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Radical Media Archaeology (its epistemology, aesthetics and case studies)

Wolfgang Ernst
Humboldt University, Berlin

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Abstract

Media Archaeology is both a method and an aesthetics of approaching technical objects. Within a broad range of such academic and artistic practices, radical media archaeology will be presented against the soft archaeological metaphor, with an emphasis on Foucault's approach and the non-human meaning of media-active archaeology. One characteristic of Media Archaeology is its focus on media materialism, analytically or creatively bound to practices like circuit bending.

Seductive events like the excavation of once buried computer game cartridges (the E. T. case) request a more code-oriented, critical resistance to the archaeological metaphor, just like media archaeology as artistic research, such as the "Dead Media" project, requires a media-epistemological counter-reading. Diagrammatic Media Archaeography will be proposed as an alternative to culturally familiar narratives of media historiography.

A special focus will be placed on video art and preservation where algorithms themselves become the archaeologists of archaic video recordings. The media-archaeological method is about signal "re-presencing" (Sobchack) rather than historicising (as in the cases of early

television recording and the Voyager space mission "picture disc"). Media Archaeology as a method of techno-logical research stays close to the signal (be it analog waveforms or digital pulses).

Media Archaeography as a mode of representation has been written about already (e.g. Ina Blom's *Autobiography of Video*). For the challenge of media time heritage, video art preservation is applied media archaeology.

Keywords

media archaeology, materialism, epistemology, aesthetics, media archaeography

Arqueología de los medios radical (su epistemología, su estética y algunos estudios de casos)

Resumen

La arqueología de los medios es, al mismo tiempo, un método y una estética para abordar objetos técnicos. Dentro del amplio espectro de prácticas académicas y artísticas en este ámbito, la arqueología de los medios radical se contrapondrá a la metáfora arqueológica suave, que pone su énfasis en el enfoque *de Foucault y en el significado no humano de la arqueología activa en los medios. Una de las características de la arqueología de los medios es que se centra en el materialismo de los medios, vinculado analíticamente o creativamente a prácticas como el* circuit bending*.*

Sin embargo, algunos acontecimientos fascinantes, como la excavación de unos cartuchos de juegos de ordenador que se enterraron hace tiempo (el caso del juego de E. T.), exigen una resistencia crítica respecto a la metáfora arqueológica más orientada al código*, del mismo modo que la arqueología de los medios como investigación artística, como en caso del* Dead Media Project*, exige una contralectura epistemológica de los medios. Por lo tanto, se propondrá una arqueografía de medios diagramática como alternativa a narrativas culturalmente familiares de historiografía de los medios.*

Se hará un énfasis especial en el vídeoarte y su conservación, en los cuales los propios algoritmos se convierten en los arqueólogos de las grabaciones arcaicas de vídeo. El método de arqueología de medios tiene que ver más con la «re-presencia» de la señal (según Sobchack) que con su historización (como en los casos de las primeras grabaciones televisivas y el «disco de imágenes» de la misión espacial Voyager). La arqueología de los medios, como método de investigación tecnológica, se mantiene cerca de la señal (ya sea en forma de ondas analógicas o pulsos digitales).

Ya se ha escrito sobre la arqueografía de los medios como un modo para su representación (por ejemplo, el libro The Autobiography of Video*, de Ina Blom). En este caso, se aplica la arqueología de los medios para intentar preservar el patrimonio temporal de los medios, como es la conservación del vídeoarte.*

Palabras clave

arqueología de los medios, materialismo, epistemología, estética, arqueografía de medios

The media archaeological impulse

Media Archaeology is both a method and an aesthetics of approaching technical objects. With reference to Foucault's *archéologie* (Foucault 1976, 7, 106-117, 138-139) and with its emphasis on the nonhuman, media-active archaeology, radical media archaeology differs from the soft archaeological metaphor. One characteristic of Media Archaeology is its focus on technological materialism, analytically or creatively bound to practices like circuit bending, while a more rigorous challenge is the techno-mathematical investigation of code and algorithms as the essence of computing. Computing is rooted in technical hardware, signal processing by electric fluidity and switching gates; i.e. the media *archive* in the Foucauldian sense (Foucault uses this word in French in the singular mode, not to be confused with the classical state archive which in French is *plurale tantum*, notably *archives*). Not simply a structural law, advanced technology

is dynamic, which makes all the difference between an algorithm as a symbolic mathematical notation (traditional archival record) and its implementation as a running program. In computational devices, there is not simply a duality between the user interface and its deep hidden ground, but rather a Moebius-loop-like dynamical interrelation resulting from the very definition of its von Neumann-architecture and corresponding human-machine interactivity.

To counterbalance speculative events like the excavation of once buried computer game cartridges (the E. T. case), a more code-oriented, critical resistance to the archaeological metaphor becomes obligatory. The topic of video games, for a moment, induces a short media-archaeological *intermezzo* on film. Film as a topic in media archaeology (Elsaesser 2016) depends on the understanding of its technical message, which is different from its iconic content. Media archaeology is fascinated with cinematography in terms of its mechanism, which is its chrono-photographic essence (returning within cinema as the genre of "Photofilm"). *Radical* media archaeology even ignores the iconic feature of the photographic still, since the cinematographic apparatus can "process" all kinds of inscriptions on tape with step-wise intermittence. Its appeal is not primarily "cinema" as movie theatre event or as art form, but the epistemic momentum which arises from close technical and philosophical analysis of what happens *within* the cinematographic apparatus itself: its automatism and *automathesis* (implicit knowledge). A radical media archaeological reinterpretation of cinematography is its time-discrete essence as implicit anticipation of the digital image. Chrono-photography and the 'moving' photographic image have frozen time and return within the Turing machine, where its operational tape for reading and writing characters is the digital equivalent of the 'moving still'. The photographic step-wise film frame recording has already prefigured the contemporary 'sampling' of analog signals into digital data, while the framed image itself, in current computing, not only implodes into the pixels of the digital image like micro-frames, but even disappears into algorithmic moving image compression. Digital film, therefore, is both the apotheosis and the *posthistoire* of the cinematographic mechanism.

When bracketed by mechanically discrete cinematography and the computationally discrete digital image, in between there is the period of the "analog" electronic image. Recently, algorithms themselves have become the media-active archaeologists of archaic video recordings, and for the challenge of media cultural heritage, digital video art preservation becomes a case study in applied media archaeology.

In terms of Radical Media Archaeology, a term like "historical media archaeology" (occasionally used by Friedrich Kittler) is an oxymoron. History and media archaeology are incommensurable. The media-archaeological method is about 're-presencing' (Sobchack 2011, 323-333) rather than historicising 'past' media technologies. Media Archaeology as a method of logo-technical research stays close to the signal (be it analog waveforms or digital pulses).

In spite of its merits in reminding contemporary technologies of past alternatives, Media Archaeology as artistic research, such as the Dead Media Project, requires a media-epistemological counter-reading. Diagrammatic media archaeography experiments with alternatives to culturally familiar narratives of media historiography. Therefore, Media Archaeography as a mode of description is proposed. Technical "miniatures" are the core modules of media-archaeographical writing, a way of close reading or thick description of technical details as new kind of "historical" source. Since 2012, Nick Montfort's website Trope Tank has been assembling such a "Series of Technical Reports".

Radical Media Archaeology against the soft archaeological metaphor

For media archaeological analysis, the notion of archaeological or even geological "layers" (stratigraphy) is metaphorical and misleading; with integrated circuits and logical arrays, and with the miniaturisation of electronics into flat 'smart devices' like the iPhone in general, two-dimensionality (and its material extensions) prevails, both in terms of electronics and of the interface (the screen). The layer-by-layer breakdown of micro-chips from Western production by the East German computing industry in the 1980s and 1990s was no archaeological excavation but an analysis of electronic circuitry. Topological configurations (whether micro-circuitry or the infrastructural and protocol webs of the Internet) are the "field" rather than the "layers" for media archaeological research.

A geological notion of "deep time" of media (even beyond Siegfried Zielinski's time frame for audiovisual media) (Zielinski 2008) even goes down to mineral excavations, enriching media archaeology with ecological concerns. Once more, however, the archaeological metaphor prevails, when Jussi Parikka's *Geology of Media* (2015), which takes a material perspective on contemporary media culture in terms of ecological temporality, is described as "a media excavation" into the raw material basis of technological development (Goddard 2014).[1]

Radical media archaeology – in its technically "grounded" version – takes its departure from technology itself. It concentrates on the epistemological insights which can be derived from the close analysis of electro-mechanical artefacts, electronics and finally computational machines; literally "fundamentally", media archaeology takes the *arché* at its mathematical face value: algorithmic rooting in numbers. The *logos* of media archaeology therefore is the square root √".

1. On the "deep time" of media Infrastructure, see: Parks and Starosielski (ed.). (2015).

Even the traditional academic science of Archaeology is not concerned exclusively with material artefacts uncovered from the ground; a radical mathematization of archaeological findings (in the early days of computing within the Humanities) has taken place in Archaeology. Nowadays, the challenge of "big data avalanche" and its complexity can be mastered by computational probabilities in a nonlinear way; here Digital Humanities (or computational philology) becomes a twin method to Media Archaeology. Digital Humanities, in its algorithmic approach, is operative "cultural analytics" (Lev Manovich 2012), displacing the more discursive "cultural studies".

In nineteenth century Paris, sociologist Gabriel Tarde once defined "deux sortes de recherches que notre temps a mises en grand honneur, les études archéologiques et les études statistiques"; the statistician "jette sur les faits humains un regard tout abstrait et impersonnel" (Tarde 1890, 99, 114) – which is a non-human perspective on human culture.

In 1936, Walter Benjamin still compared the cameraman to the surgeon, just as Foucault focused on the clinical gaze (Buschhaus 2005). In its radicalised operation, the *media*-archaeological gaze converges with technological *imaging* itself – like an optical scanner recognises the material artefact, and the so-called "imager" is a device for deciphering QR codes. Here, the very term technology unfolds in its literal sense, recalling both material hardware manipulation (*techné*) and its coded operations (*lógos*).

Media archaeology refers to *both* aspects: the physical artefact (ancient Greek *techné*), *and* its mathematical analysis (*lógos*) when it comes to computational devices, which makes the composite term "techno/logy".

The application of techno-mathematical tools of analysis to archaeology (Hodson, Kendall, Tautu 1971) results in media-*active* archaeology, not reducing technological artefacts to their materiality but transcending it towards the mathematical.

Computer archaeology: the E. T. case

Media archaeology is not just a theory but a research method as well; therefore, its character is object-oriented and operational.

What separates computer archaeology from previous technologies is its double focus on both hard- and software. The obsolescence of past computing cannot be reduced to the naive understanding of digging out its residual materialities, as has been suggested by the spectacular digging for Atari computer game cartridges a few years ago. The antique computer game *E. T. - The Extraterrestrial* (1982) has become the target of a soft and a hard way of practicing media archaeology. Ironically, the soft version concerns hardware, and the hard version concerns software.

In the collective memory of media culture, the economic failure of the computer game *E. T. - The Extraterrestrial* (1982) triggered the first crisis in this industry, leading to the literal "dumping" of its hardware in the desert of New Mexico in 1983, almost returning silicon chips to elementary silicon (sand), until it was archaeologically rediscovered in 2014.[2] But unlike classical cultural museum objects, such technological devices – which are in a medium state only when processing signals – require a new form of *processual media archaeology*.

The real "excavation" of computational devices is going to the roots of the programming code within, which requires the disassembly of machine-readable code in radical technomathematical media archaeology.[3] Digital forensics is a twin to Media Archaeology when tracing data from erased or damaged computer hard discs; not by coincidence, one scholar who is not unfamiliar with textual criticism is Matthew Kirschenbaum, who introduced digital forensics into Media Studies (Kirschenbaum 2008).

"Dead media" archaeology as artistic research

Media artist Garnet Hertz, in 2009, published a book in the spirit (and explicitly "in memory") of Bruce Sterling's *The Dead Media Handbook* initiative of 1995. The exuberant title of Hertz's book aligns itself with the 'antiquarian' discourse of the 18th century: *A Collection of many Problems Extracted out of the Ancient and Modern Philosophers: As, Secrets and Experiments in Informatics, Geometry, Cosmography, Horologiography, Astronomy, Navigation, Musick, Opticks, Architecture, Statick, Mechanicks, Chymistry, Water-Work, Fire-Works, etc., Wherennto is added, Dead Media*. If we single out by chance (that is, by random access) any such items, we find, for example, the drawing of a geometrical system for the measurement of dimensions, apparently from the late Renaissance, or – another case – the switchboard of an early computer installation in an office.[4]

The intention of Sterling's original Dead Media project was to produce a book, but it started and ended with an online archive, finally disappearing into the Internet archive itself.[5] Consequently, Hertz's monument to Sterling's 'Dead Media' project itself realigns with the more reliable chance for enduring knowledge in the Gutenberg era. The printed book text and illustrations are technically authorised by material supplements, like scraps of paper stripes with embossment which

2. For photographies from this excavation, see <https://en.wikipedia.org/wiki/Atari_video_game_burial> [Accessed:10/11/2017].
3. See <http://adamsblog.aperturelabs.com/2013/01/fun-with-masked-roms.html>. [Accessed :10/07/2014].
4. See: <http://underbelly.nu/product/a-collection-of-many-problems> [Accessed: 10/11/2017].
5. <https://web.archive.org/web/20071019055700/http://www.deadmedia.org/notes/index.html> [Accessed: 11/11/2017].

apparently is Morse code. But what is declared as 'dead media' in this case can principally be re-enacted (thus deciphered, read, sonified) today, just like the measurement instructions are mathematically valid still, and the switchboard continues in present-day computing, though in alternative miniaturised forms. Melancholy is the expression of nostalgia for something we long for but can no longer reach, since it is entropically (irreversibly) gone. The media-archaeological approach is non-melancholic, however.[6] Past media are un-dead, principally (*en archê*) re-enactable and thus in a potential state of latency, of time delay (Delta-*t*). Media-archaeological artefacts are embedded in another temporal logic which defies historisation; as long as they are not operative, they remain in 'museal' latency, though at any moment they could be reanimated, like signals as a function of time.

Media themselves as archaeologists: archaic video recording

Media archaeology aims at an *archaic* media experience: a 'rarification' of discourse (Foucault). When performed by non-engineers and non-IT specialists, it is not a simplification, but a conscious analytical reduction to techno-logical essentials and *principles* (the Latin equivalent to *archê*). Media Archaeology therefore looks at moments of technological emergency not in terms of historicism, but because technological structures become evident in their beginnings: "It is the beginnings of invented things, which appeal to me", writes Lance Sieveking (who wrote one of the first television dramas aired by the BBC), and explains: "For it is at their beginnings, that we may detect their true nature", that is: their epistemological essentials. Sieveking is quoted as the *motto* of the memoirs of John Logie Baird, *Television and Me,* which provides for a very archaeological insight indeed into first steps of the electro-mechanical television apparatus. "In principle, the *televisor* is both simple and ingenious", comments the brochure accompanying the model kit *The Televisor*, developed as a teaching device by Middlesex University.[7]

In the case of most media it is true that what later developed into mass media was originally developed for the purposes of analysis, measurement or storage in experimental research. This is the case for the Edison phonograph (preceded by Scott's phonautograph, created to register the frequencies of the human voice for analytic purposes, before it was reversed into synthesis in replay), the kinematograph (preceded by chrono-photography), radio (Hertz's Karlsruhe experimental verification of Maxwell's mathematical equations on electro-magnetic wave propagation) and the television tube, which was developed out of a measuring device, Ferdinand Braun's electronic oscilloscope. The oscilloscope itself, such as the TV tube, which only metaphorically survives as a faint allusion within the name of the website YouTube, is a sub-class of the thermionic tube which functionally (if not historically) endures in transistors and the highly Integrated Circuits within microprocessors, and appeared on the media-theatrical scene even before humans could apprehend it: Edison, when experimenting with an improvement to his evacuated light bulb, incidentally came across what became known as the 'Edison effect', which the inventor patented without being able to explain the event – the thermionic tube as diode, emanating in a glimmering shadow on the inner glass surface, a kind of non-semantic anticipation of the electronic image. In fact, the first fully electronic device for storing a literal 'bit' was the flipflop circuitry, consisting of two interlaced triode tubes – therefore "analogue" electronics returns from within "the digital".

A dramatic gap opens up between the phenomenological surface of media (such as the proverbial television "tube") and their concealed *archê*. Technological media are non-discursive formations which, however, can be addressed in technomathematical terms. Media archaeology performs a micro-epistemology, i.e. discovering, analysing and describing the epistemological sparks which spring from the most concrete level of technology itself, such as the delicate electronic saw-tooth signal generator, which creates the jumps of single cathode ray lines within a television set in order to create the impression of an electronic image for always belated human perception (Klopow 1956, 50-99).

Archaeology in Foucauldian terms deals with enunciations, i.e. what is *not* immediately visible: geno- rather than pheno-textual. A photograph of an early television set such as the 630-TS, made by the company RCA[8], does not actually show a medium, not even a "dead" one, but a technical sculpture, since it lacks its essential medium definition: signal processing. The tube (mostly for museological preservation reasons and obsolete communication engineering standards) remains empty here.

In terms of television studies, the 630-TS may have been among the first mass-produced television sets in the US, in 1946, but at this point the media-archaeological incubation period of its technology had already ended. Media Archaeology rather concentrates on the emergent prototypes such as John Logie Baird's electro-mechanic, Nikow-disc-driven *Televisor* in the 1930s. The starting point for Donald McLean's functional signal re-enactment of early 30-line television image recording (resulting in his monograph with the telling title *Restoring Baird's Image*) was the misunderstanding of gramophone records in the archives of the BBC. Put on the turntable, they produced

6. See definition of "Media Archaeology" in: <https://en.wikipedia.org/wiki/Media_archaeology> [Accessed: 30/11/2017].
7. See <www.mutr.co.uk>.
8. See Radio Museum website <http://www.earlytelevision.org/rca_630.html>.

no musical sound; attached to the oscilloscope, figurative patterns took shape and suggested an archaic line-by-line television recording, media-archaeologically recalling Bill Viola's definition of the electronic image as the "sound of one-line-scanning", closer to the unfolding of sound from the grooves of a phonographic record than to the photographic or film image.

In fact, sonification of the electronic image once served as a media-archaeological, that is, analytic tool. Baird reports on his experiments to enhance the luminosity of his early television images. In testing out the amplifiers, he used headphones and listened to the noise of the vision signal: "I became very expert in this and could even tell roughly what was being televised by the sound it made. I knew, for example, whether it was the dummy's head or a human face. I could tell when the person moved, I could distinguish a hand from a pair of scissors or a matchbox, and even when two or three people had different appearances I could even tell one from the other by the sound of their faces. I got a gramophone record made of these sounds and found that by laying this with an electrical pick-up, and feeding the signal back to a television receiver, I could reproduce the original scene. [...] If the cinema had never been invented, the 'Phonovisor', as I christened the device, might have been worth developing; it was certainly an intriguing process. Vision into sound and sound back into vision" (Baird 2004, 64 f).

But only by the intermediary retroactive application of specially written filter software, i.e. by digital processing of the damaged signals, could such original gramophone recordings be "restored". It is not the original recording which is replayed, but an algorithmicised re-enactment.

What the computer screen seems to replay is not the original recording, but a re-enactment, a digitally sampled and processed emulation of 30-line electromagnetic vintage television. What sampling (according to the Nyquist/Shannon theorem) can achieve is the "faithful" reproduction of the electro-physically "analog" signal in high fidelity. This is logical modelling; what it cannot achieve, however, is the truly co-original regeneration of the television signal amplitudes derived from photo cell-based linear electronics.

Once again, Media Archaeology as practice-based research reveals its double sense of techno/logy: on the one hand it is about restoring the materiality of mechanical or electronic devices, but on the other, in order to restore the signals, it nowadays deals with mathematised meta-realities as well. Computers and algorithms themselves here become active media archaeologists.

McLean describes the metamorphosis of time signal into timeless information once it has been sampled: "The signal is now digital and is the starting point for digital signal and image processing" (ibid.). "Line by line, the correction values plot out the profile of errors in the signal's timing" (McLean 2000, 93).

In such a moment media archaeology is not just a method of human media studies any more, but rather digital media themselves become the agency of technical reconnaissance below historical consciousness. "If it were not for computer technology, Baird's *gramophone videodiscs* would continue to be curiosities that merely hinted of a time before television as we know it. Their latent images would remain unseen and the information imbedded in them would still be completely unknown" (McLean 2000).

McLean heroically resists the classical archaeology metaphor: "Unlike traditional archaeology, the artefacts are not embedded in layers of history but have existed in both private and public collections, largely ignored as curiosities" (McLean 2000, xvi); media time is time of latency. Therefore, Baird's *Phonovision* is not a "dead medium" (in Bruce Sterling's sense), but an aggregation waiting to be re-processed in order to become a true medium (in operation) again.

Another case of "re-presencing" early television recordings is the picture disc which has been attached to the Voyager satellite for future communication with extra-terrestrial intelligence. It was already an anachronism in the moment of its launch into space in the 1970s. As a technological rebirth of early scan-line TV image recording, the picture disc demonstrates that media archaeology is not necessarily about the past but also describes a recent (and ongoing) present.

A split approach is required for a successful analysis of the techno-phenomenon of 30-line television: both in historical (contextualising) terms (Science and Technology Studies) *and* in media-archaeological terms (as literally object-oriented research, allowing for its material/logical "vetos"), resisting the historiographic quest for "coherency" (the metahistorical "emplotment", according to Hayden White). The very nature of technological objects necessarily creates a discontinuity between the human (narrative) and nonhuman (artefacts) points of view, to which Bruno Latour paid attention in his "Actor Network Theory".

Correcting the time base: non-human video tempor(e)alities

No technological analysis is complete unless its appropriate concept of time is included; therefore, *media* archaeology is concerned with technologies not only on their (infra-)structural but also on their *operative* level. With a signal being the physical representation of a message and its information, any electronic media event is a function of time signals ("Zeitfunktionen der Signale") (Küpfmüller 1974, 393) – an existential temporal form which, in this case, coincides with the technological act of induction itself.[9] The distortion of the images resulting from the scan lines – very different from the logics

9. For an online re-presencing of the moving image sequence see: <http://www.tvdawn.com/earliest-tv/the-silvatone-recording-1933> [Accessed: November 2013].

and "artefacts" of algorithmic image compression – brings out the "analog".

The emerging technologies of time control in the 1970s were the *a priori* of video-specific temporalities (Blom 2016, chap. 5); indeed, this video-temporal aesthetic cannot be explained in terms of social or economic trends any more (like "portable TV production"). Siegfried Zielinski's writings on video accentuate how its application to television resulted in "time sovereignty'" against the pre-scheduled TV programs both for producers and consumers. But this concerns its social use, while time-critical media-archaeological analysis of video goes directly into its technology.

Video-technical micro-temporalities irritate the human temporal sense. The dilemma faced by all textual analysis of video and related works is, of course, a difficult one. Ekphrastic descriptions of single works in minute detail leave readers uncomfortable, since they cannot control the description against the signal event. Photographic video stills cannot make up for the physiological effect of moving electronic scan-line images. How can the micro-movements described in time-critical analysis ever be caught in textual description – a dilemma which faces all textual studies of time-based and time-critical media. The alternative is to "write" videocity in its own medium – just like Jean-Luc Godard's *Histoire(s) du cinema*.

Obviously, terms like "video mind", "video life", "autobiography of video" in Blom's monograph are not meant in a metaphorical sense; the real message is the insistence of the cybernetic concept of a generative aesthetics which equally pervades (as expressed by Norbert Wiener) human *and* machine systems when it comes to temporal signal processing. As expressed in the 'video times' chapter, the "availability of new and more precise technologies of time control during last half of the 1970s (dynamic tracking, digital time code editing, time base correctors etc.)" opened access to a non-biologistic, bodyless experimentation with electronic "live" (instead of "life") signals, discovering genuinely chrono-poetic media tempor(e)alities (Herzogenrath 1997, 110-123). The electronic emphasis on time control de-metaphorized anthropomorphic models like "video life". Tracing the *technical* "individuation" of a specific video aesthetics in the 1960s and 70's[10] even Bill Viola's mysticism becomes a function of "brain-like" electronic technologies (cybernetic neurological research). Therefore, the use of the term "autobiography" for a technological device is rather counter-narrative; the crisis of narrative culture is itself media-induced. The media-archaeological point of view, defending the "non-human rights" of technological achievements such as electronic video, de-metaphorizes the term "life" which comes with all the many quasi-biologist associations which were attached to early video by the media artists themselves in the late 1960s/early 1970s; in terms of cybernetics, it is all signal transduction and signal "processing" – in the animal and in the machine, equally (Wiener 1948).

Applied media archaeology: video art preservation

Despite the theoretical objection against the archaeological metaphor for media-archaeological analysis, media culture has an "archaeological" aspect in the more traditional sense. Adapting to the techno-logical time regime, the core decision for media art museums is between preservation of aesthetic content vs. preservation of technological form, as has been discussed for the cultural heritage of a century of cinematography. In the phenomenological, content-focused perspective on media art, "[t]he material experience of film is neither celluloid nor its electronic variants as magnetic tapes or circuits, but rather the flow of light that reaches our eyes" (Flückiger 2013, 3). But the aesthetic message comes from within the technological structure of the work itself. Technical vulnerability is not an external threat but an essential feature of "enduring" media-artistic articulation.

When the company Ampex introduced the video image tape recording in April 1956, it was not meant as an enduring memory device. In the Platonic sense of media critique of alphabet writing, it is obvious that (like writing on a wax tablet) its real message is oblivion, since it allows for the immediate erasure and over-writing of the recorded signals. A straightforward strategy for electronic image preservation has been filming it on celluloid from the monitor. The media-archaeologically formative times of television broadcast technology only knew "live" transmission; the Marconi Company (GB, 1957) developed the Marconi Telerecorder, a recording from screen by film camera with a fast intermittent mechanism, while sound was recorded on a synchronised tape recorder with perforated recording material (double tape). But parallel to this kind of "iconic" documentation, it is mandatory to preserve the circuitry diagrams of electronic media art, which were explicit in the hard-wired "scores" of David Tudor's electro-acoustics at the *Nine Evenings* in New York in 1969, towards an archive of operative diagrams.

David Claerbout's video projection *Ruurlo, Bocurloscheweg (1910)*[11] takes its departure from an ancient postcard but delicately "animates" the leaves on the central tree in this landscape image. Long-time preservation of such a video installation requires the most precise time base correction of the electronic image lines. The time base corrector created a moment when the "digital" entered the otherwise analog television and video production of that period (just like Erkki Kurenniemi's digital control mechanism for electronic music

10. In the sense of G. Simondon (1958).

11. 1997, no sound, s/w, 60' loop; see <https://vimeo.com/171214749> [Accessed:01/12/2017].

synthesisers in Helsinki in the 1970s). The TBC, developed especially for colour signal correction, is a delay-line- and master-clock- (sync generator)-based digital device for intermediary buffering and feeding back image frames, with the delay interval (delta-*t*) ranging between zero milliseconds and the length of one complete frame. Distortions of the electronic image derive from mechanical friction in analog videocassette recorders. Video preservation is not only about maintaining a cultural object across generations, but also about preserving the technological time object itself.

There is even a media-ecological aspect of energetic cooling systems for video tape preservation; the cultural impact of the museum, especially the preservation and memory of media art, can be sustained only through the materialities and energy costs of its own "media" infrastructure, resulting in a trade-off between thermodynamic and informational entropy which has to be renegotiated again and again (Bhowmik 2016). However, this is not a "deep" temporal extension, but rather a radically challenging presence, the realest manifestation of media archaeology.

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CV

Wolfgang Ernst
Humboldt University, Berlin
wolfgang.ernst@hu-berlin.de

Unter den Linden 6, 10099 Berlin, Germany

Having been academically trained as a historian (Ph.D.) and classicist (Latin Philology and Classical Archaeology) with an ongoing interest in cultural tempor(e)alities, Wolfgang Ernst grew into the emergent technology-oriented "German school" of media studies and has been Full Professor for Media Theories in the Institute for Musicology and Media Science at Humboldt University in Berlin since 2003 (early retirement autumn 2022). His academic focus is on archival theory and museology, before attending to media materialities.

His current research covers media archaeology as method, technical storage theory, cultural transmission technologies, micro-temporal media aesthetics and their chronopoetic potentials, and sound analysis ("sonicity") from a media-epistemological point of view.

Books in English: *Digital Memory and the Archive* (2013); *Chronopoetics. The temporal being and operativity of technological media* (2016); *Sonic Time Machines. Explicit Sound, Sirenic* Voices and Implicit *Sonicity in Terms of Media Knowledge* (2016).