaeology

Media Archaeology is meant to indicate alternative models of thinking the being of media in (emphatic) time, thus: an alternative to linear historiography of technology. No narratives of media origins in the historic sense, but rather the indication of another level of media tempor(e)alities: governing principles, archaic essentials - such as the *enduring* infrastructure of radio or the recursive return of the "alphabet" in the digital age which with its alphanumerical data processing all of the sudden recalls a genealogy of mathematics which had not been central to media studies in times of analog radio and television.

"Media archaeology" encompasses a variety of approaches to media. Media archaeology is

- a method of media analysis
- addressing the structural level of media practice (which Foucault named as the governing laws of media, such as Internet protocols or the von-Neumann-architecture of digital computers)
- an aesthetics: the "cold gaze" of distanced understanding but "close reading" of technological circuits
- an "archivology", that is: deeply obliged to archival evidence and historical as well as technological precision (circuit diagrams as source of evidence, f. e.)
- a nostalgia for the analogue (certainly, but this should be kept private)
- an art form (Paul de Marinis, Carsten Nicolai) which reveals the technical basics of media as opposed to the intangible hiddenness of micro-chip based media today ("reduced to the max")
- a form of generating knowledge with the media themselves as active agents / archaeologists (like digital signal processing which restored early "phonographic" records back to sound, speech and music again (*Lautarchiv* Berlin))
- a gesture of "open source" (de-constructing hardware): not in the sense of public usage of source codes in programming, but in the sense of dis-mantling media from their designed enframing, un-clothing)
- an approach close to the materiality of media, here akin to Classical Archaeology which deals with the material remains of a culture (as opposed to philological hermeneutics)
- and finally the mathematical (square) "roots" (*arché*) in techno-*logos*

But caution, let us not be seduced by the archaeological metaphor. Media archaeology is not about beginnings, about origins in the temporal sense, but rather about the *arché*, the laws governing media in action. These principles are rather structural than temporal; it only happens at its emergence a medium reveals its structures before it becomes dissimulated by interfaces - like early radio sets.

"The cold gaze" is a description of the media-archaeological aesthetics indeed, somewhat close to Ernst Jünger's photographic media aesthetics. Admittedly, German pre-war engineering culture still lurks through (just like in Ernst Jünger's aesthetics of the photographic "cold gaze"), and the Heideggerian ways of fundamental re-thinking of terms like technology. Today, I would add to the "the cold gaze" the unpassionate ears (listening to the "sonic", that is: sound emerging from technomathematical media).

Media studies ask for a special mixture of technological competence and epistemological reflection. One should indeed expect for a researcher and critic of media to know exactly what is the electro-magnetic induction or TCP/IP & 'Routing'.¹ But of course academics do *not* read German media theories to learn technological knowledge: "Was jene metaphysischen <?!> Schriften sattdessen so anregend macht, ist die Selbstverständlichkeit, mit der darin Medientheorie in Philosophie, Literatur und die Geisteswissenschaften im Allgemeinen eingebettet sind" <ibid.>.

There is indeed a certain technologicistic, that is: machine- and code-centered school of media studies.² The field of (new) media theory seems split between two very different approaches: "Media archaeologists, like Kittler, Wolfgang Ernst or Alexander Galloway describe the non-discursive practices of the techno-cultural archive. Media phenomenologists like Katherine Hayles, Tara McPherson or Mark B. N. Hansen analyze how phenomena in various media appear to the human cognitive apparatus, that is, to the mind and senses."³ What is clear by this arbitrary name list already, is that the theoretical front is not one between continental European media archaeologists and media archivists on the one side and Anglo-speaking cultural critics of media practices on the other. The archaeological / archivological approach is rooted as much in Foucault's definitions⁴ as it is connected with Marshall McLuhan's non-contentist media analysis. Whereas Hansen in his discussion of what is an "image" in the age of new (that is, electronic and digital) media, in an explicit Bergsonian tradition insists on the coming-into-being of the mediated image in

¹ Geert Lovink, "Der Verbleib der deutschen Medientheorie", in: same author, *Zero comments. Elemente einer kritischen Internetkultur*, Bielefeld (transcript) 2008, 129-145 (xxx)

² As expressed in Wendy Hui Kyong Chun, Introduction. *Did Someone Say New Media?*, in: *New Media, Old Media. A History and Theory Reader*, eds. Wendy Hui Kyong Chun / Thomas Keenan, New York / London (Routledge) 2006, 1-10 (4)

³ Kjetil Jakobsen, in chapter 6 of his text "Anarchival Society", discusses "Archaeology versus phenomenology", in: Eivind Røssaak (ed.), *The Archive in Motion. New Conceptions of the Archive in Contemporary Thought and New Media Practices*, Oslo (Novus) 2010, 127-154 (141)

⁴ The archive "governs the appearance of statements as unique events", whereas archaeology "questions the already-said at the level of its existence <...> and the general archive system to which it belongs": Michel Foucault, *The Archaeology of Knowledge*, New York (Tavistock) 1972, 129 and 131

the "enframing" acts of the human bodily cognition only⁵, "posthuman cultural studies"⁶ as radical media archaeology takes the point of view of the machine itself, with "radical" to be interpreted in two ways: going to the roots (which is the archive), to the beginnings (less in the sense of historic causality but temporal originality: the opening and generation of the time-critical *momentum*⁷ and of temporal horizons), and in the techno-mathematical sense (square root) as the basic conditions of media hardware and algorithms (software).

This signal-based approach is different from the rather semiotic than approaches of Cultural Studies. There has been a translation barrier for relevant texts so far, different from the world of techno-mathematical engineering which would cross-culturally wire artefacts into standard operation. What looked like an antithetical configuration between German hardware-orientated and Anglo-American socially and culturally orientated media studies for a long time, nowadays seems "sublated" by a Hegelian trick ("List") of media-theoretical reason. So-called software studies⁸ and a refreshed materialist (forensic) approach⁹ links both cross-Atlantic schools.

Micro-technological research on signal transfer should not strictly be opposed to the media-phenomenological approach; the ways media affect human perception (in best McLuhanite tradition of analysis) is as close to neuroscience as it is to media archaeology.

Inbetween-positions exists as well, as expressed in Erkki Huhtamo's book *Illusions in Motion. A Media Archaeology of the Moving Panorama and Related Spectacles* - a kind of archaeology of *pre-cinéma*.

With no overall consensus about its definition, methods, tools, or even its field¹⁰, there are different ways of doing media archaeology, much of them "re-mediating" new media (theories) with previous ones recursively.¹¹ At the same time a Foucault-driven media archaeology accentuates the discontinuities.

Media archaeology is aware of discontinuities in media cultures (as opposed to the reconciling narratives of cultural history).

⁵ Mark B. N. Hansen, *New Philosophy of New Media*, Cambridge, Mass. (MIT Press) 2004, 13. See Henri Bergson, *Matter and Memory*, New York (Zone Books) 1988, 35f

⁶ Geoffrey Winthrop-Young, *Cultural Studies and German Media Theory*, in: Gary Hall / Clare Birchall (eds), *New Cultural Studies*, Edinburgh (Edinburgh University Press) 2006, 88-104 (100)

⁷ See Axel Volmar (ed.), *Zeitkritische Medien*, Berlin (Kulturverlag Kadmos) 2009

⁸ See Matthew Fuller (ed.), *Software Studies. A Lexicon*, Cambridge, Mass. / London (MIT Press) 2008; Jussi Parikka, *Digital Contagions. A Media Archaeology of Computer Viruses*, New York et al. (Peter Lang) 2007

⁹ See M. Kirschenbaum, *Mechanisms. New Media and the Forensic Imagination*, Cambridge, MA (The MIT Press) 2008

¹⁰ See Erkki Huhtamo and Jussi Parikka, *An Archaeology of Media Archaeology*, in: *Media Archaeology: Approaches, Applications and Implications*, eds. Huhtamo and Parikka, Berkeley / Los Angeles (University of California Press), 2011

¹¹ See Jay David Bolter / Richard Grusin, *Remediation. Understanding New Media*, Cambridge, Mass. / London 1999; I. Gitelman, *Always Already New. Media, History, and the Data of Culture*, Cambridge, MA (The MIT Press) 2006

The German "school" that has emerged emphasizes material factors as prime movers of media history. From writing surfaces, and inscriptions on phonograph cylinders or celluloid film to machine architectures and computer code, "Kittlerian" media-archaeologists trace the widening gap between the technological evolution and traditional cultural engineering.

Let us take, as an example, the way media archaeology approaches a central artefact in occidental cultural engineering, the wheeled clock, which in fact turns out to be a formative mechanism to develop the chronotechnical sense of oscillations which later became basic for the temporal agency of technical media.

The editor of a forthcoming book on the interrelation between religion and technology sums up: "Wolfgang Ernst <...> digs into the mechanisms of time-keeping, but arrives at quite different conclusions from those of Peters. Whereas Peters is concerned with the traces of ancient religious purposes embedded in the history of time-keeping technologies - traces that continue to have an effect in the present - for Ernst what is paramount to consider is the *dis*-continuity between the history of religious time-keeping and the evolution of time-based media. <...> for Ernst, the challenge facing the study of religion and technology is not to bring them closer together, but to rethink the terms on which they must remain separate, an argument he pursues through his account of the history of the oscillating clock and its progressive detachment from its original locus in the monasteries of medieval Europe."¹²

Or let us take the case of optical media : "One may still wonder who its real protagonists have been - the machines <..> or the people who created them, exhibited them, consumed them, and fantasized about them? The answer is an oxymoron: the *clue* of the story is their increasingly complex and contentious relationship. <...> Friedrich Kittler tells a very different story <...>."¹³ Inventors do not figure as the primary agents, but their creations seem controlled by some external machinic logic rather than by human desires and needs. What Kittler (before his re/turn to ancient Greece) provocatively calls "so-called humans" rarely appear in his "media studies without people."¹⁴

Media archaeology argues against the presupposition of an primordial binding of media to the social and cultural spaces they occupy.

Huhtamo's "version of media archaeology is closer to Anglo-American cultural studies. It is based on the assumption that although one must understand hard technological facts, it may be even more important to grasp the discourses that envelop them and mold their meanings in unique cultural circumstances" <op. cit.>. But beyond the opposition between Cultural Studies and German Media Theory <Winthrop-Young 2006: 88>, a new generation on both sides interlaces

¹² Jeremy Stolow (ed.), *Deus in Machina. Essays on Religion and Technology in Historical and Cross-Cultural Perspective*, xxx

¹³ Friedrich Kittler, *Optical Media: Berlin Lectures 1999*, trans. Anthony Enns, Cambridge (Polity Press) 2010

¹⁴ John Durham Peters, "Introduction: Friedrich Kittler's Light Shows," in Kittler 2010: 5

(to use a term from electronic imaging) both approaches¹⁵, leading to a kind of relegation between cultural and media epistemology which acknowledges both the nonhuman agencies (Bruno Latour) and their discursive dependencies.¹⁶

[For a case study in the discourse-orientated approach to past media see Carolyn Marvin, *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century* (New York and Oxford: Oxford University Press, 1988)]

Where do technological continuities derive from? Just like Manovich's archaeology of the computer screen¹⁷, Mark B. N. Hansen underlines in *New Philosophy of New Media*: no technological imperative leads from digitization to the rectangular screen (as human-computer interface HCI). Below cultural semantics (the iconology of images), "the digital image is an aggregate of quasi-autonomous, independently addressable, numerical fragments. It is not a frame and new media are not constrained by the rectangular frame. Cinematic interface may thus be seen as a cultural lag, rather than a technological imperative."¹⁸

But the matrix is a mathematical figure like the rectangular magnetic core memory for storing an image in early digital computers.

Manovich interprets the possibilities of such interfaces as prefigured already by the cinematographic avant-gardes of the 1920s, in their experiments with jump cuts, animation and collage. According to Manovich, the avant-garde anticipated digital aesthetics.¹⁹ But let us have a close look at a magnetic core memory. It is *not* just aesthetic strategies which became embedded in the commands and interface metaphors of computer software. The modernist strategy of collage reemerged as a 'cut and paste' command, the most basic operation one can perform on digital data."²⁰ The so-called "post-cinematic image" is different from the cuts and jumps and interactivity in computer games.²¹

¹⁵ See the introduction of the editors in: Hall / Birchall (eds) 2006, 1-28, and Caroline Bassett, *Cultural Studies and New Media*, in: *ibid.*, 220-237

¹⁶ As an exemplary study from the German side see Cornelius Borck, *Hinrströme. Eine Kulturgeschichte der Elektroenzephalographie*, Göttingen (Wallstein) 2005; same author: *Electricity as a medium of psychic life. Electrotechnical adventures into psychodiagnosis in Weimar Germany*, in: *Science in Context* vol. 14 (2001), 565-590

¹⁷ Lev Manovich, *Towards an Archaeology of the Computer Screen*, in: *Cinema Futures: Cain, Abel or Cable?*, edited by Thomas Elsaesser / Kay Hoffmann, Amsterdam (Amsterdam University Press) 1998, 27-43

¹⁸ Kjetel Jakobsen, *Anarchival Society*, in: Eivind Rossaak (ed.), *The Archive in Motion*, Oslo (Novus) 2010, xxx

¹⁹ Lev Manovich, *The Language of New Media*, xxx 2001, 78 f.

²⁰ Lev Manovich, *WHAT IS DIGITAL CINEMA?* <http://www.manovich.net/TEXT/digital-cinema.html> (accessed January 2011); see *idem*, *Engineering Vision: from Constructivism to the Computer* (The University of Texas Press), forthcoming

²¹ See xxx, in: Benjamin Bigl / Sebastian Stoppe (Hg.), *Playing with Virtuality. Theories and Methods of Computer Game Studies*, Frankfurt/M. (Peter Lang 2013, xxx-xxx

The language of so-called new media²² (which obviously refers to digital media driven by the binary code) is not just what interfaces offer to the human user, it is as well machine language on the operative level of computer programming. Such a perspective, without saying, is less discourse-orientated than the "social media" approach.

How could we otherwise explain that television broadcasting as a mass medium emerged after Second World War both in Western and in Eastern Block countries on the same, almost identical technological basis (both derived from pre-war developments)? Why was there not something like a specific "socialist" (even "Marxist") technological variance? The articulation of ideological differences was rather reduced to the content of the television programs.

For many years there has been a translation barrier for relevant German or French (Simondon) techno-philosophical texts to reach the anglophonic world so far - different from the world of techno-mathematical engineering which cross-culturally wires artefacts into standard operations almost immediately.

Let us start to "translate" in all senses now. What looked like an antithetical configuration in German hardware-orientated and Anglo-American socially and culturally orientated media studies for a long time, nowadays seems "sublated" by a Hegelian trick ("List") of media-theoretical reason. So-called software studies²³ and a refreshed materialist (forensic) approach²⁴ links both cross-Atlantic schools.

Further definitions of media archaeology

Media archaeology is both a research method in media studies, and an aesthetics in media arts. It denominates the non-human procedures which happen in media themselves.

The term "non-human" is taken here in a double sense: First of all, it hypothetically means the point of view of the machines, being a kind of "inhuman hermeneutics". And second, as can be demonstrated by the use of the term "communication" in Claude Shannons "Mathematical Theory of Communication" from 1948²⁵, it relieves the notion of "information" from all semantic meaning. In that sense, a transmitter of radio waves "communicates" with the radio receiver, or computers communicate in-between in the Internet. Not the quality of information counts, but it is taken as a quantitative measure, both in the statistical sense and in information theory.

²² Lev Manovich, *The Language of New Media*, Cambridge, Mass. (The MIT Press) 2001

²³ See Matthew Fuller (Hg.), *Software Studies. A Lexicon*, Cambridge, Mass. / London (MIT Press) 2008; Jussi Parikka, *Digital Contagions. A Media Archaeology of Computer Viruses*, New York et al. (Peter Lang) 2007

²⁴ See M. Kirschenbaum, *Mechanisms. New Media and the Forensic Imagination*, Cambridge, MA (The MIT Press) 2008

²⁵ Claude E. Shannon, *The Mathematical Theory of Communication*, in: *Bell System Technical Journal* 27, Juli/Okttober 1948, 379-423 / 623-656

"The word *communication* will be used here in a very broad sense to include all the procedures by which one mind may affect another. This, of course, involves not only written and oral speech, but also music, the pictorial arts, the theatre, the ballet, and in fact all human behavior. In some connections it may be desirable to use a still broader definition of communication, namely, one which would include the procedures by means of which one mechanism (say automatic equipment to track an airplane and compute its probable future positions) affects another mechanism (say a guided missile chasing this airplane)."²⁶

Media archaeology is the complementary method to media phenomenology. It does not look at media on the level of their surface effect on humans (interfaces), but rather uncovers the hidden agenda of technomathematical artefacts, or better: artefactuality, focussing on temporal and time-critical configurations.²⁷ Whereby to most human users media are opaque technology - "present-at-hand" (*vorhanden*) in Heidegger's vocabulary -, media archaeology tries to make technology transparent for analysis, that is: "ready-to-hand" (*zuhanden*). The intellectual father of Humboldt University, Wilhelm von Humboldt already differentiated between the "external form" and the "inner form" of language, neologistically conforming with phenotype and genotype and the figure / ground dichotomy as re-discovered media-theoretically by Marshall McLuhan from *Gestalttheorie*.²⁸

Media archaeology at first sight is about technological architectures, but it is concerned with media not only on their structural but as well on their *operative* level, thus becoming "post-structural" or "diagrammatic", corresponding with the generative technological diagram between gesture and symbol.²⁹ This post-structural vector (a diagrammatic media theory) places it beyond semiotics and closer to the analysis of signal processing (a signal being the physical representation of a message respectively information *in time* - that is, with time as the variable of functions under analysis).

Technological media themselves have an infolded, implicit knowledge of the physical and mathematical world which differs from human perception. Media

²⁶ Warren Weaver, *Recent Contributions to the Mathematical Theory of Communication*, in: Claude Shannon / same author, *The Mathematical Theory of Communication*, Urbana (University of Illinois Press) 1964, 1

²⁷ "Nicht <...> eine ableitende Begründung, sondern <...> aufweisende Grund-Freilegung": Martin Heidegger, *Sein und Zeit*, 15. Aufl. Tbingen (Niemeyer) 1979, 8

²⁸ See Marshall McLuhan / Bruce Powers, *The Global Village*, xxx, referring to Edgar Rubin and Max Wertheimer. See Edgar Rubin, *Visuell wahrgenommene Figuren. Studien in psychologischer Analyse*, London (Gyldendalske Boghandel) 1922. For an application see Richard Zakia, *Perception, Evidence, Truth and Seeing*, in: *The Concise Focal Encyclopaedia of Photography*, Elsevier (Focal Press) 2008, 239-250 (242)

²⁹ Guerino Mazzola, *La V 驛 itdu Beau dans la Musique*, Paris (Delatour France) 2007, 153 (explicitely referring to Jean Cavaille 鑽, Gilles Deleuze, Gilles Ch 穰 elet and Charles Alunni)

archaeology as a double-faced method here takes the point of view of humans and hypothetically the point of view of media as well. To exemplify it: The length of numbers in binary notation which is at least double that of numbers in the decimal system "makes the binary system impractical for human calculators, but it does not upset computers in the least. From the computer's point of view, these sequences of 1 and 0 are convenient, for they are easily codified in electric signals; the passage of current expresses 1, its interruption 0"³⁰ - which perfectly corresponds with a binary switch in the real world of electronics which was available "at hand" in times of the mathematician and engineer Claude Shannon: the electromagnetic relay.

What started with the electro-mechanical relay resulted in electronic flip-flop circuits first on vacuum tube, then on a transistor basis. Different from e. g. *ternary* switching, it is "easier to work in the scale of two than any other, because it is easy to produce mechanisms which have two positions of stability; the two positions may then be regarded as representing 0 and 1"³¹.

Media are not just objects of media-archaeological analysis, but as well active "archaeologists" of a different kind of knowledge themselves (understood here in Bruno Latour's sense of "non-human agencies").

Let us write and read carefully: media *archéology*. In ancient Greek, *arché* splits into a temporal and a functional meaning: *origin* on the one hand, and *command* on the other.³² Misunderstandings should be avoided here. Instead of "media archaeology", should I not rather write "prehistory of media"? The term *prehistory* implies a certain teleology that is alien to technology.³³ The prefix "pre-", though, does not just refer to a "before" in its temporal, historically linear sense, but rather to a structural pre-condition as well. This pre-structuring "before" can happen in non-linear modes (as described in René Thom's theory of catastrophe) just as there are electro-dynamic processes which are ultra-sensitive to slightest changes which result in a complete re-organization of the whole system. Theories of history fail when they have to explain non-linear, contingent events in the past³⁴, such as the sudden break into the Berlin wall on 9th November 1989 when the answer "immediately" ("sofort") by Schabowski corresponded with the immediacy of live transmission in radio and TV.

Such a contingency can not be formulated in terms of historical discourse at all, but this does not lead to agnosticism. Instead, a modelling of mathematical probabilities is the dynamic answer to that question.

³⁰ Denis Guedj, *Numbers. The Universal Language*, xxx (Thames & Hudson) xxx, 59

³¹ Alan Turing, *Lecture to the Mathematical Society on 20 February 1947*; printed in Vol. 10 in the Charles Babbage Institute Reprint Series for the History of Computing, A. M. Turing's ACE Report of 1946 and Other Papers, The Massachusetts Institute of Technology, 1986, 106-124 (114)

³² See Jacques Derrida, *Archive Fever*, xxx, Introduction

³³ David A. Mindell, *Between Human and Machine. Feedback, Control, and Computing before Cybernetics*, Baltimore / London (Johns Hopkins University Press) 2004, 6

³⁴ Ludolf Herbst, *Komplexität und Chaos. Grundzüge einer Theorie der Geschichte*, München (C. H. Beck) 2004, 213

Whereas communication studies are mostly concerned with the mass media transmission of such events, media archaeology poses the question of the "origin" of operative media on a deeper level, which is the technomathematical one - in the sense of the mathematical square root ("Ö") which is the symbolic expression of the verbal notion of *arché*). The Deleuzean equivalent is the bio-systematic trope of *rhizome*.

Media archaeology refers to the past insofar as it addresses the condition of the possibility for current media operations, which means: being (still) at work. The temporal category "past" thus appears rather like a temporal function of a present process, as an unfolding of presence-in-action, in the mathematical sense of Fourier analysis and Markov chains.

Media archaeology is not a simplification, but an analytical reduction to technological essentials and *principles* (the Latin equivalent to *arché*); when Hermann Helmholtz published his seminal *Lehre von den Tonempfindungen* in 1863, the subtitle declares a kind of sonic archeology: the "physiologische Grundlage", that is almost literally: *arché* (foundation), for the theory of music. In this sense Milton S. Kiver's book *Television simplified* (New York 1946) does not teach the appropriate use and consuming of TV programs but the precise description of its inherent electrotechnology.

Media archaeology (in my understanding) aims at an *archaic* media experience. The archaic, besides its temporal meaning ("origins"), refers to a structural element, to the dominant (*arché*), essential features of a medium system. At the same time, aesthetically it means its reduction to the essential, the elementary bits, a "rarification" of discourse in Foucault's sense.

According to the media-archaeological *credo*, technological structures become especially evident in beginnings: "It is the beginnings of invented things, which appeal to me", writes Lance Sieveking (who wrote one of the first television dramas transmitted by the BBC), and explains: "For it is at their beginnings, that we may detect their true nature", that is: their epistemological essentials. Sieveking is quoted here as the *motto* of the Memoirs of John Logie Baird³⁵ which is a very archaeological insight into first steps of the electro-mechanical television apparatus itself. "In principle, the *televisor* is both simple and ingenious", comments the brochure accompanying the model kit *The Televisor*, developed as teaching device by the Middlesex University.³⁶

What kind of "archaeology"? Media materialism

Positioned between archeology as academic discipline of analyzing material culture and the Foucauldian notion of the "archive" as the set of rules governing the range of what can be articulated at all, media archeology is first of all a methodic way and aesthetics of practicing media studies and media criticism. Only besides, it is a hunting for "dead media" discoveries and reverse engineering (such as Semen Karsakof's 1832 design for an "intellectual

³⁵ Television and Me. The Memoirs of John Logie Baird, edited by Malcolm Baird, Edinburgh (mercatpress) 2004

³⁶ See www.mutr.co.uk

machine"³⁷). Finally, media archaeology describes moments when media themselves, not exclusively humans any more, become "archeologists" of epistemic objects, like practiced in so-called "content-based" image and sound retrieval in media-archival data banks. Somewhat beyond Marshall McLuhan, media are not just extensions of men any more but have become autonomous.

Let us capture the difference between media archaeology and classical archaeology. While sharing with the classical archaeologist the attention of the material artefact ("hardware"), the essence of media archaeology comprises the *operative*, processual mode of technological media as well.³⁸

Let us define media archeologically, while at the same time resisting the epistemological temptations of a metaphorical use of that term, trying to differentiate between technical media proper and cultural technologies (such as religious rituals and liturgies) in a broader sense.

Archaeology, in Michel Foucault's notorious definition, "designates the general theme of a description that questions the already-said at the level of its existence: the enunciative function that operates within it, the discursive formation, and the general archive system to which it belongs."³⁹

Archaeology in its traditional sense is "indicating the material or substance of which anything is made or consists" (Oxford English Dictionary). For Foucault, archaeology is aware rather of the enunciative level of what happens; an enunciation is what is *not* immediately visible, rather geno- than phenotextual.⁴⁰ It is not a relation between surface and deep ground, but rather a Moebius-loop-like dynamics of back and forth.

When we apply this Foucauldean term to the genealogy of media, thus performing a *media archaeology*, his somewhat vague notion of the "discursive formation" suddenly can be addressed in positive and precise technomathematical terms. Media archaeology performs a technological micro-epistemology, that is: discovering, analysing and describing the epistemological sparks which spring from the most concrete level of technology itself, such as the delicate circuitry of the electronic saw-tooth signal generator which creates the jumps of single cathode ray lines within a television set in order to achieve the impression of a coherent image for (lagged) human perception at all.⁴¹

What predominantly counts in information processing media is not its material support; therefore no more archaeology in the classical sense is required but rather cybernetic *archaeologicalistics*.

³⁷ See Wladimir Velminski / W. E., Semn Karsakov: Ideenmaschine. Von der Homöopathie zum Computer, Berlin (Kulturverlag Kadmos) 2007

³⁸ At this point, we should pay respect to the so-called "Processual Archaeology" as developed by the Cambridge school.

³⁹ Michel Foucault, The Archaeology of Knowledge, xxx

⁴⁰ See Walter Falk, Vom Strukturalismus zum Potentialismus. Ein Versuch zur Geschichts- und Literaturtheorie, Freiburg i. Br. / München (Alber) 1976, 310f

⁴¹ See A. J. Klopow, Grundlagen der Fernsehtechnik, bers. und ergänzt v. P. Neidhardt, mit e. Geleitwort von Manfred v. Ardenne, Berlin (VEB Verlag Technik) 1956, chapter 5 (50-99)

While multi-media aesthetics is a surface effect, digital signal processing is its media-archaeological generative law. Let us not forget the techno-mathematical essence of computing, its electric fluidity and switching circuits.

Such is the media *archive* in Foucault's sense (who uses this word in French in the singular mode, not to be confused with the classical state archive which in French is *plurale tantum*, notably *archives*). As opposed to structural laws, the media-archaeological *archive* is dynamic: all the difference between an algorithm as a symbolical mathematical notation and its implementation as a running program in real hardware.

What is the relation between the phenomenological surface of media and their concealed technological condition? Whatever appears on the computer screen is a direct expression of its algorithms and codes (though disguised under audiovisual metamorphosis). It is the emphasis on *semiosis* which differentiates Charles Sanders Peirce's semiotics from straightforward structural linguistic semiotics, that is: the processual relation between signifier, signified and the "interpretant". We can catch this on the tactile level of computer interfaces: Whenever we press an alphanumeric symbol on the keyboard as part of a string (a word, a sentence, a text, a formula, a graphic notation), the "sign" (the single letter) transforms into an electro-physical signal.⁴² A transformation (or even "transsubstantiation" in the theological sense) takes place. When this passage of symbol into signal takes place, it loses all its semantical referentiality and becomes a coded element within a (physically) real word - losing "meaning" while gaining "indexicality".

Media archaeology as "critique" does not proceed by analysis of media content (which is the task of media sociology and communication studies) but means critique of the kind of ideology which is inherent in hard- and software, in the best tradition of French *Apparatus* theory (Baudry et al.).

"Most approaches to "new media" emphasize one side of the screen or the other; [...] the screen divides new media studies into visual culture studies and media archaeology. Visual culture studies stem from the Anglo-speaking academy and generally treats the interface, or representations of the interface, as the media (or filmic/televisual/print representations of this interface). [...] media archaeology, although inspired by Marshall McLuhan and Michel Foucault, is mainly Germanic", Wendy Chun remarks, and further: Media archaeology "concentrates on the machine and often ignores the screen's content. Archaeological studies critique visual culture studies' conflation of interface with medium, representation with actuality; visual culture studies critique the archaeologists' technological determinism and blindness to content and the media industry"⁴³.

To apply this argument to audio media, especially to short wave AM radio, the apparent dichotomy turns out to be rather interlaced. When I listen to a broadcast from Radio Kuwait in the early evening, the noise and the phase shifting are an articulation of the ionospheric channel of transmission (i. e. the

⁴² As emphasized in: <http://www.agis.informatik.uni-bremen.de/ARCHIV/Publikationen/BegegnungenImZeichen.pdf>

⁴³ Wendy Chun, *Communication in the age of fiber optics*, xxx, Introduction

"medium" in Shannon's sense) itself; the medium here is part of the message which, though, only becomes perceptible when being part of a successful reception of content.

As a compromise between content-orientated mass media studies and hard core media archaeology, media theorists like Lev Manovich created "software culture" studies. Manovich finds it impossible now to separate between the cultural and the technical level in or rather "on" the computer; let us, here, interpolate the term "cultural engineering" which links both.

Allow me a remark on occasion of the current PRISM debate: Necessity for "Time-Critical Media Studies" in both senses of "time-critical": in the sense of political analysis and in the most precise "forensic" (Matthew Kirschenbaum) hard- and software sense = the media-archaeological level of analysis. Obviously, PRISM refers to the fiber glass cable which links Continental European to British and US-American data transfer. "Big data traffic", as expression, has replaced "mass media communication". Such a cable can "read" in terms of symbolical (binary) data processing.

"Software studies" (Matthew Fuller et al.) does not reduce analysis to discourse, but critically looks at the algorithms and their embeddedness in Hardware structures themselves.

Micro-research

In media-archaeological terms, this requires micro-research.

"Open hardware" can be read literally: revealing the hidden structures in hardware, thus undermining the *dissimulatio artis* which is the central trope of techno-rhetorics for media in order to be successful towards humans. In May 2009 the *Micro Research* lab in Berlin⁴⁴ offered a workshop on the "Epistemology of electromagnetic waves" (curated by Shintaro Miyazaki); other workshops comprised subjects like the RFID sniffer workshop which led to the practical construction of a simple analog electronic circuit which detects the presence of 13.56 MHz RFID tags which are commonly used in plastic cards in libraries or shops.⁴⁵

[Let us remember: media-archaeology is about the fundamental, the essential, the ascetic, the reductive.]

In this way, media archaeology is an active examination and questioning of technology - "digital forensics" (Kirschenbaum).

Circuit bending

⁴⁴ *Micro-research* is the name for an independent research centre in Berlin focussing on the analysis and construction of "open hardware" on the one hand and free software on the other.

⁴⁵ See: <http://shop.marcboon.com/snifferkit.pdf>

A related media-archaeological method in media arts is "circuit bedding", a creative short-circuiting of (low-current) electronic devices in (rhetorically expressed) "catachretic" ways, very often used in the acoustic field to create new kinds of sound by means of a "jumper" cable which connects two points in the circuit in a way not intended by the engineers.⁴⁶ Unearthing previously undiscovered sounds in electronic devices is a media archaeology of the implicit acoustic knowledge of an electronic medium. In a way, Lev Theremin did this when mis-using radio technology to create his *Theremin-vox* which is circuit-bending by interference of the body (hand gestures) into an electro-magnetically oscillating field.

Soft media archaeology

The term "media archaeology" is *en vogue* nowadays in media studies; we refer to the writings and projects of Siegfried Zielinski, Timothy Druckrey, Erkki Huhtamo and others. Especially Bruce Sterling's "Dead Media Handbook Project" (initiated 1995, conceived for the Internet) cares for the redemption of otherwise forgotten technologies. Zielinski 1996: "[...] media archaeology [...] in a pragmatic perspective means to dig out secret paths in history."⁴⁷ A lot of these authors take the term "media archaeology" at face value, almost metaphorically: referring to the "digging out" of forgotten machinic visions of the past, of antique or baroque media design which was never materialized, which has remained a singular effort and which are simply forgotten today.

With the *Telharmonium Press* in Hollywood, California, Garnet Hertz published a book in the spirit of Sterling's *The Dead Media Handbook*, entitled itself in an "antiquarian" fashion of an 18th century book-title: *A Collection of many Problems Extracted out of the Ancient and Modern Philosophers: As, Secrets and Experiments in Informatics, Geometry, Cosmography, Horologigraphy, Astronomy, Navigation, Musick, Opticks, Architecture, Statick, Mechanicks, Chymistry, Water-Work, Fire-Works, etc.*, Wherennto is added, *Dead Media* (2009).

If we single out by chance (that is: by random access) any of these items, we find e. g. the switch-board of an early computer installation in an office. The book is supplemented by scraps of indented paper stripes which apparently is Morse code. What is declared as "dead media" here, in this case can principally be re-enacted (thus: deciphered, read, sonified). That is the difference to ancient sculptures or other traditional archaeological artefacts. Melancholy is the expression of nostalgia for something we long for but can not reach any more, since it is irreversibly gone. The media-archaeological approach is non-melancholic though, since past media are not dead, but un-dead, principally to be re-activated and thus in a radically present state of latency. Such media-archaeological artefacts are embedded in another temporal logic which defies historical discourse: They remain in latency just like a voice recorded on magnetic tape; at any moment, though, they can be re-activated, signals as a function of time:

⁴⁶ See, e. g., <http://absurdity.biz>, and the compilation CD *Noise and Toys* vol. 1 (2006)

⁴⁷ Originally published: 7/11/1996, at: www.ctheory.net

" ___ --- ___ "

Media archaeology is not a specific form of media history but rather an alternative to the historical discourse itself, just like Fourier Analysis replaces the linear time axis of sinusoidal signals by frequencies.⁴⁸

Different from history and narrative: archaeography

Digitization of paper-based archives from the past not only affects textual criticism and philological research by new options of accessibility and addressability of "big data" strings and by intelligent search algorithms (so-called Digital Humanities), but as well image and sound collections. Archives themselves - the traditional data-base for historical research - become temporalized by digitization, and born-digital data resulting in streaming archives right in their moment of coming into being. The micro-temporality in the operativity of data processing (synchronization) replaces the traditional macro-time of the "historical" archive (governed by emphatic historical consciousness) - a literal "quantization". The relation of the present to the past but to the present thus becomes truly "archival". Archeography practices an alternative form of minimal, serial time-writing (or rather registering), closer to the programming of computing itself. Computers practically transforms narrative aesthetics into non-discursive, algorithmic configuration of events. Current culture begins to acknowledge the operativity of digital culture beyond historical nostalgia for narrative.

Media archaeology's affinity to mathematics

[Mathematically expressed, the *arché* here is a vector which conceptually "combines the idea of magnitude (a core element of mathematics) with that of direction (a core element of physics)"⁴⁹. Calculating vectors is an alternative way of expressing what is commonly known as the "evolution" of media.]

Media, when taken as physical channels of communication and as technical artefacts which are operated by symbolic codes and streaming data, require to be analyzed in ways different from texts or works of art. The media archeological theory is such a way of looking at media objects: enumerative rather than narrative, descriptive rather than discursive, infra-structural rather than sociological, taking algorithms (literally) "into account".

The natural way of rendering Foucault's passages on archaeology intelligible (like Foucault's affinity to serial music, notably Barraqué's) is to take the notion of enunciative function at its mathematical face value.⁵⁰ This is the context when Kittler as well poses an explicitly archaeological question.⁵¹

⁴⁸ See Friedrich Kittler, *Draculas Verm 臘 htnis*. Technische Schriften, Leipzig 1993, 200

⁴⁹ Denis Guedj, *Numbers. The Universal Language*, xxx (Thames & Hudson) xxx, 97f

⁵⁰ Martin Kusch, *Discursive formations and possible worlds. A reconstruction of Foucault's archeology*, in: *Science Studies* 1/1989, 17-25 (17)

⁵¹ "Das wäre meine archäologische und diskursgeschichtliche Frage: woher kommt dieses wundersame System der modernen Mathematik mit ihren reelen Zahlen? <...> es ist singular in der Geschichte der

A pixel is the smallest conceivable picture element, which makes sense in a semantic way only when appearing within a group.

Once more: Media archaeology is not Mass-Media studies; its notion of communication rather relates to Claude Shannon's "Mathematical Theory of Communication" which does not mistake communication for mutual human understanding. Let us thus say: *mediamatics*. The "digital" means the countable; media archaeology is a radically mathematical mode.

When humans calculate in their mind and are assisted by paper, eraserhead and pencil, Alan Turing writes in his seminal paper of 1936 "On Computable Numbers", they are in a non-human, rather machinic mathematical state.

Menschheit, da° eine Kultur überhaupt versucht hat, mit reellen Zahlen die Welt zu berechnen und zu beherrschen." Friedrich A. Kittler, Die Maschinen und die Schuld, im Interview durch Gerburg Treusch-Dieter in: Freitag No. 52/1, 24. December 1993