CHRONOPOETICS AS "SONO-POETICS". The Appeal of Sound as Time-Object and Time-Subject for Technology-Oriented Media Theory

So what is "chronopoetics"?
Rhythmograms and their media-archaeological *Kehrwert*
Geometrization of sono-temporal patterns
Materiality in being: Temporal sonicity of the monochord
Short Wave Radio
Technical recording vs. symbolic transcription
A genuine media archaeology of recorded sound *avant la lettre*
"First sounds" (Patrick Feaster), "Time(ly) matters" (GWY)?

So what is "chronopoetics"?

It is not lyrical poems about the passage of time, neither is it literary musings like Marcel Proust's *A la recherche du Temps Perdu*. Chronopoetics investigates the ways technological media are time objects and time subjects; for that reason, the analysis stays close to the actual signals.

In order to perform such analysis, it first needs a cognitive training: to get distance from the discourse of cultural history. Historical discourse is all too hegemonic when it comes to discuss multiple temporalities. The media-archaeological cold gaze and listening (both technical and as human understanding) is a way to get - at least momentarily - suspended from that supremacy of historical discourse.

Media archaeology describes technological events on the level which is phenomenologically hidden to human perception. Here, a micro-drama unfolds, both *in* time and in the form of its diagramatic mathematical expression: the frequency domain. It is only by measuring, diagramatic and calculating media that this world becomes accessible to human knowledge.

Chronopoetics refers to three levels of analysis: 1. to the "hidden" tempor(e)alities with*in* technology, 2. to the phenomenological irritation of human sense of time when being coupled to media timing, and 3. to the philosophical dimension: the revelation of how technical media are position in culturally "deep time".

After getting used to non-historistic ways of rethinking media time, more constructively it takes an active step to develop a new language for the analysis and implementation of such

tempor(e)alities. While conventional historiography of technology writes "about" media time (that is, in the instransitive mode), a transitive approach to express multiple media temporalities needs to be developed. Next to non-linear verbal forms of argumentation, that results in graphical diagrams and even sonic rhythmograms - and in different temporal moods of looking and listening to media-induced events.

Rhythmograms and their media-archaeological *Kehrwert*

Musicology has been the traditional cultural domain to reflect upon different modes of time-based articulation, and has provided a rich terminology for expressing sonic eventality. It is not accedental that in electronics, engineers frequently borrow musical terminology to name time-critical processes - like "resonance" (nd the "resonant circuit" as its hardware condition in technical communication between a radio sender and a radio reception. This allows for a word-play, a slight shift of signifier: from technical *chronopoetics to sono-poetics*. Is "sound" the bridge between technical media and music as cultural aesthetics?

The both effective and affective "message" of sound as phyiscal event is not music (which is rather its semantic "content") but its temporal form. Therefore the focus of an epistemological inquiry into sound is on its temporal *gestalt*[1]. The "hidden" tempor(e)alities with*in* technology might be coined as "sonicity". This refers to the implicit temporality in electronic media. In mid 19th century, James Clerk Maxwell explicetly chose a mechanic analogy between electro-magnetic field lines and hydrodynamic oscillations and coined this the "electrotonic state"[2].

Sonic signals in terms of mechanics are vibrational physical events with harmonious partial "tones" - literally ancient Greek *tonos*, "tensions". They have a privileged affinity to the epistemological concept of the "analogue". When, e. g., an archaic computer game is emulated in a current computer but was once created for continuous vector graphics on a cathode rays screen, and if the interface on the hardware level has to be a real vector monitor (which can not be convincingly emulated by a matrix screen with its aliasing pixels), the amplifiers of the present computer soundcard are being "misused" in order to generate, on the x and y axis, such kind of vector graphics.[3]

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[1] "Zeitgestalt" in terms of Zuckerkandl 1963
[2] James Clerk Maxwell, Über physikalische Kraftlinien (1861/1862) [= Ostwalds Klassiker der Exakten Wissenschaften, vol. 102, ed. by Ludwig Boltzmann, Reprint Thun / Frankfurt/M. (Harri Deutsch), 1. Theil, 6
[3] See Stefan Höltgen, Spiele(n) mit Pfeilen. Computerspiele und Vektorgrafik, in: grkg / Humankybernetik, vol. 56, no. 4 (2015), 143-158 (158)

A few years ago, Media Studies at Humboldt University organized a symposium called *Think Analogue!*, juxtaposing the "dead medium" of analogue computing with the electronic modular synthesizer in electro-acoustics - which in fact are twin machines. Among others, media artist Benjamin Heidersberger (co-creator of *Van Gogh TV*, an early experiment in interactive television presented at Ars Electronica in Linz and Documenta in Kassel in early 1990s) projected his electronic Lissajous figures created from an oscilloscope. This is an escalation of what his father - a prominent black & white photographer in post-war West Germany - had photo-mechanically created and called "rhythmograms".

In order to captures the message of Heidersberger's medium, it takes a technology which itself is able to record movement; Ali Altschaffel has cinematographically documented the "Rhythmograph" of Heinrich Heidersberger:

Online https://vimeo.com/89780677

[Heinrich Heidersberger 1959 in Wochenschau http://www.filmothek.bundesarchiv.de/video/589598; ab 7:00 bis 7:30 mit der zweiten von drei Versionen der Maschine]

There is a remarkable, epistemologically challenging equivalence between a mechanical generation of Lissajous figures, and its electronic expression. Though completely different physical systems, their temporal unfolding is principally (*en arché*) the same. Only in mathematical terms this relation between two incompatible worlds (materiality of mechanical devices vs. immateriality of electro-magnetic waves) can be expressed; therefore the real level of epistemological insight is mathematical. The technical medium to perform this is not the digital but the analog computer.

The hypothesis of analog computing is that an electric voltage circuitry can emulate a mechanical process since in mathematical description (as common denominator) it behaves the same.

What one could actually hear in the studio with Heidersberger's rhythmo-poetic machine was not the harmonic oscillations themselves which result from the photographic registering of the light trace produced by the machine movement, but the noise of the machine itself. The visual rhythm emerges by opto-chemical recording: the subject-less long-time exposure of black & white photography. The visual "Rhythmograms" result from the inherent mathematical musicality of a mechanical analog device.[4]

The truly media-archaeological equivalent to Heidersberger's

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[4] Heinreich Heidersberger had built "an analogue computer designed for the combinatorial exploration of mathematical phenomena": Andrew Witt, Heinrich Heidersberger. Light Harmonies, Ostfildern (Hatje Cantz) 2014, 11

visual rhythmograms are algebraic formulas: differential
equations. Only such radical mathematisation resists the
metaphysical, esoteric or aesthetic seductions induced by such
visual wave forms such as *Kymatik* (Jenny).

Heidersberger's "rhythomgrams" continue what in 19th century had
started with Lissajous' tuning fork-based figures and later
resulted in Heribert W. Franke's electronic "real time"
oscillograms.[5]

When in 2014 a selection of Heidersberger's Rhythmograms were re-
exhibited[6], the subtitle was appropriately *das gestimmte bild.*
- the "tuned" image. There is implicit sonicity in such
"technical" images. This ontologically recalls Martin Heidegger's
philosophical notion of being as "Stimmung", and in terms of media
arts has been expressed by video artist Bill Viola in an early
essay defining the electronic image as "The Sound of One-Line
Scanning"[7]. Heidersberger's rhythmograms are spatial
geometrizations of time-continuous oscillations, thereby freezing
the sequential into simultaneity.

Marshall McLuhan, the founding father of technological media
studies as academic discourse, frequently referred to so-called
"acoustic space". This term does not address the explicit audible
sound but rather the implicit "sonicity" of technical articulation
- the rhythmic structure and temporality of signal processing and
algorithmic operations.[8] Any algorithm written down as source code
has to become implicitely "sonic", that is: electronically
implemented as sequential time events, in order not to remain
simply an abstract symbolism but effectively computational. This
requires temporal *understanding*.

Contrary to Heidersberger's *Rhythmograms* (produced between 1953
and 1965)Indeed, today's techno-acoustics is rather beat than
oscillations, impulses rather than continuous sound, stochastic
noise rather than Pythagorean harmonics.

One way to de-metaphorize sound art is its spectral analysis - the
analysis of such *temporal* tones as tabular mathematics. This
causes vibration <...> to assume a numerical existence, a return
to alphabet-based epistemology - a recursion of the ancient
linkage between number and music.

[For the difference between Heinrich Heidersberger's harmonic

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[5] See Witt 2014: xxx
[6] *heidersberger: rhythmogramme*, at Petra Rietz Gallery, Berlin
[7] Bill Viola, The Sound of One-Line Scanning, in: xxx
[8] Even in cultural time technology rather unfolds in "resonant
intervals" than in straightforward evolution, as expressed by
McLuhan in *The Global Village* and his *Laws of Media*. See Ernst
Wolfgang (2015) 'History or Resonance? Techno-sonic
Tempor(e)alities', in: Journal of Visual Culture, 14 (1), pp.
99-110

Rhythmograms and early computational drawings, see the
figure of Frieder Nake's *Achsenparalleler Polygonzug* (1965)[9]]

An academic turn to "sound studies" is currently taking place. But
is the focus on "sound" justified for a critical approach to
digital media culture? The hart-beat of computing (generating its
"clocking") is the crystal oscillator with its piezo-electric
effect. No sinuidal oscillations but sharp saw-teeth impulses.

In Homer's epic *Odyssey*, female sirens have been singing, but
mechanical sirens (as invented by Cagniard de la Tour) express air
pulses rather than continuous waves. Here, we are dealing with
discrete signals rather than tones. Only by addresing the sonic
time signal in its mathematical form (counting by frequencies),
sound can be "heard" by the digital computer. Computational clock
time, by clever programming of its data cycling units, becomes
truly algo-rhythmic.

As has recently been defined in the online draft for the *Rhythm-
Expression* discussion of the Berlin festival MaerzMusik:

"When rhythm is wrested from the established notion of measure in
music, a perplexing diversity of terms, instruments and practices
unfolds, situating it between a manner of flowing (ruthmos) and an
order of movement, proportioned figure (metron) [...]."[10]

["Idiorhythmy, vibration, refrain, duration and slowness,
disjunctive metronome, synchonization and rhythmic semantics, are
some modes of rhythm's expression [...]."]

Geometrization of sono-temporal patterns

The central sonic event is the sine wave which in its pure form
only exists from technical signal generators like tuning forks or
electronic circuits, not in nature

- just like sculpture in ancient Greek art idealized the actual
human body:

Fig.: Antiken-Oszilloscop

Instead of writing it on a time axis in its continuous wave form,
the sine wave can be alternatively computationally.

According to Poincaré, one can divide mathematicians into two

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[9] In: Justin Hoffmann / Kunstverein Wolfsburg (ed.), Der Traum von
der Zeichenmaschine. Heinrich Heidersbergers Rhythmogramme und die
Computergrafik ihrer Zeit, Wolfsburg 2006, 24
[10] Hosted by Bojana Cvejić, Tom Engels and P.A.R.T.S. Research
Studios group, with Bernhard Lang. Haus der Berliner Festspiele,
14 March, 2016, within the "Thinking Together" discourse program

types - those with visual and those with auditory intuition.[11]
It is the operativity, the inner sonicity of computing which
reveals temporal patterns indeed; that is processual media-
archaeology. The algorithmic rhythm of digital calculation can be
visualized by rectangular versions of the so-called Ulam spiral.
In fact, this is no sound-"image" but a time-diagram.

[Similarly, the Moiré effect originates from the "pixelized" image
by the grid in half-"tone" photo printing (raster). For color
raster printing several grids have to be overlaid, resulting in
moirés which correspond to "Schwebung" in sonic impulse series.
The moiré projector, overlaying one stable grid (slide) with a
movable second grid (slide), is a musical composition, a "Sirenic"
device.[12]]

A temporal sequence is here translated into a spatial order.[13]

The Ulam Spiral is a method devolped by the mathematician
Stanislaw Ulam in 1963 for the graphic representation of prime
numbers by means of locations on a rectangular spiral.[14]
Nikita Braguinski experimented with such data visualization for
his Ph.D. thesis on the oblique sounds originating pseudo-randomly
from electronic toys and early computer games[15]:

Fig.: Ulam-Spirale-Primzahlen-PASCAL.png, created by Nikita
Braguinski

[See Nikita Braguinski, Die Spiraldarstellung - ein
experimentelles Visualisierungsverfahren, *online*
https://www.medienwissenschaft.hu-
berlin.de/medienwissenschaft/medientheorien/miniaturen/braguinski-
spiraldarstellung-03.pdf]

The rectangular Ulam spiral representation allows for the
visualization of the calculations by the digital computer PASCAL
from the early 1960s for prime number culculation - which is all

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[11] See Steve J. Heims, John von Neumann and Norbert Wiener. From
Mathematics to the Technologies of Life and Death, Cambridge,
Mass. / London (The MIT Press) 1980, 128

[12] See Emanuel Goldberg, Die Berechnung der Moiré-Erscheinungen,
in: Zeitschrift für Reproduktionstechnik 8, Heft 12, 1906, 189-
195, as referred to in: Michael Buckland, Vom Mikrofilm zur
Wissensmaschine. Emanuel Goldberg zwischen Medientechnik und
Politik, Berlin (Avinus) 2010, 39-42

[13] Wolfgang Coy, Der diskrete Takt der Maschinerie. In: Georg
Christoph Tholen / Michael Scholl / Martin Heller (eds.),
Zeitreise. Bilder, Maschinen, Strategien, Rätsel, Zürich
(Stroemfeld/Roter Stern) 1993, 367-378 (367)

[14] See M. L. Stein, S. M. Ulam, M. B. Wells, A Visual Display of
Some Properties of the Distribution of Primes, in: The American
Mathematical Monthly, Vol. 71, No. 5 (May, 1964), 516-520

[15] *RANDOM. Die Archäologie der elektronischen Spielzeugsklänge* at
Humboldt University, Berlin, February 2016

about the hypothesis that it might be possible to detect
repetitive patterns in an apparent random sequence.

["Am Anfang der Suche, das heißt im Zentrum des Bildes, sind keine
Muster erkennbar. Wenig später beginnen sich auffällige Bänder von
wellenartigen Mustern zu bilden, die jedoch zeitweise von
Rauschanteilen unterbrochen werden."]

The algorithmic procedure in the PASCAL computer in its time could
still be sonified by loudspeakers, since the cycling units of
calculation were within the low frequency range of the human ear.[16]

[See as well Christoph Borbach / Thomas Nückel, Sonifikation
zellulärer Automaten = Cellular Sounds Project:
https://www.youtube.com/channel/UCAYWbTbWZ5VimoDLYA1CsDg]

Before the introduction of the electronic tube which allowed for
calculating with ultra-sonic speed almost devoid of material
inertia, electro-mechanic computing was audible in itself, like
the 4 Hz clocking of the early Zuse 1 computer.

The misuse of electronic radio vacuum tubes as digital switch
resulted in a quantum leap of speed in computing; therefore the
first fully electronic digital computer, the otherwise silent
ENIAC at Princeton, requires explicit sonification to make it
understandable for human ears again.

[as has been performed in the Signal Laboratory of Humboldt
University Media Studies by Martin Carlé.]

In the early days of digital computing, technological devices for
short-time data storage like the *acoustic* mercury delay line used
the slowness of sound waves itself as dynamic storage medium.

So far, the Ulam spiral has been used for the visual demonstration
of mathematical regularities. Braguinski proposes the application
of the Ulam spiral for signal analysis as well, as an alternative
to the usual tools for sound visualization like wave form and
spectrogram, with a focus on the idendification of structural
regularities or deviations on the micro level.

When we look at such geometric pictures, we may have learned to
decipher the implicit sonicity in it. The mathematic construction
of a rectangular spiral is step-wise created from discrete
elements in succession. Such discrete elements may be the sampling
values of any digitized signal, thereby translating (rather than
simply transforming) the time-domain into the frequency domain
which is visual patterns.

This allows to recognize repetitive patterns in the data output of
what is called a random generator; immediately it becomes

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[16] See Nijenhuis, W. 1962: Hörbares Rechnen der Pascal, in: Philips
technische Rundschau, 24. Jahrgang, 1962/1963, Nr. 4/5, 169-176

literally "evident" that what sounds like accidental noise, when being produced by a digital device, can only be pseudo-random.

Such spatializations of the time axis for the sake of analysis results in a geometrization. Does this deprive the sonic event of its essential message which is time? Is this a re-Pythagorizing of the musical event into a mathematical ratio instead of its processual wave event?[17]

This is not simply a technological question but a momentum with epistemological dimension. The time function of a sound signal *s*(*t*) can only be approximated by the signals of the sample-and-hold operation in analog-to-digital conversion.[18]

Fourier transformation allows for translating the physical "time" signal into the frequency domain which can thereby be numerically addressed and mathematically processed - still being the same signal, having lost all its temporality. Fourier analysis supposes that the analyzed signal is *ideally* periodic, reaching back indefinitely into the past and extending likewise into the future. But once again: The pure sine tone does not exist in phsical reality. Any physical real signal is time-varying, always being characterized by a beginning and an anticipative sense of ending. Analysis can only focus on the time domain or the frequency domain (that is why Denis Gabor developed his time-windowing of sound anlaysis in terms of "acoustic quanta").

[Straightforward Fourier Transform of a periodic sound, by supposing a Platonic ideal endlessness, sacrifices the tempor(e)ality of the sonic signal which is always marked by the trace of its beginning: the *transience* of the signal. There is an existential temporality ("being-to-death") of any physical sonic event in Hegel's and Heidegger's sense. Wavelet-Analysis tries to capture exactly such temporality by slicing the sound.]

[An die Stelle der zweidimensional angeordneten Analyse tritt die Analyse der Prozessualität selbst, "weil außer der Zusammensetzung des Schalls auch dessen Verlauf visualisiert wird"[19].]

Materiality in being: Temporal sonicity of the monochord

Different from the material artefacts of classical archaeology which are preserved in museums of cultural antiquities, technical media from past times are not simply monuments which survived into the present, but they are essentially time objects themselves,

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[17] See Hermann Gottschewski, Graphic Analysis of Recorded Interpretation, in: Computing in Musicology vol. 8, 1992, 93-96
[18] See Fig. 4-4 in: xxx Görne, Tontechnik, 2nd ed. 2008, 130
[19] Julia Kursell / Armin Schäfer, Kräftespiel. Zur Dissymmetrie von Schall und Wahrnehmung, in: Zeitschrift für Medienwissenschaft 2, 1/2010, 24-40 (32)

"Zeitobjekte" (Edmund Husserl's term), techno*chrono*logics, in the active sense: They are not simply subject to historical time, but active agencies in the media-theatre of time. Given the definition that technical objects become media only in the moment they actually process signals, that is: being in operation, then technological artefacts from the past can not be reduced to their materiality but have to be processual. Then they are timing themselves, undoing historical distance, being radically unhistorical.

"[T]he vexing relationship between media, time and history can be viewed as variations on one German verb: *zeitigen*. It derives from *Zeit* ('time') and is normally a transitive verb followed by a direct object. "*X zeitigt Y*" means "*X* brings forth (or yields) *Y*", with the understanding that *X* does so in or over time."[20] Central to chrono-poetical analysis of technology and media culture therefore is the intransitive use: *Medien zeitigen*; "*zeitigen* here means to "time-ize" or "put in time" (2014: 406). [...] To deprive *zeitigen* of its direct object opens up two dimensions of "time-ing" which, taken together, drive a wedge between media time and the time of history."[21]

The archaeological model of an ancient Pythagorean monochord becomes a *media*-archaeological object only when it is activated, that is, when the string is pulled. Processual archaeology is not concerned with the human behind the artefact, but with the system embracing both.[22]

Once a technical medium is intentionally activated, it starts to generate complex non-human phenomena, resulting in a media-active drama. Thereby the medium dis-closes its implicite knowledge in time.

While Greek & Roman Archaeology, Classical Philology or Historical Musicology adheres to diachronic, "historic" time, media archeology allows for a *synchronic* perspective or rather listening. As a *method* it concentrates on the functional-operative, processual dimension both in the material and in the theoretical sense. This allows for an archaeology of past media events as "re-presencing" (Vivian Sobchack), resulting in a literally better *mathesis* (understanding) of ancient technological knowledge by retro-active media archaeology.

Short Wave Radio

[20] Geoffrey Winthrop-Young, TS "Timely Matters", 2015
[21] GWY, TS "Timely Matters", 2015, according to suggestion by Larson Powell
[22] Kent V. Flannery, "Culture, History vs. Cultural process: A Debate in American Archaeology, in: Mark P. Leone (Hg.), Contemporary Archaeology. A Guide to Theory and Contributions, Carbondale 1972, 105

Even in high-tec electro-magnetic "Hertzean" wave propagation such as radio and television or mobile communication devices, media archaeology rather "listens" to the implicit sonicity of vibrational ratios. The task of a media theoretician now is to find arguments why, e. g., Short Wave radio communication is not an out-dated medium in times of Internet radio, and not just for nostalgics of analog technologies. Short Wave radio reception means listening not only to the actual radio program but as well listening to radio as techno-physical medium (try it, if you have an old reveiver with AM / SW mode), a more media-critical and media-aesthetic transitive coupling of our ears to the technology. With its fading signal strenght and all kind of noisy interference from the ionosphere sourrounding the globe, we become aware of radio in its true sonicity: the structural affinity between technical media and sonic articulation.

Technical recording vs. symbolic transcription

Since Thomas Alva Edison's phonograph, the analogue audio-recording media have built up a signal-based memory of sound which challenges the symbol-based traditional musical score as textual archive, recording even the non-musical articulations, the non-intentional, non-semantic evidence of the acoustic event, such as noise or bird-singing in the background which had been rather inaccessable for alphabetic or other symbolic notation. Wax cylinders or gramophone records constitute a sonic "counter-archive" (Paula Amad).

Once such recorded signals have been transcribed into the symbolic code, all non-musical (non-harmonic) information is irreversibly lost (unless the phonographic record itself is being preserved for later, unforseen technical "understanding").

From passive archaeological records to active media-archaeology, such signal recordings allow for the electronic measuring of sonic articulation. Instead of the predominance of musicological interpretation which is cultural semantics, this liberates the sonic event to experimentation, enabling a non-hemeneutic analysis on the sub-philological, sub-alphabetic level.

But what has been recorded on analog media is now being re-played from within the computer. With the digitization of endangered audio media, the symbolical order of clocked time sublimely returns within sound itself – which both Bergson and Heidegger denounced as "vulgar" mathematical time, mathematizing the vibrational event.

Sampling and quantizing of acoustic signals transforms the time signal into frequencies as a condition for re-synthesis. Media culture turns from phonocentrism to mathematics. Digitizing analog

records equals mathematical sound analysis itself. Hermann von Helmholtz questioned "mathematized" sound on the epistemological level:

"[H]ow can we be sure that what has been proven mathematically also occurs in nature [...]? [...] There is nothing in Fourier's analysis to suggest that it is litte more than a mathematical fiction, 'permissible for facilitating calculation, but not necessarily having any corresponding actual meaning in the things themselves'"[23]

In fact humans listen mathematically to the continuous sound, with our hearing channel being an implicitely calculating organ since since the inner ear counts frequencies subconsciously (*nesciens*, in Leibniz' term[24]).

There is a priviled affinity between sonic resonance and the experience of past time. Ludwig Wittgenstein once confessed that when he imagined a tune recorded for a gramophone "this is the most elaborate and exact expression of a feeling of pastness which I can imagine"[25] – undoing historicity in favor of a different access to temporality.

[Does the acoustic signal loose its temporal indexicality when being recorded? Binary "recording" on Compact Disc is a punctual temporal moment, while in acoustic recording by gramophone there is a processual time signal. Its re-play generates a different sense of the past. Replicating a sound from a recording medium, even if taken away from the real event, "retains its indexing properties"[26]. As engraved index (in Peirce's semiotic sense) a sound forms a sharp contrast to its symbolic notation. Sound, when being re-generated out of electro-magnetic latency, embodies a tempor(e)ality different from the almost scriptural engraving in the gramophone groove.[27] The gramophone groove is literally being in-formed by sound, but this is still a material, physical shaping, whereas digital information is no question of matter or energy any more: a sequence of symbols which can be statistically measured in terms of transitional binary entropy, a new kind of "score".]

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[23] Helmholtz, *Lehre*, 56; engl. Übers. S. 34 (?); zitiert nach Erlmann 2010, xxx

[24] On the "Zählorgan Ohr" see Georgiades 1985: 42

[25] Ludwig Wittgenstein, here quoted after: Gregory Ulmer, Applied Grammatology, Baltimore (John Hopkins University Press) 1985, 110

[26] Naomi Cumming, The Sonic Self. Musical Subjectivity and Signification, Bloomington / Indianapolis (Indiana University Press) 2000, 90 (unter Bezug auf Charles Sanders Peirces Collected Papers (1.335, 1905)

[27] See Theodor W. Adorno, Die Form der Schallplatte [1934], in: same author, Gesammelte Werke, vol. 19: Musikalische Schriften VI, Frankfurt/M. (Suhrkamp) 1984, 530-523

"First sounds" (Patrick Feaster), "Time(ly) matters" (GWY)?

Phonography "avant la lettre" is understood here in a double
sense: first of all, all signal record is pre-symbolical, non-
alphabetical, no "letters".

It is the media-archaeological intention to listen to early sound
recordings in a non-historical way (anti-hermeneutically). From
this archaeological site emanates a geninely signal-based
resonance of the past "based on waves and simultaneous time"[28]. It
requires something like the "media-archaeological ear" to make
knowledgable use of that option.

In 1857, the Parisian printer Édouard-Léon Scott de Martinville
patented his *phonautographe*. Sound waves would trigger vibrations
on a parchment, which would then be transmitted to a stylus which
etched out the waves on a page darkened by the carbon of
lampblack. Scott designed a pure inscription device lacking any
playback feature, since as an expert in stenography his target was
that people could and should learn to *read*" the graphic traces
left by the mechanical acoustic transduction. Scott recorded
sounds, but it did not occur to him "that by retracing the grooves
and channeling the vibrations back into a funnel it could also do
the reverse. "And read they were, though neither in Scott's
lifetime nor by human eyes. In 2009, almost exactly 150 years
after the recordings had been made, a set of squiggles was
scanned, converted into digital waveform, and played back by a
computer. At first, a minor mishap occurred. The researchers
engaged in acoustically disinterring Scott fell prey to Kittlerian
time axis manipulation." (GWY 2015)

"[T]hey thought they were hearing a woman's voice, singing the
French folk song '*Au claire de la lune*,' but later they realized
they had been playing back the audio at double its recorded speed.
When they dropped it down to the right tempo, a man's voice
appeared out of the crackle and hiss: Édouard-Léon Scott de
Martinville warbling from the grave."[29]

Today, opto-digital reading of early Edison cylinders allows for
listening again to otherwise unaccessible sound recording; the
opto-digital *close reading* of sound as image, though, dissolves
any meaningful unit into discrete blocks, which are accessible for
human analysis only by operative techno-mathematical diagrams.[30]

The recording which became famous by Internet circulation has been
the French song "Au claire de la lune" sung into the phonautograph

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[28] See Tony Schwartz, The Responsive Chord, New York 1974 <?>
[29] xxx Johnson 96, as quoted by WGY, Typescript "Time(ly) Matters",
2015
[30] See Patrick Feaster, Pictures of Sound. One thousand years of
educed audio: 980-1980, Atlante, GA (Dust-to-Digital) 2012

in 1959. But closer to the medium, the very first recording
surviving as phonautogramm in the Parisean archives leads to a
moment of indecidability, an irritation of hermeneutic and
acoustic understanding: sound or noise? Which is the "first sound"
- a recognisable artefact, or a media event?

Audio: Feaster-2012-Ur-Phonautograph-Scott-1857-Track-16.wav

But caution, the record from which sound emanates in such acoustic
argumentation is not a disc with acoustic grooves any more but a
computer storage disc with discrete data sections which need
algorithmic processing to become rhythmic music again.

This is an analytic, media-archaeological form of deciphering the
sound of the past. To the media-archaeologically sharpened mind,
such sounds from a computer audio line-out will never be confused
with a "live" sound since such a mind is conscious of the
algorithms of which such an animation is a technomathematical,
processual function.

<siehe § "„First Sounds" (Patrick Feaster)" in: PHONARCH-ENG>

In media-*active* archaeology, the technological apparatus itself
turns out to be the archaologist proper. Patrick Feaster and David
Giovannoni succeeded in re-sonifying the preserved phonautographic
engravings (*Schallbilder*), beginning with Scott's recording of a
sound folk tone of 435 Hz in the year 1859.

Here the pure vibrational medium (the sine wave again) is the
recorded message, before it became buried and dissimulated in
musical "content".

150 years later science realized that with optical "reading" of
such acoustic signal lines sound can be re-synthesized and thereby
re-sonified.[31]

What metaphorically appears like the pick-up of sound images by a
"virtual, digital gramophone needle"[32], in fact is something media-
epistemologically different, a picking-up of a completely new
kind: the techno-mathematical ear.

True media archaeology starts here: The phonograph as media
artefact does not only preserve the memory of culturalized sound
but stores past *technical* knowledge as well, a kind of frozen
media memory embodied in engineering and waiting to be listened to

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[31] The sonification of Lèon-Scott's phonautogram from April 8,
1860, in Paris (the children song "Au clair de la lune, Pierrot
répondit") can be accessed *online*
http://www.firstsounds.org/sounds/1860-Scott-Au-Claire-de-la-
Lune-09-08.mp3

[32] Harald Haack, Die erste Klangaufzeichnung. Eine Audiografie,
online http://newsbattery.blogsport.de/2008/05/07/die-erste-
klangaufzeichnung-eine-audiografie

by media-archaeologically tuned ears. The noise of the wax
cylinder itself which the record articulates whenever it is being
re-played is not discursive, but media-archaeological information
of the physically real event. Let us listen to this attentively
and not exclude it by anthropocentric hermeneutics.

With the micro-physical *close reading* of sound, the materiality of
the recording medium itself becomes archivally poetical.[33] Instead
of musicological hermeneutics the media-archaeological ear listens
to signals.

The media archaeologist, without passion, does not hallucinate
life when he listens to recorded voices; the media archaeological
exercise is to be aware at each given moment that we are dealing
with technical media, not humans, that we are not speaking with
the dead but operative recording keeps sound un-dead.

"Phonographic reproductions are physical effects of the real. A
gramophone inscription surface captures sound waves emanating from
Enrico Caruso's larynx. "This is not the case when we write about
Caruso"[34] - all the difference between transitive signal recording
and intransitive historiography.

From "beyond the grave" (Chateaubriand),

"[...] Scott's Parisian recording session is the first undead
moment in time. It is the earliest instance of physically recorded
history we can directly link back to by means of technologies able
to reproduce the recording. Here, media become the subjects of
media archaeology by providing a technological link-up that
enables us to experience a fully mechanized (and later digitized)
Proustian *madeleine* moment: a temporal interface that cuts across
time. [...] With the invention of the phonograph, he [sc. Edison]
decreed, speech "has become, as it were, immortal" (quoted in
Kittler 1999: 21). New media allow us all to graduate to
ghosthood; but ghosts are apparitions very much at odds with
history. Referring to Edison's phonograph, John Peters notes that
it "divides history into two halves, a before and an after. Prior
to 1877, all sounds died" (2004: 177)." (GWY 2015)

At that point, let us go even one step further: "Is that which is
divided here, especially if it is divided into mortality and
immortality, still contained *by and within history*?" (GWY 2015)

"First, technological media record and store" - or steal? -

<see video *Theft*, by Lena Athanosopoulos, negative phonography:
waves / voice / silence / radio / absence>

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[33] Karl Sierek, Die weiße Leinwand, in: ders., Aus der Bildhaft.
   Filmanalyse als Kinoästhetik, Wien (Sonderzuahl) 1993, 115-130
   (122), referring to: Umberto Eco, Semiotik, 263f
[34] Geoffrey Winthrop-Young, Timely Matters. A Story of Media at
Odds with History, typescript (November 2015)

"real time (with, as in case of Scott's almost inaudible voice, all the accompanying noise, crackle and hiss - indeed, the very concept of noise has real-time recording as its technological apriori). This storage of time by means of media technology and its subsequent re-production by later media technologies allows for a direct temporal interface between otherwise distinct moments of *human* time." (GWY 2015)

But is this still a human voice, or does it turn out - resulting from analysis into the nature of speech by nineteenth century measuring and recording media - that the human voice in itself is a mechanical event which can be co-originary produced by synthetic devices?

Any audio recording "takes its own time. Technological media operate in accordance with their inner *eigenzeit* ("own time"), which is categorically distinct from the surrounding human time. "The *eigenzeit* of the apparatus world relates to the macro-time of history like self-referential systems to their so-called environment."[35] (GWY 2015)

In terms of cybernetical theory, we live in systems of closely or tightly coupled tempor(e)alities.

"*Medien zeitigen*, then, implies that operating in their micro-temporal *eigenzeit* media engage in a 'techno*poiesis* of time'"[36] - which is chronopoetics. "They create a piece of technologically facilitated time that can be moved along *outside* of the human time of history and then - with ghostlike effects - be reinserted back into it." (GWY 2015)

Chronopoetics aims at replacing the unifying, totalizing signified "time" by a plurality of tempor(e)alities, as expressed by George Dyson:

"Time as we know it just does not exist in the digital universe. A computer is not operating on time, it just operates on sequence. [...] this other world exists now, and it is not tied to our form of time at all."[37]

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[35] Ernst, Wolfgang. 2012. *Gleichursprünglichkeit. Zeitweisen und Zeitgegebenheit technischer Medien*. Berlin: Kadmos, 306
[36] GWY 2015, referring to Ernst 2012: 286
[37] George Dyson, Turing's Cathedral <?>, xxx. This has been expressed as well in Dyson's lecture "No Time Is There: The Digital Universe", on occasion of the conference *Time and the Digital Universe* within the festival MaerzMusik, Berlin, Haus der Berliner Festspiele (March 12 / 13, 2016)