



Tracing Tempor(e)alities in the Age of Media Mobility

Wolfgang Ernst

► To cite this version:

Wolfgang Ernst. Tracing Tempor(e)alities in the Age of Media Mobility. Media Theory, 2018, Geospatial Memory, 2 (1), pp.164 - 180. hal-01870456

HAL Id: hal-01870456

<https://hal.science/hal-01870456>

Submitted on 7 Sep 2018

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial - NoDerivatives 4.0 International License

Tracing Tempor(e)alities in the Age of Media Mobility¹

WOLFGANG ERNST

Humboldt University, Berlin, Germany

Media Theory
Vol. 2 | No. 1 | 164-180
© The Author(s) 2018
CC-BY-NC-ND
<http://mediatheoryjournal.org/>

Abstract

New forms of tempor(e)alities coemerge with the geospatial aspect in media mobility. Though mobile devices predominantly communicate by the visual interface, on its technologically operative level it is rather akin to radio in terms of the electro-magnetic spectrum, and to the binary alphabet of algorithmicized codes. The media-archaeological approach to geospatial “memory” therefore analyzes data transfer from distributed storage agencies and interactive “online”-citizenship. Geospatial media analysis (navigation, mobility, orientation) is necessarily accompanied by micro-temporal analytics. Digital communication of cultural memory transforms from the traditionally space-based archives (its “tectonics”) into dynamic up-dating in high frequency steps; site-specific memory is substituted by media-specific storage, recall and transfer. Symbolic urban cityscapes become a phenomenal function of underlying media infrastructures which take place at the emptiness left by former cultural and collective memory.

Keywords

media temporalities, memory vs. storage, Media Archaeology vs. Media Phenomenology, infrastructure, topological graphs, smart online-citizenship, chronosphere

Introduction

When visitors to Italy in the late 18th century, during their educational Grand Tour, finally arrived in Rome, the capital of their classicist dreams, they were frequently faced with a disappointment. The ancient ruins were much less sublime than the previously known reproductions (such as Piranesi’s notorious engravings) had suggested, and it took several days of rereading the texts of ancient authors to readjust the optical perception, restoring the symbolic order within the real city by the philological filter. Nowadays, mobile communication devices with their dominant interface, the screen,

immediately adjust locations to predominantly visual or textual (rarely auditive) information from the Web data repositories. Within such globally extended urbanity, memory is not derived from individual or social recollection any more (bodily and psychically “interiorized” – *Erinnerung* – in G. W. F. Hegel’s term), but from storage located in distributed computer farms. Geospatial memory for the user is predominantly mediated to the eye by the dominant interface of the micro-computational “smart device” which, in the field of perception, becomes almost identical with the visual terminal itself. Memory forms and enters geospatial perception primarily through this technical format.² As pointed out in Marshall McLuhan’s media theory, this privileging of the visual information channel is only superficially image-driven and an effect of the ancient Greek phonetic alphabet which directed information transfer from mouth and ears (oral speech) to the eyes: reading alphabetic texts. The essential alphabetic information, though, cannot easily be read any more by most users in urban mobile computing, since it is hidden within the “smart” devices as alphanumeric code. Critical media-philological analysis must now recede into the operative level below the miniature mobile “phone” screens, which is codes and protocols. “Geospatial media has saturated cityscapes”³. But the hidden geospatiality, operative within such media, is not about geographical spaces any more, but about geometries of processual ICs (Integrated Circuits) and storage chips, and spaces in Internet traffic are organized as topological graphs. Any “digital” communication results from a rigorous encoding of analog signals into the data matrix. Such data do not migrate any more but are copied, compressed, decompressed, and identically reproduced. Geography becomes a phenomenological metaphor.⁴

Spatio-temporal media analytics

Geospatial media, understood in its technological sense, relates to both the physical positioning of mobile communication devices and the large scale computational analytics of data emanating from such micro-processor based tools. Different from passive immobile communication media, such as home television sets, personal computers (or servers at institutional locations) for the processing of Web-based information, or early “mobile” communication technologies like the analog transistor radios (except bi-directional ham radio communication⁵), digital mobile media become senders themselves – thereby vulnerable to analysis as well as interception. Making use

of the Global Positioning Service (GPS) means being positioned (geospatially monitored) at the same time. Portable communication devices can capture and process geospatial information in both the geographic and electromagnetic “fields”. In GPS, which is based upon a network of satellites to provide precise coordinate locations, the effective computation is not only space-based, but also time-based, calculating spatial location from the ratio of micro-temporal distances in signal transfer. Geospace has become time-critical itself, interlacing the conventional separation of perceptual “time” and “space” into a spatio-temporal data tissue.

Software environments like Google Earth, which have become available to users of mobile communication devices, result in new kinds of “spheres”. After Teilhard de Chardin had introduced the neologism “Noosphere” in his *Cosmogenesis* as the “thinking envelope of the biosphere” – that is, the human sphere of reflection and consciousness⁶ – Marshall McLuhan adapted this concept to the “acoustic space” of electronic communication media environments. But the Turing machine (*alias* “computer”) from 1937 operates within a sphere of computability which is different from de Chardin’s human mind-based “noosphere”, or the electromagnetic “acoustic space” in McLuhan’s sense, defining everything that could possibly be executed by digital machines. The algorithmic technification of the calculating human mind extends to a geospatial and multitemporal scale.⁸

Geospatial technologies map both human and nonhuman mobility (weather, for example) into computational topologies. Computational tools for mapping and analyzing georeferenced data, based on the GPS, detect geospatial patterns on the ecological level just like mighty search engines in the Internet detect clusters of communication behavior by humans. All of a sudden, the obscuring metaphor of “cloud computing” becomes very concrete. What used to be called cultural or social memory turns into distributed data storage. This non-human “memory” is obscured by the metaphor of “Cloud computing”, which relies on *sharing computing resources* rather than having local servers or personal “smart” devices to handle software (abbreviated to “Apps”). In “cloud computing”, *the cloud* “is used as a metaphor for ‘*the Internet*’” as such, with its different nonhuman agencies such as server farms for data storage.⁹ Cloud-based geospatial computing already practices this different kind of “memory”;

data can be collected in the field using mobile devices and then transmitted to cloud-based servers for further processing and ultimate storage; geospatial information can be made available to connected mobile devices via the “cloud” architecture, allowing access to vast databases of geospatial information “anywhere where a wireless data connection is available”¹⁰.

While the art of cartography, even when augmented by photography and trigonometric measuring, has primarily remained a cultural technique – that is, bound to operations of the human hand – computer- and satellite-based geospatial mapping is not simply a new dimension but a new media-epistemic quality. Apart from collecting and storing geospatial data, it is their algorithmic processing which endows them with mathematical intelligence, culminating in the geographic information systems (GIS) which process data based on their precise location on earth and beyond (hence already becoming “cosmospatial”).¹¹

Geospatial analysis is applying statistical analysis and predictive analytics to data which has a geographical or spatial aspect, operated by software capable of rendering maps to such datasets (geomatics).¹² The GIS has become “intelligent” by “deep learning” – that is, in terms of radical (instead of nostalgic) media archaeology, grounded in genuinely mathematical operations, such as vector-based map overlay (combining two or more maps or map layers according to predefined rules); or in terms of raster-based GIS, widely used in the environmental sciences and remote sensing, involving algebraic operations.¹³ Spatial analytics is based on statistical operations, but distinct from traditional mathematics, it becomes dynamic by being incorporated into the electronic circuitry of micro-processors. Thereby geospatial media, both as subject and as application, apply to spatial data that vary *over time*, with the time series being at the core of cybernetic analysis.¹⁴

While the user interface content of geospatial analysis still looks as if integrated into the conventions of screen culture, its real media message goes beyond the traditional image, and becomes diagrammatic iconicity instead. 2D and 3D mapping operations and spatial statistics analyze the properties of physical surfaces, such as gradient, aspect and visibility, and surface-like data fields. Geovisualization turns analysis into imaging synthesis, making sublime data sensible to human perception again on the phenomenal

level: maps, diagrams, charts, 3D static or rotating views – providing animations and fly-throughs – and spatio-temporal visualizations.¹⁵

Dis-locations: Diagram and topology instead of “mobility”

When the act of communication transfer becomes a cluster of technically calculable numbers, mobility itself dissolves from Newtonian physical spaces into geometric Cartesian space – that is, data configurations which are closer to Iannis Xenakis’ stochastic music in its temporality than to conventional space in visual culture. Norbert Wiener’s *Cybernetics* (1948) analyzed how the goal- and target-orientated trajectory (mobility) is replaced by statistical probabilities. With digitally coded transmission, the trajectory (*telos*) of “tele”communication is being effaced in favor of a mathematical (chrono-topological) immediacy – which makes all the difference between “live” transmission and “realtime” calculation, leading to a techno-logical proximity instead of mobility as energetic movement. The structural essence of mobile digital communication and the World Wide Web is not primarily the transmission of documents (the “mobility”) but its hypertextual and hypermedia link structure – a dynamic topology rather than a static cartographic topography. What is essentially transmitted and installed are symbolical machines – algorithmic “Apps”. The physical location of texts or books at a certain place (such as the traditional library) is replaced by topological space and a grid of computer servers to host them. Such a location is both geophysical (in terms of hardware) and conceptual (in terms of logical units). Instead of imposing library-orientated terminology, a media theoretical analysis of the World Wide Web adapts to the dynamism of the medium. Within that dynamic context, algorithmic orientation (such as performed by search engines) is not about mobility but about statistics, vectors and graphs.

Media-phenomenological vs. media-archaeological analysis of geospatial media memory

City streets are no longer simply physically and bodily conquered but navigated along metadata, shaped by web infrastructures. The cybernetic (that is, system theoretical) assumption persists: users, once their physical/bodily spatial environment is actually

coupled to virtual (that is, calculated) environments by computational interfaces in the real-time “online” mode, get (post-)human at the same time – with the prefix “post” literally referring to data transfer which technologically preconditions such a double-bind *situation*. Implicitly, Claude Shannons’ *Mathematical Theory of Communication* (1948) still has more to say to “what actually happens” here than most media sociologies. While the media-phenomenological approach primarily investigates the affects and effects of such mobile communication media on individual and collective memory, it requires a complementary analysis which concentrates on the very geospatial infrastructures – the “conditions of possibility”, in the Kantian sense. The cognitive *a priori* of “time” and “space” itself is replaced by the *temporeal*, a cluster of differentiated spatio-temporal infrastructures in data traffic. What necessarily gets into focus for critical analysis is the grid composed of both topological (rather than geographical) and micro-processing agencies: the storage lattice for data and its micro-delays in signal processing.

Media Archaeology, which is both a field of study and a method of inquiry, aims at striking sparks of critical insight *from within* such technological knowledge, against which so-called “social media” effects turn out rather epiphenomenal. As research method, it is less a discourse analysis of media phenomena, but rather concentrates on their grounding in material and/or logical artefacts. As a method of media analysis, it addresses the structural (material *and* logical) preconditions of media practice, which corresponds with what Michel Foucault’s *Archaeology of Knowledge* once named as *l’archive* (in the French original from 1969), such as Internet protocols¹⁶ or the von-Neumann-architecture of digital computers. In that sense, Media Archaeology is technocentric – that is: machine- and code-centered indeed. Against the opaqueness of micro-technology hiding behind the flat screen of “smart phones” in communication, Media Archaeology intends media-awareness by making transparent its proverbial Black Box. While media phenomenologists rather analyze how various media appear to the human cognitive apparatus – that is, to the mind and senses – media archaeologists “describe the non-discursive practices of the globalized techno-cultural archive”¹⁷. Imagery and data collected from satellite or airborne camera and sensor platforms has already resulted in nonhuman Remote Sensing.

The “mediated experience of cities”¹⁸ by humans is the focus of media phenomenology, but below all this, the practices of “geospatial memory” are time-critically (“post”-)structured by high frequency-clocked media technologies. While human users are developing new perceptual and conceptual modes of geo- and chrono-location, they are geo- and chrono-located by the devices they use themselves, resulting in large data banks and predictive data fields hosted by the computing server farms or providers like Google, Facebook, and the NSA. Geospatial individual and collective “meaning-making” becomes a function of the digital communication devices and “apps”; its underlying episteme is utterly techno-mathematic.

“Radiocity”

There is a media-epistemological ground behind the surface figures of mobility. This first of all concerns the physical nature of “motion”¹⁹ and its secondary re-entry in techno-cultural emanations. Marshall McLuhan, around 1960, remarked that electricity and electronic devices create rooms without walls²⁰ and a “media field”²¹. Looking through the media-archaeological magnifying glass, under the surface effects of social mobility, we detect the migration of electrons in cables and in micro-chips. Electronic speed in wireless communication does not rely on mechanical vehicles anymore; it moves even within the vacuum – be it the Thermionic Tube or the empty space of the universe. Electro-magnetic waves (the literal meaning of “radio”) are being propagated almost unbound to matter or energy.²² Inspired by this media-epistemological insight, the notion of a temporal “field” (“Zeitfeld”, as expressed by Edmund Husserl’s phenomenology) has replaced the mechanical idea of linear time by cloud-like temporal figurations.

The traditionally more or less spatial notion of the “city” is increasingly accompanied by parallel manifestations of dissipated net-citizenship, which is infrastructurally based on radioCITY in terms of ubiquitous, pulse-modulated radio waves for mobile communication devices in wireless data transfer processed by individual micro-processors like smartphones. After the recent or imminent death of analog AM and FM radio, there actually is more “radio” than ever: the pulse-modulated, digital rhythms of impulses, processed by algorithms. The extension of the radio “empire”

has always-already transcended the geospatially-fixed location (“region”). With digitally coded radio transmission, waves are being replaced by impulses (samples) which can then mathematically be pre-calculated. In Pulse Code Modulation, the spaces in between pulses can then be filled by delayed bit streams. Thus, interpolation replaces mobility. In “tele”communication, all of a sudden, spatial distance (the *a priori* of mobility as transfer) does not count any more, since it is being replaced by the temporal act of calculation. Analog frequency multiplexing and digital time multiplexing, as forms of multiple use of communication channels, are based on the time-critical interlacing of signals.²³

In so-called *cognitive radio*, “time hopping” means the intelligent use of short-time vacancies and time slots.²⁴ Time-discrete operations increasingly replace the traditional electronic signal transfer in the broadcasting world. Analog radio signal reception differs from the dis-locational positioning in data-based “mobile” communication, which is logical addressing (“URL”) instead of analog broadcasting. Classical radio mobility once culminated in the technoculture of so-called “World Receivers”; at almost any point on the earth, a German citizen could receive the German-speaking program of Deutsche Welle. Now this access is being replaced by the *online* service of Deutsche Welle which is no wave (“Welle”) anymore but streaming data *via* Internet access by cable or by wireless LAN.²⁵ Advertising for that dramatic change in radio culture, the Deutsche Welle service claims that on the Internet radio information can be multi-medially coupled. Behind that phenomenological, user-interface-based aesthetics, the hypertextual link reigns – a structure completely different from classical electro-magnetic broadcasting. The director of Deutsche Welle, in his farewell-speech to the analog German-speaking program on October 29th 2011, advertised for the “radio” portal www.dw-world.de: “Stay tuned, search for new ways of access”.²⁶ This is already the language of nonlinear connectivity, implying that radio already has gone. Radio “on demand” and as download by Podcasting is not tuning (mobility) between radio frequency channels anymore (bandwidths), but rather between temporal channels even if declared “live stream”; the physically and temporally authentic analog “live” signal is being replaced by realtime calculation) – deconstructing linear time. Digitalization (that is: mathematization) indeed introduces a discrete time-hopping, discontinuous mobility, moments instead of trajectories. Algorithmically precalculated transmission actually swallows the time of transmission itself, just like in the macro-

temporal sphere the culturally emphatic notion of “tradition” is currently being replaced by a synchronous, even historicist “immediate” (Leopold von Ranke) access to the archivized past(s). The elementary scheme of communication is not transmission from point A to point B anymore, but rather the modification of a temporal (momentary) configuration.²⁷

Decades ago, the Sony “Walkman” was a symbol of mobility in carrying around recorded sound individually, as a kind of *temporally mobile* independence from music reception by transistor radio. The cassette has been succeeded by the mp3 player (the iPod), but the current shift towards cloud computing replaces this mobility by dynamic access to the (media) archive itself; smart devices access sound files stored in local networks (moving and navigating *within* the archive).

Local memory? A techno-archival retro-effect

Memory literally gets in motion.²⁸ Instead of going to local archives for research as in previous times, scholars can now move *online* within digitized archival records not only at home (without moving) but at any place. The Internet is not an archive but a protean dynamism, characterized by change rather than endurance. Permanent updating (or updating in permanence) has been the temporal aesthetics of modernism already. This corresponds with the shift of emphasis from the final archive to temporary, literally intermediary storage. In museums, the institutional keepers of material cultural memory, the traditional permanent exhibition is increasingly being replaced by temporary exhibitions; Bergsonian *durée* turns out as a function of frequencies. Memory has become a function of immediate access to data storage centers, while, in turn, the present becomes radically temporalized (even micro-archivized) in dynamic, realtime data processing. Human perception of the present city is immediately linked to data storage and processing, shrinking individual or collective memory to a surface effect. Identities, by technically mediated environments (whether through writing, cinema or digital media), become ephemeral in times of immediate transfer of coded information. Formerly place-bound local memory sites are superseded by new media environments, like the fashionable projection of images or texts on architectural surfaces during “enlightened” city night shows. Immobile matter itself becomes a

function of the mobile screen. In a psychic counterreaction, the global reach of web-based and mobile communication devices is accompanied by a nostalgic desire for local roots. In times of ubiquitous mobility, both for bodies and for communication devices, a retro-active longing for “citizenship” or community-building arises on the symbolic (computational) and imaginary (media user) level.

Ubiquitous computing leads to what Ray Hammond predicts in his vision of *The World in 2030* – “always on, always connected, everyone to everyone, everything to everything, always and everywhere”²⁹ – which has not only a spatial but also a temporal dimension. The user is connected to a chrono-sphere defined by the (meta-)medium and is allowed to jump in temporal layers provided by the *online* archive. To be suspended from ubiquitous mobility is the true luxury in today’s temporal economy – the katechontic impulse of pausing, of deferral. Instead of setting geospatial memory in motion, moments and locations of resisting permanent change is retro-effectively gaining momentum.

Media-archaeological foundations of mobile communication: From the electro-magnetic field to the techno-mathematical matrix

Movement is predominantly associated with linear migrations and nonlinear dislocations in space. In cultural analysis, it is frequently taken in its discursive meanings, in the sense of “cultures of mobility”.³⁰ Even the most exact analysis of mobility seems bound to discursive metaphors. Literally, *metaphora* itself is the Greek term for transport vehicles, and so-called “buses” communicate data between processing and register units within a micro-chip.

In H. G. Wells’ scientific fiction, *The Time Machine*, travelling between past and future still takes place in terms of mobility, with a chrono-mobile vehicle moving *within* (endophysical) time. Nowadays, time itself is being moved within the mediasphere. This new way of being-in-time started with the invention of photography, fixing and preserving a unique moment in time, and continued with phonography which can replay voices of the dead, escalating with cinematography, which allows for the reversal

of the entropically, thermodynamically defined arrow of time and for slow respectively fast motion. Time became electronically manipulable by the STOP/PLAY and REWIND/FASTFORWARD keys in audio and video recording on magnetic tape; phase-shifting of oscillations in electronic synthesizers is known from electronic music.³¹

The video artist Bill Viola, in his essay on the “sound” of electronic images, pointed out the techno-mathematical spatialization of former time-signals, “the current shift from analog’s sequential waves to digital’s recombinant codes” in technology.³² The equivalent in computing is the concept of *time sharing*, the geometrization of the present itself. Significantly, in digital technology, the term “field”, which derived from the analogous, steady movements within electro-magnetism itself, transforms into the description of a discrete configuration, as expressed in the “Field Programmable Gate Array” (FPGA) for re-configurable hardware in micro-processors. The dynamic field becomes a digital matrix, transforming “mobility” into addressability.

Today, the idea of the central computer with remote shared access is turned upside down by the concept of “cloud computing”. The Internet is not restricted to being an extension of interconnected central computers (“servers”) which are being accessed from immobile homes, but mobile communication devices themselves have become small computers to be connected to network access points and areas. The “Internet of things” and ubiquitous computing result in a re-entry of mobility as a secondary effect of a topologically “immobile” grid. Data navigation within topological space (or rather networks) might still be called “mobility”, but its nature has transformed completely from physical location to geometrical graphs and logical relations (in mathematical terms), from analog tele-communication to computational mobility (even if wireless communication, technically, is still “radio”-based).

Computational devices generate new temporal figures – a true technopoetical chronomobility based on nonhuman agencies of delayed memories and dynamic intermediary storage. Computational mobility ultimately results in ephemeral tempor(e)ality which is characteristic in current high-frequency e-trading; the financial

market is defined by radical time-critical indexicality; even nano-second delays induced by fiberglass cables literally counts.

“Mobility” – a term of modernism

The notion of “mobility” rather belongs to the discourse of modernity; in a famous analysis on occasion of a new railway line connecting Paris to another French city, Heinrich Heine once remarked (just like Paul Virilio’s dromology later) that space is killed by speed. Mobility has been a paradigmatic feature of 20th century modernism. With the mobilization of formerly symbolically ordered time, a temporal horizon called historicity opened where the forthcoming future could be anticipated as “future in the past” already. Martin Heidegger in 1934 identified the temporalization of time itself “Zeitigung der Zeit” instead of reducing it to the parametrical “Faktor tempus”³³. Within that frame of perception, two temporal figures dominate the scheme of movement: the trajectory and the discontinuous jump.

From a sociological perspective, the mobilization of collective energy (such as migration) corresponds with the technical mobilization (physical transport with the appropriately named auto-mobile) and the mobilization of communication by almost immaterial signals on the electronic level. Material mobility starts with the steam-engine based railway, and immaterial mobility with telegraphy as recently presented in the exhibition *Car Culture*, appropriately sub-titled, *Medien der Mobilität (Media of Mobility)*, at ZKM Medienmuseum Karlsruhe (June 2011-January 2012). The network of material cables for “landline” telephone communication has been replaced by radio communication networks.³⁴ Physical mobilization like railway traffic has been accompanied by the parallel mobilization of symbolic communication embodied in electronic “tele”communication media – Samuel Morse’s telegraphy in 1844, killing distance both in space (“tele”) and in time (“live”); telecommunication: “live” transmission. But in the age of digitized broadcasting and digital communication engineering, the term for the current end-user device, the literal “mobile” phone, itself becomes a nostalgic metaphor.

Synchronization has been the technical essence of success in modernist communication between sender and receiver. But today, reception is anticipated by the sender. The immediacy of “live” transmission is being replaced by “streaming media”, which is based on asynchronous transmission, buffering data signals in micro-

memories, thus causing minimal delays (due to calculation) even if they are not noticeable by slow human senses any more. What Jacques Derrida once claimed as *différance* for sequential writing, here turns techno-mathematical. Coded time itself becomes an “artefact”.³⁵ The so-called delay time (caused by the inertia of matter) and run time (*alias* “dead time”) is the temporal interval between a system input and its response at the output. As transport time, this refers to micromobility on the media-archaeological ground level of electronic circuitry. “The time it takes for material to travel from one point to another can add dead time to a loop. [...] The distance may only be an arm’s length, but a low enough flow velocity can translate into a meaningful delay.”³⁶ This form of a temporal *inbetween* is central to the notion of media itself. Aristotle once discovered in the echo phenomenon the resistance of the transmission channel air to sound, which he coined *to metaxy* – a term whose Latin translation by scholastics in medieval times turned into the *medium*. Time in communication itself is “medium” in Claude Shannon’s functional definition of the channel of transmission.

Time hopping. Time “travelling” (in) the World Wide Web

Tracing mobility, understood literally, recalls the methods of technical observation and mathematical calculation of movements. On a micro-level, such mobility has been traced with the detection of the “Brownian Motion” in the 19th century. But this tracing is not cartographic any more (which still adheres to iconic perception), adhering instead to mathematically averaging myriads of elementary movements of particles (like the electrons in the Thermionic tube). Norbert Wiener described such motion as “ergodic” – which is invariant across a temporal trajectory in its statistical behaviors. Within such stochastic analysis, the single individual particle does not count anymore – just like in information/communication/entertainment spheres the mobile subject is surveilled as nonlocated address. A bio-cognitive gap opens: while human bodies undoubtedly still move in space and time in mobile ways (the everyday experience), connected to digital media humans are coupled with another, media-inherent time and space. Techno-logical addressability replaces physical or biological identity. Technical media record such movements, while mathematics (statistical and/or stochastic analysis) tries to make sense of apparently random movements. Technical tools of time axis and memory manipulation have been known since phonography, cinematography

and video art, in technical engineering and aesthetics, performing micro-temporal operations of signal migration. Such figures of analog time-shifting are now challenged by nonlinearity. Metaphorical data “flow” and “streaming media” replace the static monument. Knowledge has always been in motion, but now it becomes time-critical. Chronology becomes ephemeral; short-time finality is taken into account from the beginning. Para-textual temporal remarks like “last modified” and “accessed” in the online encyclopedia Wikipedia indicate the replacement of traditional long-time assumptions of knowledge spaces by time-critical updates of the present – which results in con-temporary time layers, as long as older and newer versions are not erased but stored. The Wayback Machine for obsolete web pages from the Internet (operated by archive.org) is a heroic manifestation of such options of techno-memory mobility.

Liberating reality from “time”: *Eigenzeit* takes over

The classical definition of time (by Aristotle) is explicitly bound to the perception of movement (mobility). Speed has been calculated since antiquity; acceleration and dynamics become analyzable by the Leibnizian differential calculus. Here, time is still understood in its scientific sense as an external physical parameter. Today, the traditional notion of vehicular transfer is being replaced by the mathematically calculated tunneling of the channel (Claude Shannon), short-cutting distance – more teleportation than telecommunication.

Nonlinear time is part of the mathematical geometrization of temporality, different from the one-directional “time arrow” provided by physical entropy. Mobile communication in the “digital” present is rather confronted with heterochronotopies (in allusion to Mikhail Bakhtin’s term “chronotope” and Michel Foucault’s notion of “other spaces”). Networked locations which can be addressed with the speed of electricity replace the still energetically biased spatial notion of “mobile” transfer. Harold Innis once directed academic attention in analyzing cultural and imperial power to the media-induced “bias” of communication, which is either space- or time-enhancing; thus, spatial mobility is matched by chrono-mobility. This mobility within time has now transformed into chrono-logical mobility itself. Mobility has traditionally been understood as happening *within* the grid (or frame, or Cartesian coordinates) of

time and space. But from a different, micro-temporal perspective, a variety of *Eigenzeit* figures appear – times endogenic to subsystems, to media as well as to organisms.

The experience of modernity has been an acceleration of delay or speed as explosions of temporal experience. But this experience is still conveniently framed by the parameter time (*t*), which is experienced phenomenologically (Husserl, Bergson) and related to media such as the phonograph and the kinematograph. Being measured by clocks (Martin Heidegger's "vulgar time"); this is "mathematical" time (Henri Bergson). But in the age of active digital calculation, this mathematical time itself becomes operative, resulting in a de-coupling of tempor(e)alities from the despotic signifier "time". This requires different terms to nominate these temporal kaleidoscopes (requiring "chronopoetics"³⁷). Jean Baudrillard identified the current *implosion* of history as discourse; Bernard Stiegler names it the *ekstasis* of time.³⁸

Notes

- ¹ Parts of this text relate to a former keynote lecture on occasion of the symposium *Tracing Mobility – Cartography and Migration in Networked Space*, November 26, 2011, Haus der Kulturen der Welt, Berlin
- ² See Nanna Verhoeff, *Mobile Screens. The Visual Regime of Navigation*, Amsterdam (Amsterdam University Press) 2012 (with thanks to Jon Inge Faldalen, scholar of "imagenesis", at Oslo University, Norway, for that reference)
- ³ <http://mediatheoryjournal.org/calls-for-papers/cfp-geospatial-memory-and-the-city>
- ⁴ See Hartmut Winkler, *Geometry of Time. Media, Spatialization, and Reversibility*, lecture given at conference *Media Theory on the Move*, Potsdam, 21 - 23 May, 2009, URL: http://homepages.uni-paderborn.de/winkler/hase_e.pdf (accessed October 10, 2017)
- ⁵ Amateur radio (*alias* ham radio) "describes the use of radio frequency spectrum for purposes of non-commercial exchange of messages, wireless experimentation, [...] and emergency communication", different from commercial broadcasting, or professional two-way radio services: https://en.wikipedia.org/wiki/Amateur_radio, accessed October 17, 2017
- ⁶ See Georgy S. Levit: "The Biosphere and the Noosphere Theories of V. I. Vernadsky and P. Teilhard de Chardin: A Methodological Essay". *International Archives on the History of Science/Archives Internationales D'Histoire des Sciences*, 50 (144), 2000: p. 160–176
- ⁷ Alan Turing, "On Computable Numbers, with an Application to the Entscheidungsproblem", in: *Proceedings of the London Mathematical Society* (2), vol. 42 (1936), 230-265
- ⁸ An argument developed in the Master thesis by Thomas Nüchel, *Berechenbarkeit als Sphäre digitaler Medien [Computability as the Sphere of Digital Media]*, submitted Winter term 2016/17, Humboldt-University, Berlin, Institute of Musicology and Media Studies (now online at e-doc server of Humboldt University)
- ⁹ https://www.webopedia.com/TERM/C/cloud_computing.html, accessed October 17, 2017
- ¹⁰ https://ipfs.io/ipfs/QmXoypijzW3WknFjnKLwHCnL72vedxjQkDDP1mXWo6uco/wiki/Geospatial_analysis.html, accessed October 17, 2017
- ¹¹ See <https://www.aaas.org/content/what-are-geospatial-technologies>, accessed October 16, 2017
- ¹² https://en.wikipedia.org/wiki/Geospatial_analysis, accessed October 16, 2017
- ¹³ Ibid.

¹⁴Ibid.

¹⁵Ibid.

¹⁶ See Alexander Galloway, *Protocol. How Control Exits after Decentralization*, Cambridge, Mass. / London (MIT) 2004

¹⁷Kjetil Jakobsen, "Anarchival Society", in: Eivind Røssaak (ed.), *The Archive in Motion. New Conceptions of the Archive in Contemporary Thought and New Media Practices*, Oslo (Novus) 2010, 127-154 (141)

¹⁸ <http://mediatheoryjournal.org/calls-for-papers/cfp-geospatial-memory-and-the-city>

¹⁹"Bewegung ist Aenderung der räumlichen Verhältnisse <...> wenigstens zweier materieller Körper gegeneinander": Hermann Helmholtz, *Abhandlungen zur Thermodynamik*, edited by Max Planck, Ostwalds Klassiker der exakten Wissenschaften, vol. 124, Leipzig 1902, 6

²⁰Marshall McLuhan, manuscript entitled "Grammars of Media", NAEB Papers (University of Wisconsin), Box 66, Folder 9, as quoted in: Josh Shepperd, "Medien Miss-Verstehen. Marshall McLuhan und die National Association of Educational Broadcasters, 1958-1960", in: *Zeitschrift für Medienwissenschaft* vol. 5, no. 2 / 2011, 25-43 (40)

²¹ Marshall McLuhan in a letter to the NAEB director Harry Skornia, December 16, 1958, quoted *ibid.* (41)

²² W. T. Runge, "Elektronische Geschwindigkeit ist keine Hexerei", in: *radio-tv-service* Nr. 77/78 (1967), 2895-2899 (2895)

²³ See H. Raabe, "Untersuchungen an der wechselzeitigen Mehrfachübertragung (Multiplexübertragung)", in: *Elektrische Nachrichtentechnik* vol. 16, no. 8 (1939), 213-228 (213)

²⁴ http://de.wikipedia.org/wiki/Time_Hopping

²⁵ The regular German-speaking program of the German world-wide radio Deutsche Welle ended as linear broadcasting (analog short wave) on the night from 29 to 30 October 2011.

²⁶ Bettermann: "Bitte bleiben Sie uns verbunden, suchen Sie neue Zugangswege"

²⁷ Pierre Lévy, "Die Metapher des Hypertextes", in: Claus Pias / Joseph Vogl / Lorenz Engell et al. (eds.), *Kursbuch Medienkultur*, Stuttgart (DVA) 1999, 529 [*Les Technologies de l'intelligence. L'avenir de la pensée à l'ère informatique*, Paris 1990, 78-82]

²⁸ See Eivind Røssaak (ed.), *The Archive in Motion. New Conceptions of the Archive in Contemporary Thought and New Media Practices*, Oslo (Novus) 2010

²⁹ Ray Hammond, *The World in 2030*, Paris (Editions Yago) 2007, 66

³⁰ See *Berliner Atlas paradoxaler Mobilität*, edited by Friedrich von Borries in cooperation with the initiative ÜBER LEBENSKUNST, a project of Kulturstiftung des Bundes in cooperation with Haus der Kulturen der Welt, Berlin (Merve) 2011

³¹ See Karlheinz Stockhausen, "... wie die Zeit vergeht ...", in: *Die Reihe. Information über serielle Musik*, Heft 3, Universal Edition, Wien / Zürich / London (1957), 13-42

³² Bill Viola, "The Sound of One Line Scanning", in: Dan Lander / Micah Lexier (eds.), *Sound by Artists*, Toronto / Banff (Art Metropole & Walter Phillips Gallery), 1990, 39-54 (47)

³³ Martin Heidegger, "Logik als die Frage nach dem Wesen der Sprache" (lecture summer term 1934), ed. Günter Seibold, (vol. 38 of *Gesamtausgabe*) Frankfurt / Main (Vittorio Klostermann) 1998, 101

³⁴ Franz Pichler, *Mobile Kommunikation per Funk. Von Heinrich Hertz zum handy Netz des Mobilfunks*, Linz (Universitätsverlag Rudolf Trauner) 2011, 1

³⁵ Jacques Derrida / Bernard Stiegler, *Echographien. Fernsehgespräche*, edited by Peter Engelmann, Vienna (Passagen) 2006, 13

³⁶ Doug Cooper, "Dead Time Is The "How Much Delay" Variable"; *online* <http://www.controlguru.com/wp/p51.html>

³⁷ See Wolfgang Ernst, *Chronopoetics. The Temporal Being and Operativity of Technological Media*, transl. by Anthony Enns, London / New York (Rowman & Littlefield) 2016

³⁸ Bernard Stiegler, *Denken bis an die Grenzen der Maschine*, edited by Erich Hörl, Berlin / Zürich (diaphanes) 2009, 69

Having been academically trained as a historian (PhD) 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 has been on archival theory and

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

Among his 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).

Email: wolfgang.ernst@hu-berlin.de