

Asymmetries between "sound" and "music"

According to the "Y" model, artistic and scientific research operate in distinct but parallel lines, derived from the same epistemological challenges. Media-archaeological argumentation, instead of contributing to so-called "sound studies", rather turns the notion of sound upside down in order to reveal, below its apparent auditory phenomena, its epistemological essence which is an enunciation of specific *tempor(e)alities*. Therefore "implicit sonicity" will be addressed, not simply to make verbally explicit what is already articulated in sound art, but rather to reveal the hidden epistemological implications of sound itself. While sound as acoustic vibration is a physically material event, in its temporal form ("implicit sonicity") which affects the human sense of time it is volatile and immaterial. How does sound as matter relate to its immaterial timing?

In a fundamental sense, sound *matters* as time-critical articulation. The concept of "sonicity" as epistemological approach is rather related to media-archaeology than to the acoustic. Sonicity happens as non-material oscillations even without being heard as acoustic "sound" any more.

"When we see rhythm preserved in a radio aerial, we cannot stop the image of a reciprocal action between the geometric and the temporal from intruding into our thought. It is therefore on our best interests to regard things as truly the products of stationary waves. Periods are spatio-temporal function. They are the temporal face of material things. As it vibrates, a thing reveals both a temporal and a material structure."¹

The almost immaterial sonicity of electro-magnetic waves, far beyond simply a phenomenon in acoustic culture, make "sound matters" a fundamental event of being-in-the-world. There is sound in the machines themselves, in symbolic representation (data) and in non-symbolic occurrence (signals); the cultural semantics of "music" (discourse) clashes with technical embodiments of sound (non-discursive) as articulation of specific *tempor(e)alities*.

This involves the asymmetrical relation between "sound" (as signal event) and "music" (as cultural code) - which is turned upside down in "digital" media sound which is the truly techno-logical mathematization of sonic matter - and thereby a re-entry of the "musical" structure.

According to Norbert Wiener's seminal cybernetic definition, information - measured in *bits* - is "neither energy nor matter". Is the current interest in sound therefore a "post-digital" nostalgia for vibrational matter? Different from "music" in the Pythagorean tradition, sound can not be reduced to an aesthetic, political or discursive construction. The agency of emancipating sound from music is media-epistemological indeed: It has been signal recording technologies and media theories (*avant la lettre*) which heightened awareness of the physicality of sound as vibrational event (both mechanical and electro-

¹ Gaston Bachelard, *The Dialectic of Duration* [FO 1950], Manchester (Clinamen) 2000, 78

magnetic). In terms of ontological unrevealing, it is techno-logical analysis (such as spectrography and Fast Fourier Analysis) which matters as a better "understanding" of sound than human hearing itself. Sonic auscultation is an attempt to capture the volatility of sound and reveal its temporal message in a concrete manner through the algorithmic stethoscope, which is software for sound analysis.

Spectral analysis of sound transforms the signal from the time domain into the frequency domain. The analytic science has become aesthetic practice in "spectralism" as compositional technique in contemporary music², where the experimentation of micro-times is being replaced by mathematical patterns.

Sound art matters: Implicit "sonicity"

Does aesthetic experience come to existence only in human perception?³ For the media-archaeological ear, the musical structure does not already unfold in a silent decoding of the score (as claimed by Theodor Adorno), but only as actual enactment, in its operative implementation in structurable matter.

"[M]usical time is the organization or the set of forms 'imprinted' <...> on sonorous matter, on sound."⁴ Is sound material, and music conceptual? If music is sounding matter shaped in symbolically ordered time, it is: *drama*.

Coded writing of music is "symbolical" time; "real" time takes places in analog signal recording; "imaginary" time is the discourse of history suggesting coherence where is, in fact, fragmentation - time shards.

Only when a musical score is decoded and *incorporated* into human performers or *implemented* into signal processing machines, it can be articulated as sound. "Music" is the semantic content of "organized sound" (according to Edgar Varèse and John Cage); the message of a vibrational medium is the experience of time, just as in technological operations: "Media mediate change and are therefore the material form of time."⁵

[Philip Glass 1974 on Repetitive respectively Minimal Music: "So bleibt zu hoffen, daß man dann in der Lage sein wird, das „Jetzt“ der Musik wahrzunehmen, frei von jeder dramatischen Struktur, als ein reines Medium des Klangs."⁶]

² See Hugues Dufourt, *Musique spectrale: pour une pratique des formes de l'énergie*, in: *Bicéphale* no.3 (1981), 85-89

³ On *Rezeptionsästhetik*, see Roman Ingarden, *Vom Erkennen des literarischen Kunstwerks*, Tübingen 1968

⁴ Jean-François Lyotard, *God and the Puppet*, in: ders., *The Inhuman. Reflections on Time* [*L'Inhuman: Causeries sur le temps, Paris 1988], Stanford, Cal. (Stanford University Press) 1991, 153-164 (153)

⁵ Sean Cubitt, *The Practice of Light*, Cambridge, MA (The MIT Press) 2014, 257, as quoted in the introduction to Timothy Barker, *Television In and Out of Time*, forthcoming in: Andrew Hoskins (ed.), *Digital Memory Studies. Remembering through digital and social media*, London / New York (Routledge)

⁶ Zitiert nach Programmheft der Aufführung der Berliner Kammeroper von *In the Penal Colony*, Musik Philip Glass, Hebbel-Theater Berlin, November 2002, 7

In discussing the essence of the *tone*, G. W. F. Hegel defines it in its temporal essence: "Ein Verschwinden des Daseins, indem es ist"⁷. - a disappearance of being, while it exists.

The commonality of sound, vibration, light, and technical image lies in their equal condition as time-critical frequencies. The existence of sound *in* and *as* time is twofold: its explicit tempor(e)alities in human perception and its implicit dynamics as epistemic object.

The privileged alliance between technological events and musical sound is based on their common denominator which is its temporal processuality. This is evident in a central electro-technical device: the resonant circuit, otherwise significantly called "tuned" circuit. Such an electric circuit consists of an inductor and a capacitor in mutual connection. "The circuit can act as an electrical resonator, an electrical analogue of a tuning fork, storing energy oscillating at the circuit's resonant frequency."⁸ Resonant circuits are used either as sender (for generating signals), or as receiver (for picking out a signal at a particular frequency from a band of carrier signals), particularly in radio technology, up to the mobile media in digital wireless communication.

In an experiment from 1889, David Lodge placed two resonant circuits next to each other, each consisting of a Leyden jar connected to an adjustable one-turn coil with a spark gap. When a high voltage from an induction coil was applied to one tuned circuit, creating oscillating currents, electric sparks were excited in the other tuned circuit only when the circuits were adjusted to resonance. Not by coincidence engineers borrowed the terms to describe the micro-temporal event of oscillatory electro-magnetic discharge from musical science. "Lodge and some English scientists preferred the term 'syntony' for this effect, but the term "resonance" eventually stuck."⁹

What McLuhan once daringly termed "acoustic space", is more fundamental than what the human ear can hear, indeed. As the radio producer Tony Schwartz wrote in his book *The responsive chord* in 1974: "In discussing electronically based communication processes, it is very helpful to use auditory terms [...] like *feedback ... reverberation ... tuning* [...]."¹⁰

"Sonicity" inbetween vibrational force and electro-magnetic waves

In *The Audible Past*, Jonathan Sterne differentiates sound as perceptual quality from mechanical vibration as physical event: „As a part of a larger physical phenomenon of vibration, sound is a product of the human senses and not a thing in the world apart from humans. Sound is a little piece of the vibrating world“¹¹ and „somewhat human-centered“¹². But some conditions must be

⁷ G. W. F. Hegel, *Enzyklopädie* (1830), § 459 (= *Werke*, Frankfurt/M. 1970, vol. 10, 271)

⁸ http://en.wikipedia.org/wiki/LC_circuit (accessed 23rd January, 2015)

⁹ Wikipedia *ibid.*

¹⁰ *Garden City, New York* (Anchor books), 23

¹¹ Sterne 2003: 11

¹² Sterne 2012: 7

given "for something to become recognized, labeled and valorized as audible in the first place"¹³.

Vibration encompasses both a „dissolution of matter“ as well as „sensory experiences of things which vibrate“¹⁴. Vibration (such as in high frequency radio) operates even before being translated into sense-data called sound, light, heat - against „purely audiological conceptions of sound“¹⁵ which limit the frequency range. Against a „naive physicalism“ and a „phenomenological anthropocentrism“, Steve Goodman defines the "ontology of the vibrational force" as an "in-between of oscillation, the vibration of vibration, the virtuality of the tremble. Vibrations always exceed the actual entities that emit them. Vibrating entities are always entities out of phase with themselves."¹⁶

The theoretical conceptualization of vibration carries itself a temporal index: In late 18th and 19th century, "new technologies and scientific theories heightened awareness of the physicality of sound as vibration"¹⁷, while at the same time generating non-mechanical vibrations like the electro-magnetic oscillation, technologies of telephony and radio.¹⁸ Tactility is the mode in which sound can be experienced by humans as vibration - different from the electro-magnetic field ("light") which does not mechanically enact pressure.

The English noun "sound", in German, splits into two different notions: a) *Schall* which is the physical acoustic air pressure which can be perceived by the human ear and hearing; b) *Klang* which names the periodic, harmonic sonic events.

Taken at face value, sound is "mechanical disturbance from a state of equilibrium that propagates through an elastic material medium"¹⁹. But German language differentiates between *Schall*, *Klang*, *Ton*. In English, the semantics of "sound" embraces all this trinity.

Sound excludes noise by definition - but noise is integral to communication theory. Sound therefore is too limited in its epistemological scope. The notion of "sonicity" includes noise as the stochastic alternative to music in Iannis Xenakis' sense and in terms of electronic music: subtractive sound synthesis creates "order from noise", filtering frequency bands,

like the Indian concept of an all-encompassing "drone" ambience which is continually present throughout and from which music can be extracted - different from the traditional Occidental additive notion of sound from single harmonic propositions or waves.

Additive music builds sonic events up synthetically, with its base being silence, whereas the subtractive musical concept actually begins from sound. Here, all

¹³ Veit Erlmann 2010: 18

¹⁴ Shelley Trower 2012: 7

¹⁵ Friedner/Helmreich 2012: 76, as quoted by Papenburg

¹⁶ Goodman 2010: 82

¹⁷ Trower 2012: 2

¹⁸ Trower 2008: 134

¹⁹ Encyclopaedia Britannica, 2003

the notes and possible notes to be played are present before the musicians even start playing.²⁰

Sonicity refers to the specific temporal knowledge which is implicit within sonic instruments of analysis and synthesis²¹ on the one hand, and to graphically or mathematically derived sound on the other.²² This even extends to the concept of non-struck sound like the theoretical fiction of vibrational forces called "ether".²³

At that point, the semantic associations of "sonicity" might start to get misleading. In 19th century discussions on the nature of electro-magnetic phenomena, acoustic terms have been borrowed, e. g. Maxwell's notion of the "electrotonic state"²⁴. It had been Christiaan Huyghens' "undulation theory" which equalled light to acoustic waves, resulting in the literally "media"-theoretical fiction of an ether.²⁵ But the equation of electro-magnetic "waves" with elastic mechanical vibrations is just a heuristic model to gain metaphorical evidence (*Anschaulichkeit*) of an otherwise directly imperceptible event.²⁶ Maxwell cautions on the (otherwise useful) analogy between light and the vibrations of an elastic medium.²⁷

From bodily sound ... to the all-embracing sonic?

The epistemological challenge is in the cultural dilemma of articulated sound (be it oral poetry, spoken language or music). On the one hand sound is very material (physical air pressure which hits, even violates the human ear); the Berlin Club Transmediale (CTM) 2015 festival theme *Un Tune* therefore has

²⁰ See Bill Viola, *The Sound of One-Line Scanning*, in: xxx 1990, 44

²¹ In that sense, John Durham Peters writes of "sonic revelations" of the vibrational qualities of the human eardrum by Hermann von Helmholtz' artefactual resonators (Resonatoren): Helmholtz, Edison, and Sound History, in: Lauren Rabinovitz / Abraham Geil (eds.), *Memory Bytes. History, Technology, and Digital Culture*, Durham / London (Duke University Press) 2004, 177-298 (185)

²² Derivation is meant here in its sense of mathematical differentiation as well where the derivative of a sinusoidal function describes its rate of change near a chosen input value. On the close ties between mathematical abstraction and phonocentricity in early Indian science see Moebus / Wilke 2011, 227

²³ The term "sonality" has been proposed to name such concepts: see Oliver Moebus / Annette Wilke, *Sound and Communication. An aesthetic cultural history of Sanskrit Hinduism*, Berlin / New York (de Gruyter) 2011, 12 and 705

²⁴ "Elektrotonischer Zustand", in: James Clerk Maxwell, *Ueber physikalische Kraftlinien [= Ostwalds Klassiker vol. 69]*, 5

²⁵ Criticized by Albert Einstein, *Äther und Relativitätstheorie*, Berlin (Julius Springer) 1920, esp. 9f

²⁶ Josef Maria Eder, *Photochemie (die chemischen Wirkungen des Lichts)*, Hallen (Wilhelm Knapp) 1906, 11

²⁷ "[...] so müssen wir doch dessen eingedenk bleiben, dass sie nur auf einer formalen Aehnlichkeit zwischen den Gesetzen der Lichterscheinungen und denen der elastischen Schwingungen beruht": James Clerk Maxwell, *Ueber Faraday's Kraftlinien*, ed. L. Boltzmann, Leipzig (Akadem. Verl.-Ges.) 1898, 5 [Reprint 1995]

been exploring sonic articulations in terms of direct bodily effects and other sensory stimuli.²⁸

This shifts the focus from the symbolic and cultural semantics of music to questions of physical sono-affective forces. Sound moves in between musical meaning ("what does it attempt to portray?") and media communication ("what effects do sound and frequencies have upon us?").

"Sound matters. It mediates between the real and the virtual, connects the physical reality of acoustics with the mental reality of the muses."²⁹

But even if the affective potential of sound is clearly a focal point, "yet it constitutes only one aspect of an investigation into the distribution, modulation, and perception of frequencies"³⁰. Therefore sonicity might be liberated from sound. With the traditional distinctions between noise, sound, and music being increasingly blurred in artistic practice, "the concept of 'the sonic' <...> as an overall category <...> transgresses the limits of the musical and the acoustic" (ibid.) and opens into "the spectrum between bio-acoustical field recordings, brainwave entrainment, binaural beats, biofeedback, psychoacoustics, noise, and sub-bass vibrations"³¹. Such vibrations are delicately moved matter.

Material sound *versus* electro-magnetic sonicity

Even if sound is - to human perception - the most immaterial matter, still it is different from the electro-magnetic waves which touch the human eye as really immaterial "light". Sergei Eisenstein was wrong when he asked "to remove the barriers between sight and sound"³². In terms of harmonic relationships there might be a symmetry between the visual and the auditive, but in terms of (electro-)physics there is an epistemological asymmetry between mechanical, violent vibrations and electro-magnetic "waves". Optophonic "listening" to the "sound" of visual patterns by sonification rather obscures this fundamental difference.

(Ultra-)Sonic imaging

The electronic image, different from traditional painting, with its 650 successive lines every 25th / second, only exists when succeeding within a time-critical window of synchronized presence. Video artist Bill Viola actually listens to "The

²⁸ See <http://www.ctm-festival.de/festival-2015/theme>

²⁹ Martin Carlé / Anastasia Georgaki, Re-configuring Ancient Greek Music Theory through Technology. An adaptive electronic tuning system on a reconstructed ancient Greek barbiton, in: Michèle Castellengo / Hugues Genevois (ed.), *La musique et ses instruments / Music and its instruments*, Sampzon (Éditions Delatour France) 2013, 333-380 (335)

³⁰ CTM 2015 theme

³¹ CTM 2015 theme

³² Sergei Eisenstein, *the Film Sense*, New York 1969, 87

Sound of One Line Scanning"³³. Marshall McLuhan actually termed electronically mediated communication "acoustic space".³⁴

Ultrasound imaging, known from medical diagnosis, itself is images based on sound, where the (comparative to EM waves) slowness of acoustic waves (echo delay) are used to create electronic signals which can computationally be transformed into two-dimensional visual data. Such sound phenomenally is not experienced directly (binaurally) but indirectly seen, as image.

Ultrasound, by definition, transcends (above 20 kHz) the realm of acoustic signals which can at least be recognized within the audible range of the human ear.

Different from visualised "light sound" from celluloid in cinema, in sonography the inaudible sound is visually revealed. The age of sound film is linked to the functional (Fournier d'Albe) or aesthetic (Raoul Hausmann) "optophone".

Sound & matter *versus* the electronic audio signal

All kind of "waves" are a form of energy transfer without physical transport. Still there is a radical difference between mechanical and electro-magnetic waves. Acoustic vibrations are among the most immaterial articulations of materiality. Not only can physical matter can be forced to vibrate, but - as pointed out by Henri Bergson - matter itself consists of vibrations, that is: implicit sound.³⁵ Matter thus resolves "into numberless vibrations, all linked together in uninterrupted continuity, all bound up with each other, and travelling in every direction like shivers through an immense body"³⁶.

But "sound" relates to "matter" only in the acoustic sense of mechanical vibrations. The oscillations of the electro-magnetic field are a different kind of sound. Let us therefore undo the tight sound/matter coupling, in favor of a more processual, time-critical notion of sound as signal event.

When propagated in a physical medium like air or water, sound is the most ephemeral form of matter; itself it has no solid materiality but is matter unfolding in time. Matter here becomes a temporality, like an analog electronic image which the video artist Bill Viola once described as "The Sound of one-line Scanning". "Phonovision" was the name given to gramophone records as storage medium of the earliest electro-mechanical Baird-Television picture series.

When mechanically propagated sound is being technically transduced, this is not simply a linear translation, but it changes its essence from acoustic to electric signal. Within a telephone line, or when stored as magnetic charges on

³³ In: xxx Lexier (ed.), *Sound by Artists*, xxx

³⁴ See Tony Schwartz, *The Responsive Chord*, New York 1974

³⁵ As emphasized in the Mauricio Lazzarato, *Video Philosophie*, Berlin (b-books) 2xxx

³⁶ Henri Bergson, *Matter and Memory*, London (George Allen & Unwin) 1950, 276

tape, a media-epistemological "transsubstantiation"³⁷ of sound has happened, since as such the audio event becomes accessible to signal processing.

The so-called audio signal, beyond its possible origin in the physical world, may have come into existence by electronic generation exclusively - in electro-technical *autopoiesis*.

The real essence of sound such as in Electronic Dance Music or Drum and Base is not primarily bodies but electrons in periodic motion. As (still) human composition or mix or mastering, it is still *musical*, while the *sound* itself has been de-corporalized completely, neither be connected to a human performer or voice nor to a mechanical instrument any longer. What started with the electronic live recording and studio editing, now has become the message of the electronic and algorithmic (that is, techno-logical) medium itself.

Beyond the physical world of mechanical vibrations, the sonic articulation, on the electronic level, exists as signal only. In reverse, electrons - the essential elements of electronic media - are themselves accompanied by waves. Erwin Schrödinger intuitively recalled the oscillating monochord and thereby defined implicit sonicity:

"Suppose the electron in the hydrogen atom is analogous to a string - tied at both ends - in a musical instrument. Such a string emits a very definite tone together with its overtones, but not the wavelengths in between. With this idea in mind, Schrödinger <...> set up a wave equation for the electron"³⁸ - which is the only true "radio", as radiation.

The electro-acoustic "lab": Cologne versus Paris

Memory manipulation on and by tape has been common practice in the heroic age of magnetophone-based audio engineering. This actually reminds of the different techno-aesthetics of the Paris electronic music studio run by Pierre Schaeffer with its conceptual *musique concrète*. Stockhausen criticized the Paris studio for its aleatory concept of "found sound" (passive magnetophone recording and then active manipulation) rather than generating electronic sound genuinely from non-environmental electronics.³⁹

Only in electronics, the almost pure sine wave as elementary unit exists (which fascinated young Stockhausen).⁴⁰ In its physically impossible form, the *ideal* sine wave has a technological existence indeed: within the digital computer as mathematical function expressed in executable code.

³⁷ In the Catholic liturgy, the substance, or reality, of the Eucharistic offering (either bread alone, or bread and wine) is changed into both the Body and Blood of Christ. See the entry "Transsubstantiation" in the *online encyclopedia* Wikipedia: <https://en.wikipedia.org/w/index.php?title=Transsubstantiation&oldid=696228320>; page status: 21 December 2015

³⁸ Steve J. Heims, John von Neumann and Norbert Wiener. From Mathematics to the Technologies of Life and Death, Cambridge, Mass. / London (MIT) 1980, 103

³⁹ See Baumgärtel 2015: 100

⁴⁰ See Tilman Baumgärtel, Schleifen. Geschichte und Ästhetik des Loops, Berlin (Kulturverlag Kadmos) 2015

A primary difference between the Paris studio of *musique concrète* (Pierre Schaeffer) and the Cologne WDR radio of Electronic Music (created by Herbert von Einem) is not simply an aesthetic but a media-epistemological one: Recording and manipulation of originally physical sound *versus* electronic sound generated by tone oscillators from the beginning, in pure sonicity. There is electro-mechanical kinetics and tactility on the one side, and circuitry-operative electronics on the other.

In artistic practice the active co-agency of the magnetophone has been recognized by pianist Glenn Gould.⁴¹ Many of such compositions enhance the live performance by human musicians in communication with pre-recorded sound. It has been against this tape-based sampling that, in contrast, the computational paradigm of real-time human-machine-interface developed, such as Roland Pfrengle's piece *Klaviermusik* (1984).

Very experimentally, Karlheinz Stockhausen in the Cologne Westdeutscher Rundfunk radio station "Studio für elektronische Musik" generated sine waves genuinely from within electronic oscillators. Notably his piece *Kontakte* (created contemporary to KLT, 1958-1960), in its first version, is not primarily about communicational "contacts" between human instrumentalists and sound machines any more but about the coupling inbetween electronics in its radically *non-discursive autopoiesis*. While for instrumental parts there is a conventional score, the electronic parts are in graphic representation.

Techno-logical understanding instead of human hearing

Hearing is based on the very touch of sonic waves; therefore the acoustic dimension of media may seem as the very extreme of tactility - an 'audio-tactile' space that McLuhan conceived as defining mode of media culture (McLuhan 1962).

In this space there is no fundamental distant view as in vision. The temporal equivalent to the audio-visual "proximity" or "tactile" is "immediacy".

All changes when sound becomes transduced into an electric signal and thereby modulates a radio high frequency carrier band. Electro-magnetic waves do not mechanically touch the human ear. All the sound is there but unhearable: the implicit sonicity of electromagnetic vibrations, closer to light (especially in Ultra Short Wave radio transmission).

That is why Claude Shannon, in his notorious diagram of communication engineering, makes a difference between the technical reception and the final "understanding" of a received message. The ear becomes an electronic receiver. Zwicker called the ear a "Nachrichtenempfänger", with the brain being the final destination. But the electro-magnetic event is not material any more but an epistemological challenge to re-think sound-as-matter. It can only be phenomenologically observed by its effects or needs mathematically to be diagrammaticized (Maxwell's equations).

⁴¹ See the "Glossary" explaining practices of audio tape recording and cutting, in: Glenn Gould, *Vom Konzertsaal zum Tonstudio*, Munich / Mainz 1992, 173

De-materialization? Digitalized "sound"

Sonic events (from noise to music) are not perceived by the human ear alone. Technological analysis not only provided the means with which to better understand bodily and neuronal affects; they have a sonic understanding themselves.

But when sound carriers changed from technically extended writing (such as analog phonography) to calculation (in digital computing), this was not just another version of its materialities, but a conceptual change.

"Music" as cultural art form, in Western tradition, does not belong to the sonic realm, since it is primarily conceptual; from there stems its affinity to early programmed computer music such as Lejaren Hiller's Illiac Suite composition. In 1984, IBM Germany edited a combined book (Heinz Josef Herbort) and LP record called *Computer-Musik*, with the appropriate sub-title "Vertonung im Zeitalter der Prozeßrechner".

Once the analog audio signal becomes digitized, the term "signal processing" becomes fully justified in terms of computing. Coded in binary values, the signal within computing devices shall not be called "audio" any more, even if it can - by digital-to-analog conversion - be emitted via loud-speaker for human ears as sound again. What phenomenologically appears like sound has inbetween (in the techno-logical media channel) gone through a complete substantiation. In digital media, we have lost "sound".

The gap between the material recording of a sonic event and informational ephemerality principally started with the first coded inscription already: the alphabet. The binary code is the smallest possible of such alphabets, and its advantage stems from its distinctive signal-to-noise ratio in signal transmission and signal storage, such as Pierce / Shannon defined a "Philosophy of PCM"⁴².

Friedrich Kittler, in his writings on the entanglement of music & mathematics, reminds that one and the same alphabet has been used to notate verbal language, music and mathematics - a "unicode" which unexpectedly returned as alphanumeric notation with the digital computer. This recursion can not be described in terms of cultural history any more but calls for a different diagram of cultural timing.

Digitized signals at first sight resemble the tradition of music notation (the score), but in addition, they are endowed with operational activity: they are algorithmically executable. Symbolic archival permanence is almost time-invariant, sublated from change with time, leading to ahistorical immediacy in the moment of re-play. We are not tuning into the past any more in sonic temporality.

⁴² In: xxx