MEDIA ARCHAEOLOGIES OF THE RECENT PRESENT

[Keynote to *Technopolitics Salon* "Media archeologies of the present", 28th January 2016, within the exhibition *Tracing Information Society – a Timeline*, at neue Gesellschaft für bildende Kunst (nGbK) Berlin, presented by *transmediale* in collaboration with the TECHNOPOLITICS working group (Vienna)]

Contemporary culture increasingly indulges in ubiquitous computing. A media archaeology of this technological present reminds of its underlying technical and logical pre-conditions. Contrary to the intuitive understanding, "media archeologies of the present" is *not* about the most recent technological events which govern our contemporary techno-social condition. The printed timeline *Tracing Information Society*[1] starts with 1900. But when do media conditions "begin"? Any "media archaeology of the recent past" finds itself in a blind spot: The *archive* of the present, which in Michel Foucault's sense is the techno-logical *a priori* of multi-media enunciation, by definition is not accessible. A media archaeology of the present refers to technological infrastructures, not to narratives, questioning the suggestive linearity of the "timeline" itself, in favor of alternative chrono-poetics such as algorithmic timestretching. Different from a linear sequence in chronological order, my arguments will zig-zag back and forth on (and against) the technopolitical "timeline" of information society, close to the actual step-wise operations of the turingmachine reading / writing head.

"Media archaeologies of the present" as non-historicist diagnosis of Information Society

A linear timeline misses the complex non-linear constellations which redefine the "recent" technological past. According to Walter Benjamin's *Theses on History*, the past "flashes" into the temporal now ("Jetzt-Zeit"). In reverse, the "Now" becomes antiquity almost immediately. The contemporary condition dates back to basic, recurrent technologies which are *recent* in the literal sense. German "rezent", as defined in the dictionary, in the biological context means "gegenwärtig [noch] lebend, auftretend oder sich bildend"; in Austrian use of speech, "rezent" means "zeitgenössisch, aktuell, vor Kurzem entstanden."[2]

Digitization means archaeologisation in the sense of mathematising the present. The Instant Archaeology Concept, connecting computer data bases with digital editing, has been developed by Michael Mikina and Francis Wittenberger for Digitale '98 festival at the Cologne Academy of Media Arts. The video material during the festival was recorded in a away that allowed for an individual editing in real-time.[3]

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1 http://www.technopolitics.info/Timeline

2 http://www.duden.de/rechtschreibung/rezent; 27. Oktober 2016

3 On the concept of "instant archaeology", see Siegfried Zielinski, (An-)Archive. Die Abschaffung der Gegenwart und das Archiv der Zukunft, in: Bernhard Serexhe (ed.), Konservierung digitaler Kunst: Theorie und Praxis. Das Projekt digital art conservation, Karlsruhe (ZKM) / Wien (AMBRA) 2013, 95-113 (100

Further entries into the "Time Line"

- Media history usually dates cinematography back to 1895, with its first public screening (*The arrival of a train*) in Paris by the Lumiére brothers. But this vintage drama is not historical; in way, the train arrives again. In recent years, the "post-digital" in media art has been announced, such as the "archaeological" use of anachronistic media like early 16mm film - a retro-effect of temporal snapshots against digital atemporality, an archaic counter-practice.[4]

- In September 1919 Eccles and Jordan described the flip-flop in a brief one-page paper "A trigger relay utilizing three-electrode thermionic vacuum tubes"[5]. In the previous year (June 21, 1918), Eccles & Jordan *implicitely* invented the vacuum-tube based trigger circuit or multivibrator as circuitry which only retrospectively is identified as the "first" flipflop circuit, the basis for binary electronic memory. Media-archaeologically prior to the invention of electronic computing, Eccles and Jordan described their invention as a "method of relaying or magnifying in electrical ciruits for use in telegraphy and telephony". Implicitely, a flip-flop circuit embodies two stable states. It takes a timeline shift to link to Claude Shannon's "A Mathematical Theory of Communication" (1948) pointing out that a flip-flop can be used to store one bit of information and flip-flop circuits can operate symbolic algebra by Boolean two-valued algebra (AND, OR, NOT). "Using vacuum tubes as switches, flip-flops became the basic storage element in sequential logic used in digital circuitry, and the basis for electronic memory."[6]

Independently, in the early Soviet Union, Bonch-Brujevich in 1919 defines the same electronic coupling for radio signal transmission.[7] Such co-originality expresses a non-linear temporality of techno-logistical coming-to-articulation, subverting the timeline. Instead of a linear history of technologies, there is diagrammatic "path dependency" in technical individuation rather than the linear timeline historiogram of technical evolution. If the analysis of information society is meant to be "traced" rather than narrated, media archaeography is required. There are temporal modalities, or time-scales, which escape the timeline, such as cyclical patterning of “techno-economic paradigms"[8] (so-called Kondratieff waves). Cultural experimentation and techno-aesthetic discoveries may be "out of sync", in relation to such long wave patterns of around 50 years. Such macro level cycles may be applied to techno-aesthetics, experimenting with alternative modes of writing history of media. The concept of technological nonlinear "path dependency" (as applied by Pinch / Trocco in

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4 See Malin Wahlberg, A Relative Timetable. Picturing time in the era of new media, in: John Fullerton / Jan Olsson (eds.) 2004: 93-103

5 In: The Electrician, vol. 83, (September 19, 1919), 298

6 http://www.historyofinformation.com/expanded.php?id=4061; accessed November 3, 2016

7 See Nitussov / Trogemann / Ernst (eds.), Computing in Russia, Braunschwieg (Vieweg) 2002

8 As expressed in Michael Century's forthcoming book on experimental media culture in Canada 1968-90 (contracted for publication with MIT Press)

their synthesizer-book *Analog Days*) recalls Fernand Braudel's triad of temporalities (immobile history on the geological or climate level, the *longue durée* of cultural time, and finally the event level. Media have their own time and temporality, rather in self-stabilizing intervals than as linear unfolding.

The timeline becomes operative when conceived like the "tape" of the Turing machine, scanning the entries and removing them back or forth as a function of the media-archaeological "program" table of media-archaeological reasoning. The very entry 1936 (Turing, "On computable numbers") will thereby transform into a write/read operation of the turingmachine itself : "Das Medienzeitalter, im Unterschied zur Geschichte - die es beendet - läuft ruckhaft wie Turings Papierband. Von der Remington über die Turing-Maschine zur Mikroelektronik, von der Mechanisierung über die Automatisierung zur Implementierung einer Schrift, die Ziffer und nicht Sinn ist [...]."[9]

The turingmachine scans an entry in a square from the paper tape, which in combination with the instruction by the command list results in a specific "m-configuration" at a given time[10]. "These events occur only at discrete 'moments' - between which nothing happens [...] like the ticking of a clock [...]."[11] This is archival, symbolically ordered temporality, a kind of kinematographical apparatus where the read/write head takes chrono-photographic snapshots of the machine state.

Such kind of operation reenacts the early Mediaeval form of registering events. The Annalistic writing system (as opposed to chronicles and historiography proper) conveys a way of experiencing reality not in terms of continuous but in discrete time[12], closer to state-based automata with discrete writing/reading of symbols on an endless memory tape (the diagram of the Turing Machine).

- A media archaeology of the present is not only non-linear (in the sense of Manuel DeLanda's proposal *A Thousand Years of Non Linear History* (1997), but even non-human. Providing insights into the non-human nature of technological tempor(e)alities is a specific interest of media archaeological sense of time.[13] "Media cross one another in time, which is no longer history"[14], but rather re-entries of past technologies within the new.

Between remake and re-mediation (Bolter / Grusin 1999), certain technologial media apparatus and artefacts sometimes reoccur; historicizing media analysis

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9 Friedrich Kittler, Grammophon - Film - Typewriter, Berlin (Brinkmann & Bose) 1986, 33

10 William Aspray, John von Neumann and the Origins of Modern Computing, Cambridge, Mass. / London (MIT Press) 1990, 176

11 Marvin L. Minsky, Computation. Finite and infinite machines, Englewood Cliffs, New Jersey (Prentice-Hall) 1967, 12

12 Hayden White, The Value of Narrativity in the Representation of Reality, in: Critical Inquiry vol. 7 no. 1 (autumn 1980), 5-27

13 See Michael Goddard, Opening up the black boxes: Media archaeology, 'anarchaeology' and media materiality, published 28 April 2014 in the online journal New Media & Society, http://nms.sagepub.com/content/early/2014/04/27/1461444814532193

14 Friedrich A. Kittler, Gramophone, Film, Typewriter, Stanford, CA (Stanford University Press) 1999, 115

accentuates this *discursive* force, whereas media archaeology lets the non-discursive real of such processes speak. Media historiography semanticizes technological events, while media archaeology is the articulation of the indexical trace.

Telegraphy, for example, is not an outdated communication technology from the nineteenth century; beyond its obsolete technical implemenation in cables and electro-magnetic relays, its endurance is the "digital" *avant la lettre*, different from analog radio and television signal transmission inbetween.

Discrete time signal processing has been implemented in electronic modules such as the sample and hold circuits, analog delay lines, and analog feedback shift registers as predecessors of digital signal procesing. There is a current re-entry of analog computing as mathematical modelling. An analog computer, modeling a real physical system, uses its physical quantities to represent the behaviour of another physical system, or mathematical function.[15] Even if it is obsolete in techno-historical terms, the analog computer media-archaeologically re-occurs in quantum computing, thereby questioning the linear timeline.

- 1822: In terms of a media archaeology of the present Information Society, Joseph Fourier's *Theory of Heat* provided for the mathematical condition of techno-mathematical Digital Signal Processing. Fourier Transform converts a mathematical function of time into a new function whose argument is frequency counted in cycles per second (hertz)[16], thus transforming the time domain of a signal into its frequency domain which is discrete numerical values. Discrete-time Fourier Transform facilitates digital storage and computation of physical (real-world) signals and their replay, since the operation can be reversed from the frequency domain back into the time domain. Such high-fidelity reconstruction of signals is not simply essential for audio and video reproduction technologies today, but for inquiries into the non-historical nature of media tempor(e)alities as well. The Moebius loop like entanglement between the time and frequency, between analogue vibrations and discrete numbers, is the essence of a time machine which is physical and symbolic at the same time: *algorhythmics*[17].

- In 1965, James Cooley and John Tukey published a paper "re-inventing the algorithm of Fourier Transform and describing how to perform it conveniently on a computer."[18] Against its suggestive expression, Fast Fourier Transform is not simply an escalation of computational speed but resulted in a new object of knowledge in terms of Process-Oriented Ontology. FFT has been included in the Top 10 Algorithms of 20th Century by the IEEE journal Computing in Science &

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15 See http://en.wikipedia.org/wiki/Analog_computer; last modified 29. April 2007

16 en.wikipedia, "Fourier transform", accessed September 27, 2013

17 See Shintaro Miyazaki, Algorithmics. Understanding Micro-Temporality in Computational Cultures, *online* in: Computational Culture, Issue 2 / 2012 (http://computationalculture.net)

18 https://en.wikipedia.org/wiki/Cooley%E2%80%93Tukey_FFT_algorithm (3-11-16)

Engineering.[19] In principle (*en arché*), this algorithm, including its recursive application, was implicitely invented around 1805 by Carl Friedrich Gauss, who used it to interpolate the trajectories of asteroids. Published only posthumously, the recipy of Gauss' asymptotic computational time remained in latency; still it is implicitely operative in present ubiqutous computing. At that point, the suggestive timeline actually *mis*represents the archaeology of media knowledge.

- The domain name www.youtube.com was activated on February 14, 2005 and has since become the substitute for a missing audio-visual "library" of the WWW (no "archive"). In 1996, being aware of the accelerating obsolescence of Web pages in the Internet, Brewster Kahle started the Internet Archive http://www.archive.org which soon provided for an additional symbolic time machine: the Wayback Machine, implemented in 2001, which for an Internet address (URL) presents a chronologically ordered list of links to the same web page at different times.

The current Internet may be associated with previous communication networks like the horse-based postal system of the Persian empire (Innis, *Bias of Communication*) and the telegraph network in nineteenth century, a reconciliation of the high-technological present to the cultural past; radical archaeology of communication media concentrates on the non-linear discontinuities which challenge even the human as central agency of such processes. Paul Baran's proposal for packet switching distribution in the US military digital ARPAnet makes the decisive conceptual difference. Media archaeology is both about identifying the logical precondition and the actual escalation of such constellations.

Questioning the "Time line"

Let time "finally" fold the timeline upon itself, like a Moebius loop. The first timeline has been a diagram designed by the founder of graphical methods of statistics William Playfair, an engineer and political economist. the line, area and bar chart of economic data. Playfair's trade-balance time-series chart has been published in his Commercial and Political Atlas, in 1786.[20] But instead of being an external function of linear time, technology since has auto-poietically generated its own "time axis" as differential signal in every oscilloscope to measure electrified time signals.

There is no time in a graphical timeline; this is a geometric spatialization, a visual suggestion of one-directional sequences of events. Temporal processuality is claimed here only symbolically, different from any physical or technical signal. In the physical world, the time axis is synonymous with the one-directional "time arrow" as defined in 1927 by Arthur Stanley Eddington.

With technological operations, we are actually within time, not in simply symbolic "historical" time. Symbol time returns with informational entropy.

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19 https://en.wikipedia.org/wiki/Fast_Fourier_transform (3-11-2016)

20 https://en.wikipedia.org/wiki/William_Playfair; accessed Nov 3, 2016

The current Technopolitics Salon "Media archeologies of the present" primarily refers to "*Dinge die in den letzten 20 Jahren passiert sind*" (Armin Medosch); in a parallel Transmediale project, the present even extends to "100 years". The timeline is supplied with names, years, and subject headings. But the media-archaeological question is not primarily about "beginnings" and moments in the historic timeline, but rather the crucial epistemological and structural moments and momentum worth to be identified and analyzed.

Google's N-gram viewer searches the full texts of some 15 million books for semantic terms and plots their frequency over a timeline. Alternatives to the linear concept of a techno-political timeline are foldings and recursions in the sense of McLuhan's *Laws of Media* ("Tetrads"); non-linear time is expressed as well in the Nyquist-criterium of physical equilibrium and the "chaotic" oscillations in the Chua electronic circuit; sociology of technology knows the diagramatic model of path-dependence.

"Recursions fold time and thus enable direct contact between points and events [...] that are separated when history time is stretched out on a continuous line."[21]

In a "Timeline" of storage techniques from A.D. 77 to 2014[22], the chronological axis is boring; US computer industry privileges the linear outlook into an increasingly powerful future of storage media, instead of admitting the aporetic dead-end of Moore's Law ca. 2030. Moore's Law, the observation that the number of transistors in a dense integrated circuit doubles approximately every two years, has been formulated in 1965 to define the growth of processing power and memory capactiy in micro processors, in graphic expression on a timeline is a logarithmic function. The timeline of Information Society as archaeology of the present should be Janus-faced, anticipating the "future in the past" (*futurum exactum*) already for around 2030 as dead end. Gordon Moore, the co-founder of Fairchild Semiconductor and Intel, in his paper described a doubling every year in the number of components per integrated circuit; in 1975 he revised the forecast to doubling every two years. The very condition for Information Society has a sense of its own ending.

Non-linear, rather "epochal" media-archaegraphy is resistance against the narrative-linearity which seduces to interfere with biographical data by the spectator.

How do you draw time?", Rosenberg and Grafton ask in their 2010 study. The answer is on the micro-computational level. Here, contemporary information culture has the means to actually cope with temporal complexity. The "time line" concept which started with Playfair in eighteenth-century but is an out-dated way of symbolically reducing temporal complexity (Koselleck, Luhman) to linear history. The timeline as info-graphics on display here explicitely is a print-out on paper; this affords physical space experience; the time of reading can be controlled by the visitor him/herself like a museum walk, different to externally defined video streaming. The timeline privileges the visual cognition

21 Winthrop-Young, op. cit., note 5

22 http://www.computerhistory.org/storageengine/timeline

of techno-temporality; an alternative option is a truly time-based form of knowledge access: sonification, by parameter mapping of the data entries.

A complex interrelation between the components of the "Tracing Information Society" installation has been proposed by the "dynamic-abstract" diagrams developed by Doron Goldfarb with algorithms and codes: the data-aesthetics of Digital Humanities, allowing for *n*-dimensional analysis rather than focus on one-dimensional time line. Instead of the graphically linear time, an interactive diagram allows for "diffractive time" (Paula Barad).

Traditional stratigraphic time "exhibits succession but not duration"[23], but the more advanced so-called "Harris matrix"[24] for archaeological excavation of cultural sites puts emphasis on differential series rather than on geological layers. The temporal evidence for data on computer hard drives and storage media is flat and rather archaeo-*logical* in the strict sense. It requires special software for an artifical chronological listing as "timeline" of all activities which have been enacted on such a data carrier, based on the analysis of file systems, log- and registry informations.[25]

David Gelernter's candidate for replacing the current desktop metaphor is called "Lifestreams"[26]. Since December 15, 2011, the "timeline" has been the order in which all the content of Facebook users is organized and shown. But within the computer, the reading / writing head of a Turing machine only apparently "inscribes symbols one by one in an infinite string, giving rise to time as a sequence-stream, exactly as in classical mechanics."[27] But the turingmachine memory tape itself, moving back and forth, has replaced the linear timeline.

Media archaeology is time-reversed analysis. Rather than nostalgically looking back to "dead media" as the fossils of past technologies, it attempts epistemological reverse engineering – a taking apart of contemporary technologies to see in them temporal superimpositions. Techno-logical traces of the past, in the current hardware conditions, are polychronic assemblages of past technical solutions with have actual effects on (literally con-temporary culture. Media technology does not ask for external discursive narrativization any more, but itself exposes its knots or folds of technical developments in its layers of engineering. Rather than being seduced by a linear, narrative timeline, let us attend for such unexpexted moments,.

Undermining the "timeline": Timestretching

23 V. G. Childe, A Short Introduction to Archaeology, New York (Collier Books) 1962, 30 (as quoted in Kusch 1991: 8)

24 E. C. Harris, Principles of Archaeological Stratigraphy, London (Academic Press) 1979

25 See http://www.sleuthkit.org

26 David Gelernter, Machine Beauty. Elegance and the Heart of Technology, New York (Basic Books) 1997, 102

27 As summarised by Francisco J. Varela, The Specious Present. A Neurophenomenolgy of Time Consciusness, in: Jean Petitot / same author / Bernhard Pachoud / Jean-Michel Roy (eds.), Naturalizing Phenomenology. Issues in Contemporary Phenomenolgy and Cognitive Science, Stanford (Stanford UP) 1999, 266-316 (268)

It has been in musical notation (since Guido of Arezzo) that a symbolic "timeline" has been introduced which is quantized by interval marks of beats, with the notes on the y-axis being a function of the non-variable *t* which is the x-axis. Etymologically, *timing* itself means "dividing". The sonic "present" itself, taken at face value, becomes subject to micro-temporal manipulations. Karlheinz Stockhausen started his tonal compositions by phase-shifting of electric signals in the sonic "time field"[28].

The apparent linearity of time had already been irritated by Muybridge's and Marey's chonophotographical sampling of micro-temporal moments; temporal zigzags provided composers like Paul Hindemith with paradigms through which to explore the manipulation of both time and motion as infinitely divisible properties - the master paradox of Zeno's arrow as discussed film-critically by Henri Bergson in *L'Évolution Créatrice*. Hindemith's one-act opera *Hin und Zurück* (1927) plays with conceptions of temporal reversal. The music, running forward and backward, evokes such time axis manipulation.[29] *Online*-navigation in data bank, nowadays, leads to a permanent " re-programming" of the temporal entries ("Zeitstellen") on the historic timeline."[30]

A micro-"archaeology of the present" has been in(tro)duced by signal processing. Different from a linear timeline, the "time series" (Norbert Wiener) has become the central feature of signal analysis of the cybernetic present.

Once sound or light waves have been transformed into frequency values, computable reality results in "a quantifiable, nonhuman time"[31]; signal processing is independent of the narrative time line. "It is only with multimedia interface metaphors that the timeline has re-entered into computational space.

A further, "final" proposal points to limits of the visual timeline graphics itself, to be replaced the temporalities of "acoustic space" (McLuhan). Time warping and rhythm manipulation such as introduced in the audio engineering software packet Ableton Live, time stretching and time compression as introduced with the ACAI sampler, are operations introduced into audio engineering with the arrival of the digital sampler since the late 1980s. The sonic present can since be extended to the immediate past as "retention" or future as "protention" in Husserl's phenomenological terms, thereby technically emulating the human "inner sense of time" itself. While with the firmly inscribed phonographic groove of analog recording as material micro-timeline, changing pitch without affecting speed has been impossible, sono-poetical algorithms now allow to dis-continue the apparent temporal flow of time itself - resulting in an aesthetics of loosely coupled time as a key feature of our contemporary media condition.

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28 Karlheinz Stockhausen, ... wie die Zeit vergeht ..., in: Die Reihe. Information über serielle Musik, no. 3, Universal Edition, Wien / Zürich / London (1957), 13–42

29 David Trippett, Composing Time: Zeno's Arrow, Hindemith's Erinnerung, and Satie's Instantanéisme, in: The Journal of Musicology, Vol. 24, Issue 4 (2007), 522–580 (paraphrased abstract)

30 Wolfgang Hagen, "Being There!" Epistemologische Skizzen zur Smartphone-Fotografie, in: Bildwerte. Visualität in der digitalen Medienkultur, transcript Verlag, Bielefeld 2013, 103-131

31 Kittler 1999: 170 f.