

# NOTEBOOK "SPACE-VARYING SIGNAL PROCESSING (TECHNICAL IMAGING)"

## Detailed content of thematic blocks:

### NOTES ON (CHRONO-)PHOTOGRAPHY

- The "cold gaze": Media archaeology in alliance with the photography
- Photography without the painterly hand
- Historicism and the photographic archive (analogue times)
- Photography, memory and the archive: Heidegger's distrust
- Reverse temporal indexicality: The enduring photographic image
- Chrono-photographic freezing
- Between analog and digital (non-)temporality: the photographic snap shot as temp"aural" moment
- The animated photograph: *Blade Runner*, Claerbout
- Material chronophonography: The symbolic de-construction of a mechanism
- From natural movement to the un-natural in its chrono-photographic reproduction

### NOTES ON CINEMATOGRAPHY

- Cinematographic spatialisation of time
- The "quanta" of human perception of the present - always already cinematographical?
- Stilled time: The "moving" photographic image
- Digital presence: the "moving still"
- Photofilm has already prefigured the digital image
- "Sampling" the visual present (self-recursive images, thumbnail movies, kinematographical projection)
- Digital sampling of "analog" moving imagery
- Digital moving image compression
- Asymmetries with Photofilm: photosound?
- Film *versus* video: Memory on demand?
- Photographic in/formation

### NOTES ON THE ELECTRONIC IMAGE

- Implicit sonicity: No "still" with(in) the electronic image
- The impossible "still" image in video / television
- Re-presencing Baird's television signals

### NOTES ON DIGITAL IMAGERY

- The archival from within photography (the digital regime)
- Satellite "imaging"
- Between reading and scanning the image
- Images from data
- Physical "space" and and logical "map": de-iconizing cartography

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### NOTES ON (CHRONO-)PHOTOGRAPHY

**The "cold gaze": Media archaeology in alliance with the photography**

- camera lens capable of freezing the moment of danger, enframing the traumatic shock in a manageable format; for Ernst Jünger, optical technology creates an almost Nietzschean aesthetic of detachment [...]; thus the photograph "[...] stands outside the realm of sensibility. It has something of a telescopic quality: one can tell that the object photographed was seen by an insensitive and invulnerable eye. The eye registers equally well a bullet in midair or the moments in which a man is torn apart by an explosion" = Ernst Jünger, *Photography and the second consciousness*, excerpt from: same author, *On Pain*, in: *Photography in the Modern Era: European Documents and Critical Writings, 1913 / 1940*, ed. C. Philips, New York (Aperture) 1989, 207-210 (208); chronophotographical indifference; photographic and cinematographic "freeze" images corresponds with the literally *theoretical* "cool" archaeological gaze

- "frozen" condition not just a physical state but a theoretical aesthetic in itself; corresponds with the photographic "shot", the *freezing* of its moving object in a temporal slice / moment

- a technical medium, unless in operation (under current), in a cold state of latency

- insistence on the mechanical or electronic or algorithmic "eye", the cold gaze, key to media archaeological approach; a "vision" of machinic agency; before a cultural historian tells stories about past media cultures, there is a prior level on which the past has been recorded; documents of the past are concrete instances of pasts-present, but even more so the way in which technical media records time and acts as a time-machine between current times and the past. This time-machine is non-hermeneutic; Kittler's claim: technical media do not record only meanings, but also noise, and the physicality of the world much outside our human intentions or signifying structures; for instance an old phonograph is the first media archaeologist before human intervention

- "Media archaeology executed through the epistemological figure of the 'cold gaze' is [...] a way of stepping outside a human perspective to the media epistemologically objective mode of registering the world outside human centred sensory perception" = Jussi Parikka, *Archival Media Theory: An Introduction to Wolfgang Ernst's Media Archaeology*, in: W. E., *Digital Memory and the Archive*, xxx, 1-21 (11)

- "For the first time the inert world presents itself in its independence from human beings. Photography shows cities in aerial shots [...]; all spatial configurations are incorporated into the central archive in unusual combinations that distance them from human proximity" = Siegfried Kracauer, *Photography*, trans. Thomas Y. Levin, in: *Critical Inquiry* 19, no. 3 (Spring 1993 / 1922): 435

### **Photography without the painterly hand**

- "The photogram, or cameraless record of forms produced by light, which embodies the unique nature of the photographic process, [...] allows us to capture the patterned interplay of light on a sheet of sensitized paper without

recourse to any apparatus" = Moholy-Nagy, "From Pigment to Light [1936], in: *Photography in Print: Writings from 1816 to the Present*, edited by Vicky Goldberg, New York (Simon & Schuster) 1981, 339-348 (344); *dissimulatio (medii) artis*

- liberating the artistic hand for more experimental drawing and painting as a non-realist art form; "the instrument chronicles whatever it sees, and certainly would delineate a chimney-pot or a chimney-sweeper with the same impartiality as it would the Apollo of Belvedere" = Henry Fox Talbot, *The Pencil of Nature* (1844), explanation to plate II *View of the Boulevards at Paris*; idem, *Some Account of the Art of Photogenic Drawing, or, The Process by Which Natural Objects May Be Made to Delineate Themselves Without Aid of the Artist's Pencil*, in: *Photography. Essays and Images: Illustrated Readings in the History of Photography*, ed. Beaumont Newhall, New York (The Museum of Modern Art) 1980), 23–31; Richard Beaudoin / Andrew Kania, *A Musical Photograph?*, in: *The Journal of Aesthetics and Art Criticism*, vol. xxx (2012), 115-127

- escalation when photographic exposure and developing itself becomes autonomous from human operator; first automated camera in 1938 Super Kodak Six-20 = Sara R. Yazdani, *Photography in Flux. art, media, and ecologies in the works of Wolfgang Tillmans*, Dissertation for the degree of philosophiae doctor (PhD) University of Oslo, 2018, note 159. "For the first time, between the originating object and its reproduction there intervenes only the instrumentality of a nonliving agent. For the first time an image of the world is formed automatically, without the creative invention of man" = André Bazin, *The Ontology of the Photographic Image*, in: *What is Cinema?*, eds. Hugo Gray / André Bazin, trans. Hugo Gray, Berkeley (University of California Press) 1967, 13

- "the whole cabinet of a Virtuoso and collector of old China might be depicted on paper in little more time than it would take him to make a written inventory describing it in the usual way. The more strange and fantastic the forms of his old teapots, the more advantage in having their pictures given instead of their descriptions" = Talbot 1844

- truly media-archaeological moment, or rather: momentum. In the early days of photography, it took a long time interval for the object to get fixed by interaction of light and the silver grains on the photochemical carrier. For humans and other animals, this meant suspending any movement, almost: fossil like freezing during a portrait session, becoming a statue for a certain interval of exposure. Whoever nowadays, in the age of photographic clicks, undergoes this archaic experience in face of a Camera obscura, makes this experience of time itself passing as still - with the curious side-effect that in the background things happen which do not get inscribed like in the famous Daguerrotype of the Boulevard du Temple in Paris which looks empty except one human sitting in a chair to get his shoes polished

- project "Picturing Aura", a media archaeology of aura-imaging technologies / optical instruments (Jeremy Stolow, Montreal); Benjamin tracing the photographic aura / spiritistic aura-tracing by photography itself; Wolfgang

Hagen on "medium" fixation in early photography, separating photochemical noise from what appeared as mediumistic appearances

## **Historicism and the photographic archive (analogue times)**

- while historical observation (and recording) tends to narrativize events, ultra-short photographic exposure revealing the accidental = Dolf Sternberger, *Über die Kunst der Fotografie*, in: Wolfgang Kemp, *Theorie der Fotografie*, vol. II.: 1912-1945, München (Schirmer / Mosel) 1979, 228-240 (xxx); the contingent which short-time photography is able to catch with diminishing time of exposure; can the tempo-real be caught this way which has escaped symbolic notation (historiography) so far

- undoing historicity? photographic memory not immaterial but bound to a chemical storage medium. *Temporal* transcendence of materiality is a faculty of operative media technologies

- photography, understood with Roland Barthes' *La chambre claire* as a photonic emanation of an object, memorizes rays of light reflected by this very object to the viewer in the present - a delayed transfer of what otherwise vanishes into the dark; inscribes physical tempor(e)ality into the image, while computational imagery exorcises time parameter in favor of its mathematical / numerical, therefore: calculable reverse, spectral frequencies; different from painting as cultural technique, algorithmically generated *imaging* (such as fractals) exclusively emerge within the machine, by-passing human vision: "Raytracing algorithms calculate paths and angles of light beams resulting in the pixel-by-pixel buildup of brilliant hyper realistic pictures; radiosity algorithms calculate diffuse reflections from various objects resulting in a growing luminosity within a given picture"; while mathematics involved in raytracing operates with laws of light reflection and refraction, radiosity based on cosine law formulated by Johann Heinrich Lambert's *Photometria* (1760) = Holl, in: DHQ

- light emission itself can be photographically sustained in the time channel of tradition; emphatic temporal distance as described by historiography shrinking to an affective moment of Benjamin's *Jetztzeit*; the past flashes into the present

- photographic image characterized by the physical irreversibility of the inscribed photonic moment which authorizes its temporal indexicality; for the same reason any photography subject to another temporal destiny visibly known as chemical entropy

- temporal index not rooting in the imaginary "referent" of the photographic image (Barthes) but in the material irreversibility of the en-lightened photosensitive chemistry (argument Hagen, "entropy"), fixed only in the moment of developing the negative; chemical photography irreversibly degrades in luminance; moment of exposure to light momentarily in-forms the negative in Heider's sense (medium / form, loose / tight coupling), crystallizing silver halogenite

- from tight coupling of the material carrier (screen) with its iconic surface (oil painting) to electronic or computational *imaging* where the electronic materiality is only loosely (ephemerally, temporally) coupled to its visual signal output

- section of the medical film archive of Charité Hospital, Berlin, generated by a secret medical film project between 1941 and 1945, thrown by the SS into lake Stößensee near Berlin when the Red Army approached Berlin; divers detected these films in 1993; just three of several hundred film rolls could be deciphered at all, one of them showing on the basis of heavily damaged film material a naked man who performs several movements, apparently directed by orders from outside. "More cannot be seen" = Keller 2000

### **Photography, memory and the archive: Heidegger's distrust**

- cultural objects in museum display: "World-withdrawal and world-decay can never be undone. The works are no longer the works they were. It is they themselves, to be sure, that we encounter there, but they themselves are gone by" = Heidegger, Origin, 166

- Barthes' notion of the photographic *punctum* as experience of by-gone presence (*Dagewesenheit*)

- "If for Heidegger the *Gestell* appears as a kind of 'photographic negative' of *Ereignis*, Benjamin insists that this negative imprint must be developed" = Rebecca Comay, Framing Redemption: Aura, Origin, Technology in Benjamin and Heidegger, in: Ethics and Danger. Essays on Heidegger and Continental Thought, Arleen B. Dallery and Charles E. Scott (eds.), Albany (State Univ. of New York Press) 1992, 139-167 (161), referring to M. H., *Vier Seminare*, Frankfurt/M. (Klostermann) 1977, 104)

- as technological artefacts, images suspended from from cultural and humanistic categories, such as habitus, style. "For the historic index of the images doesn't simply say that they belong to a specific time, it says above all that they only enter into legibility [Lesbarkeit] at a specific time. And indeed this entering into legibility constitutes a specific critical point of the movement inside them. Every present is determined by those images that are synchronic with it: every Now is the Now of a specific recognizability [Erkennbarkeit]" = *Gesammelte Schriften* vol. 5 (Das Passagen-Werk) N 2a, 6 = p. 577, quoted in: Fynsk, 116; read the "entering into legibility" from the media-archaeological point of view as a non-discursive practice of machine reading; no metaphysics here, but algorithmic data administration; external metadata an archival texture exterior to the object, as opposed to deriving metadata from primary inscription within the digital image itself

### **Reverse temporal indexicality: The enduring photographic image**

- inherent limits of photography which technically can always only be a snapshot / interval ( $\Delta t$ ) of time - unless long-time exposure, like in the early days of photography and in Bragaglia's photo-dynamism, as well as in

Étienne-Jules Marey's serial chrono-photographical exposures; cinematography still composed of moving stills

- Hiroshi Sugimoto's long-time exposure in photography of a cinema film screening results in the screen as white square, resulting in kind of pure, non-semantic Bergsonian *durée*; temporal indexicality which is (in spite of its iconic content) the real medium message of photography hereby dissolves into the temporal interval itself - an aesthetic reverse engineering of the long exposure time in ordinary photography; Matthias Flügge u. a. (ed.), *Raum. Orte der Kunst*, Nürnberg (Verl. f. mod. Kunst) 2007, 304 ff.; Hiroshi Sugimoto, *Time exposed*, catalogue Kunsthalle Basel (1995), ed. Thomas Kellein, Stuttgart 1995

- different from cinematography which is not only in time but embodies a temporal extension in itself; inbetween: chronophotography

- long time exposition (the early temporality of the photogenic process) introduces times as (Bergsonian) endurance into the image, somewhat comparable to John Cage's composition of 4'33 minutes silence for piano

### **Chrono-photographic freezing**

- Jules-Étienne Marey and Edward Muybridge chrono-photographically transforming an otherwise temporally experienced sequence (movement) into a spatial series (of discrete moments), close to the present aesthetics of the animated GIF; even if cinematographic montage manipulates / deconstructs the linear time axis, its elementary units still consist of temporal (sequential) objects; linear time is its matter

- comparing photographic moment, i. e. the fixation of a moment in time, to the immediate transmission of an electronic image in television or video. In the first case the photonic event is chemically made to have a lasting effect, whereas in the latter case it vanishes from the phosphor screen of the monitor in a fraction of a second. But even this fraction is an interval, a  $\Delta t$  (even if it tends to zero). The media archaeology of photography itself reveals how the long-time, almost painterly exposure of early Daguerreotypes and Talbotypes by progressing mechanical and chemical means shrank down to the notable photographic "click" or "shot". On the other hand, it can happen that a photographic negative film is being developed months or even years later, such as in the tragic case when two rolls of film were found next to the corpse of Robert Falcon Scott who died with his team on the way back from the South Pole in 1912 after having only been second to Roald Amundsen. The author of *The Great White South*, Herbert Ponting, a photographer and who previously had accompanied Scott in the Antarctic, had the film developed (= signal memory), while a letter (= symbolic memory) which Scott had found in Amundsen's former tent at the South Pole and carried with him until his untimely death, was uncovered from snow (the medium of oblivion and frozen memory) as well and finally posted to its addressed destination: H. M. King Haakon of Norway = "Letter from the South Pole", in: *Living Memory*, Oslo (National Library of Norway) 2006, 67; timing of photographic immediacy and postal deferral, otherwise clearly alternative to each other in its temporality, here interfere, being subverted upside down. Scott from the developed photography still looks at us (the Barthesian *punctum*) as if

it was a live transmission, televised from the past - chronotelevision, cutting short and undermining what is cognitively (*studium*) known to us as the historical distance which separates us from that past moment, based on the symbolic regime of historiography (letters) = Vigdis Moe Skarstein / Tinje Grave 2006: 67

### **Between analog and digital (non-)temporality: the photographic snap shot as temp"aural" moment**

- very term photography itself becoming antiquated in the digital age, where the analogue "writing of light" (records) has been replaced by numerical "computing" of photonic energy transduced to binary information. While photography technically fulfills Derrida's criterium of the belatedness ("*différance*") of (hand-)writing, digital photography rather belongs to Gutenberg Galaxy (McLuhan) of typography

- notion of "space" itself derives from Latin *spatium* which names the interval; can be of geometrical or temporal extension; in room acoustics a function of the signal run time difference. With the shrinking of the temporal interval of processing a photographic negative in digital instantaneity, the sense of history is indirectly affected as well: no more *Entwicklung*

- with almost immediate non-storage of received photographs, emphasis of Barthesian "ca a été" = Roland Barthes, *La chambre claire. Notes sur la photographie*, Paris (Gallimard / Seuil) 1980, dissolving as well

- lamenting loss of "aura" (such as watching the shadow of a tree branch passing by in the progressive sunlight) by photographic image reproduction = Walter Benjamin, *Kleine Geschichte der Photographie*, in: same author, *Medienästhetische Schriften*, Frankfurt/M. 2002, 309; chrono-scenario takes a lot of time, contrary to its instant photography which would rather result in a series of snapshots in chrono-photographical aesthetics; Benjamins description equals gnomon of the ancient sun dial which is an analog time measuring medium par excellence, different from the digital clock

- the more precise the photographic snap-shot ("still") has become in the time-critical sense, the more it does not confirm but irritate the human perception of the present which physiologically and neurologically rather embraces an interval of around three seconds. The numerical sampling of the present (which Henri Bergson and Martin Heidegger already criticized as "mathematical time" of cinematography and the oscillating clock) de-anthropologizes the present moment. The technical "instant" itself has become fuzzy. The aesthetic equivalent of this micro-temporal irritations is the photographic flicker, as expressed in Anton Stankowski's photography of a passing car (1929). In a kind of representational oxymoron, speed itself becomes the message of the photographic still. What had been a deficiency in early photography - the comparatively long time of exposition required to produce a Daguerreotype - has (after the mastering of that problem by Talbot's Gelatine kallotype) returned as a chrono-aesthetic message; Berlinische Galerie exhibition *Sprung in die Zeit. Bewegung und Zeit als Gestaltungsprinzipien in der Photographie*, Martin-Gropius-Bau, Berlin (1992)

## The animated photograph: *Blade Runner*, Claerbout

- Ridley Scott's film *Blade Runner* (USA 1982, based on the novel *Do Androids dream of Electric Sheep?* by Philip Dick), epistemology of the so-called Turing test: How long does it take for humans to differentiate androids from full humans. In its most advanced version (the "Nexus-6" series), the replicants are infused with memories derived from (other) humans. In the first private scene between Deckard and Rachael, she carries a photograph claiming that this shows her as a young child with her mother. Deckard reflects on the function of such photographs in infusing replicants with memory - not in the sense of simple data storage, but in a way closer to G. W. Hegel's differentiation between mechanical memory and internalized remembrance (Deckard, in the German translation, speaks of "Erinnerung"). *Erinnerung* is a quality which differentiates computer memory from human skills of digesting perception into recall. When she wants to know if she is a replicant, Deckard tells her a scene from her most intimate memory to prove that her remembrance is an implant. Finally, Rachel throws the mother-and-child photography on the table and leaves. A minute later, when Deckard takes a closer look at that photography, shadows slightly move across the surface, subtly suggesting an animated picture (familiar from the "Ken Burns effect") which is a dynamic index to the temporal real - as if his own "living" memory was stimulated or he himself was reminded that he might be a replicant himself - questioning the difference between remembrance and technical memory.

- digitally animated photographs by David Claerbout (as presented in his gallery exhibition *Still (not) moving* = January / February 2014, gallery EIGEN + ART Lab, Berlin; blur the difference between the present and the past, and evokes the notion of the *undead*; a "post-digital" tempor(e)ality is evoked

- in "Director's cut" version of *Blade Runner*, a different photography turns up, once more supposed to show a childhood memory of the human/replicant, in fact a house garden scene. At one point in the close-up zoom on this photography, the leaves in the garden tree on the supposed memory photography of Rachel's youth slightly move which is a dynamic index to the temporal real / Siegfried Kracauer, *Theory of Film*, exemplifying the scene of rain drops falling on ground; leads to irritations of human confidence into the clear distinguishability of artificial and human memory

- further irritation resulting from film-making at work: both the main actor of the *Blade Runner* and his antagonists, the Replicants, have been enacted by indifferently humans in the 1982 version

- shivering of the leaves on the photographic still (its "still movement") in the Rachel memory *Einstellung* itself no more moving than the shown photograph; both composed of still frame sequences from within the cinematographical apparatus

- in phenomenological terms, a digital photography of a media-archaeological artefact and a movie of the same artefact look the same, but chronologically they embody totally different essentialities. A further difference is



the filming of photography as opposed to the photographic print itself: The print endures, while cinematographical recording passes both *in* and *with* time

### **Material chronophotography: The symbolic de-construction of a mechanism**

- *Owners Workshop Manual* for the YUGO / Zastava car itself a real "paper machine" (Turing), allowing to deconstruct and to reconstruct a Yugo car from scratch (esp. the 45 A series) = Somerset (Haynes Publishing Group), 2nd ed. 1990; diagrammatic algorithm of the manual convincing: "The tasks are described and photographed in a step-by-step sequence so that even a novice can do the work" - which is chronophotography in the best pre-cinematographic tradition of Marey and Muybridge" (p. 5). And the cover has a jacket comment on the series: "Every Manual based on a complete Stripdown and rebuild"

### **From natural movement to the un-natural in its chrono-photographic reproduction**

- *temporal* quality of the "analogue"; time-continuous signal which differs from the "digital" time-discrete impulse. Mechanical cinematography has always already been dissimulating its digitality in a quasi-analogous perception by the lazy human optical apparatus, with the effect of "natural" reproduction of movement. The audience once reacted to Eadweard Muybridge's chrono-photographical analysis of movement with reservation: It was perceived as un-natural = Zglinicki 1979: 176; unease later philosophically expressed by Henri Bergson who defined the cinematographic movement as the false impression of time

- has chrono-photography, in traditional media historiography, been reduced to a mere fore-runner of the moving image, but chrono-photography the immediate precursor of digital sampling in an chrono-epistemological sense: an alternative to the linear continuum of historiographical time; correlates with sonic operations (Gabor's "acoustic quanta" as sampling wave forms on film stripe into "grains" for resynthesis as time-stretching; asymmetry between continuous sound and discrete image inscription on celluloid

- chapter four in Bergson's *L'Évolution créatrice*: cinematography nothing but a false simulacrum of movement, since what is un-rolled is frozen momentary images. According to Bergson, "true movement is between static states and is not their simple accumulation. [...] Hence, for Bergson, there is no such thing as the present" = Mary Ann Doane, *Has Time Become Space?*, in: Liv Hausken (ed.) 2013, 89-108 (94); in Bergson's sense, what human mind conceptually terms "the present" rather reminds of Heinrich Hertz' definition of "inner delusions" ("innere Scheinbilder") of a temporal reality = idem, *Mechanik*, xxx; according to Bergson human cognition an analytic operation, which according to McLuhan's diagnosis has been induced by the alphabetic discretization of continuous speech since antiquity = McLuhan 1964/1994, 238; cinematography around 1900 is the return (even "recursion") of the alphabetic implication. The analytic approach (discretisation) which is mirrored by the Weber brothers'

measuring of human petal movement and chronophotography (and in Reuleaux' Kinematik) then transfigures into synthetic projection: "movies". This is a media-epistemological transsubstantiation (to borrow a Christian term)

- Bergson describing the clock-movement in quasi cinematographical terms; in fact in the camera-projector constructed by the Lumière brothers, the perforated film is being driven by a clock-like mechanism. Dis/continuity (with the slash signifying cinemato-graphic cut) the very essence of the mechanical movie apparatus, of its dialectic of movement and stillness halting the single frames of the continuous celluloid reel for a moment in order to evoke the physiological after-image and neuronal image-blending within the observer; Laura Mulvey, *Death 24x second*, xxx 2006, 12 (on Dsiga Vertov)

- Muybridge's and Marey's chronophotography technically the Aristotelean definition of time as numerical measurement of movement against the phenomenological philosophy of time (St. Augustin, Husserl). Movement became time-critical by mechanical analysis; *tempo-real* moment of recording - sublimely below human perception - undermined the traditional symbolic order of narrative time

- operating inside the cinematographic camera (resp. the projecting apparatus) the clock mechanism, including a form of mechanical *escapement* which became essential for the "binary information digit" as so-called "hindrance" (materially the electro-magnetic relay) in Shannon's logical circuit diagrams

- *integrates* cinematography continuous time in 24 frames/sec. and thereby mechanically performs Leibniz' infinitesimal calculus as approximation by numerical discretization; "analogue", apparently continuous signal is pre-digital in the sense of its implicit mathematicity. Analogue movement becomes digital as "movie"; current "post-digital" culture nothing but the application of such being in the physical world; due to Fast Fourier Transform the speed of technological simulation happens in real-time

## NOTES ON CINEMATOGRAPHY

### **Cinematographic spatialisation of time**

- apparent temporal indexicality of the cinematic sign "which would not be that of its own functioning. This is what imbues cinematic time with historicity" = Mary Ann Doane, *The Emergence of Cinematic Time. Modernity, Contingency, the Archive*, Cambridge, Mass. (Harvard Univ. Press) 2002, 23; different from "analog", time-continuous signal recording, cinematography does not record a continuous tempor(e)ality outside itself, but in fact *spatializes* it - a linear, but not steady but interrupted geometrization and thereby mathematization in terms of Bergson's critique of the moving image = Doane 2002: 66. With each discrete photographic frame which is in fact *stilled* during recording and projection by the intermittent mechanism of the apparatus, a sampling of the present takes place which is instant archiving. "Once the present as contingency has been seized and stored, it ineluctably becomes the past" = Doane 2002: 23

- translation into the chrono-symbolic order equals the cinematographic recording with the written document: In the moment of reading / viewing "it becomes the experience of presence" = Doane *ibid.*, as long as the physiological persistence of vision and the psychological *psi* phenomenon result in the virtual impression of continuous motion. Such a repetition of the present moment, though, fundamentally differs from electronic "live" transmission of visual signals. In terms of informational entropy, such a reviewed present is redundant: "The act of filming transforms the contingent" - which is no finite alphabet on the source side - into a discrete series (time-string) of visual characters, "reducing its contingency" = *ibid.* - unless the sampling theorem in the mathematical sense of communication engineering is being applied. The act of cinematographic recording is not historicizing but quantizing. Against the prevailing notion of "the archive's historicizing impulse" = Doane 2002: 30, techno-archival operation asks to be decoupled from its tight alliance and absorption with the historical discourse. "The cinema engages multiple temporalities" = Doane 2002: 30 - not only the narrative diegesis, but first of all (in the media-archaeological interpretation) the chrono-mechanism of the technical apparatus itself. The instant recording which takes place in cinematography is "archiving the present" indeed, but the historicistic interpretation of this act ("cinema transforms the present into immediate history" = Doane 2002: 105) does not refer strictly to what the apparatus does; "historicizing" quality only active when the technical analysis is coupled with contextual, that is: media-external narratives; only "the spectator's historical knowledge inevitable makes the event 'historical'" = Doane 2002, note 79

### **The "quanta" of human perception of the present - always already cinematographical?**

- Karl Ernst von Baer identifying what cybernetics later defined as "subjective time quantum" (SQ) for the phenomenological perception of the present, which according to measuring in physiological laboratories (Wilhelm Wundt) extends between 1/10 and 1/16 of a second = "Vorwort der Schriftleitung" (preface Helmar Frank) to the reprint of K. E. v. Baer, xxx, in: *Grundlagentexte aus Kybernetik und Geisteswissenschaft (GrKG)*, xxx, Quickborn (Schnelle) 1962; Canales, *Tenth of a Second*; appears von Baer's lecture in 1860 like a pre-cinematographic identification of the single frame; consequently Frank 1962 asks: "Folgen unsere Erlebnisse tatsächlich in diskreten Zeitabständen wie Filmbildern aufeinander?" *ibid.*; technologically induced model of the time-window of the present criticized by Henry Bergson in chap. 4 of his *Évolution créatrice* as false, mathematical time concept, different from the very nature of time as *durée*. Informational aesthetics has carried this time-discrete analytics further, identifying the limit of cognitive apperception to 1 bit/SZQ per second = Helmar Frank, *Kybernetische Grundlagen der Pädagogik - eine Einführung in die Informationspsychologie*, 1962 - "photofilm" on the operative (rather than film-dramaturgic, diegetic) level of analysis

- coincides cinematographic frequency with the hearing threshold of impulse sequences into the psychophysical impression of a deep tone (such as very low organ pipe)

## Stilled time: The "moving" photographic image

- Bergson criticizing cinematic delusion as mathematical clock time which samples duration (the true essence of time) into measurable, spatial slices; geometrization of time the message of digital culture itself with its sampling techniques and mapping of time into topological storage and data processings. *Tempaurality* here, does not endure any more. "Benjamin might say that the loss of aura associated with electronic reproduction is a function of its inability to *endure*" = Doane 1990: 227

- *delta-t* the temporal interval of photographic signal "inscription". the chemical exposure time to light has been increasingly approaching zero, transforming from almost Bergsonian duration to almost Dirac impulse for measuring the temporal moment; temporality of the photographic plate is latency; momentary flash (or rather long exposure in early pre-kalotypic photography) embodying different temporalities

- in media-archaic incubation epoch of photography, took a long time interval for the object to get fixed by interaction of light and silver grains on the photochemical carrier. For humans and other animals, this meant suspending any movement, almost: fossil like freezing during a portrait session, becoming a statue for a certain interval of exposure. Whoever nowadays, in the age of photographic clicks, undergoes this archaic experience in face of a pin hole camera, makes this experience of time itself passing as still - with the curious side-effect that in the background things happen which do not get inscribed like in the famous Daguerrotype of the Boulevard du Temple in Paris which looks empty except one human sitting in a chair to get his shoes polished

- temporality which transcends the inherent limits of photography; photograph technically can only be a snapshot of time - unless there is long-time exposure or overlaying, like in the early days of photography and in Bragaglia's photo-dynamism, and notably in Étienne-Jules Marey's serial chrono-photographical exposures. In whatever experimental form, cinematography is still composed of intermittance-rhythmicized stills

## Digital presence: the "moving still"

- from the first public film screenings onwards, a disruptive cognitive dissonance between the affective illusion of continuous movement and the parallel knowledge that this is technically achieved by radical photographic discretisation

- human sense of the actual present irritated by the cinematographic presence of the "moving still" - that is, when continuous, "analog" time is recorded in discrete "digital" frames. The static or stationary shot, while the recording camera is still moving the reel, dissolves the dichotomy between "still" and "moving", resulting rather in *imágenesis* = abstract to the lecture "Still Einstellung: Stillmoving Imágenesis" by Jon-Inge Faldalen in research seminar *Medien, die wir meinen* at Humboldt-University, Berlin, Media Studies (Media Theatre), May 7th, 2014

- crucial difference between *presence* and *the present* in the chrono-technical sense of what Walter Benjamin, in his essay *Über den Begriff der Geschichte* (1940), termed *Jetzt-Zeit*: "a notion of time that is ripe with revolutionary possibility, time that has been detached from the continuum of history" = <http://www.oxfordreference.com>

- the more film comes close to registering what humans perceive as living motion, the more, as technology, it underlines the unbridgable gap between technical animation (by recording and replay) and organic bodies, resulting in an allegoric sense of melancholy which self-reflexively accompanies early film. The content of artificial, technical "animation" is the *liveness* of a "movie" only on the perceptual level; cognition knows the actual message of discontinuous, mechanically controlled stepwise motion; Laura Mulvey, *Death 24x a Second. Stillness and the Moving Image*, London (Reaktion Books) 2006

- late nineteenth century, the psycho-physiological discovery of the "tenth of a second" as perceptual unit of what humans experience as the present, and chronophotographic analysis of motion; coincided with the emergence of cinematography and its frequency of image projection to produce the impression of a continuous movement; in fact their measuring and transmission instruments were cooriginary. Commenting on "modern communication", Thomas Edison's chief laboratory engineer remarked: "We all live in a tenth of a second world" = A. E. Kenelly, *The Metric System of Weights and Measures*, in: *Scientific Monthly* 23, no. 6 (1926), 551, quoted here after: Jimena Canales, *A Tenth of a Second. A History*, Chicago / London (Univ. of Chicago Pr.) 2009, 5

- dramatic epistemological difference between the "analogue" electronic (video) image which as an effect of the cathode ray tube unfolds in time itself, as opposed to the cinematographic image where its still frames are externally moved by the apparatus

- any media archaeology of "movement" based on the close analysis of what occurs *within* material apparatus - different from external phenomenological cinema studies; Willy Merté, *Die Grundlagen der Kinematographie*, in: *Naturwissenschaften* Bd. 7, Heft 25 (1919), 435-443; intermittent drive has been the condition of possibility (*arché*) of the kinematographic effect (and micro-temporal affect, the "presence shock")

- digital images "images" no more, but alpha-numerically coded texts composed by hexadecimal symbols (the "technical image" as defined by Vilém Flusser). Any digital image can be printed out as radically non-iconic "dump file" matrix.

- "Treat time as discrete": In a variation of Alan Turing's definition of digital computation, this introduces *discreteness* into movement

- media-archaeological research not about the "true" nature of time but rather unfolds the operative processualities of technical media in combination with neurological signal processing within humans. All of the sudden, the transcendental notion of "time" implodes into a multitude of events.

- logocentric concept of the present (just like "the continuous") is not the real at all as physical reality, but itself is metaphysics when compared to what actually occurs microtime-delayed

- in former cinematographic and again in "digital" media times, humans experience the present always already as temporal simulacrum. "Practically, we perceive only [...] the past gnawing into the future" = Henri Bergson, *Matter and Memory*, transl. N. M. Paul / W. S. Palmer, New York (Zone) 1991, 150, as quoted in: Doane 2013: 94 - which exactly corresponds with the function of the ultra-short "cache" memory, the intermediary storage device in the Central Processing Unit of high-speed digital computers as kind of dynamic, transient archive.

- what is experienced by humans as a temporal horizon (such as a musical melody), matched by "predictive analytics" in algorithmic computation, allowing for mathematical intelligence to become operative. Media archaeology focuses on the identification and description of such micro-media-dramaturgies

- discontinuous mutation, which is the techno-temporal reality behind the apparent "post-digital" smoothness in computing

### **Photofilm has already prefigured the digital image**

- photofilm, if not understood as a literary, film philological genre, seen through the lense of narrative analysis, but taken at face value as its most basic event: discrete "sampling" of reality by cinematographic time-discrete recording, the human / machine divide becomes crucial. Human perception is "smoothing" discontinuous photographic samples (frames) into the *sensation* (von Helmholtz) of continuous movement, but this takes place in neuronal cognition only, whereas analogue signal measuring and recording (since times kymographic and phonographic recording) actually *is* continuous

- media-archaeological perspective turning notion of "photofilm" upside down: can be identified as a symptom within a much broader epistemological context, which is technical media analysis (measuring, recording) and synthesis (projection) of the "contemporary" present

- after chrono-photographic "sampling" of movement by still iconic frames, now "digital" sampling of the present mo(ve)ment as technical analog-to-digital conversion by means of the sampling-and-hold electronic module, kind of "cinematography" already: a non-iconic capturing of movement. The analysis of movement has been a key function in the development of cinematography (prior to narrative "movie" cinema). "The inscription of the gesture is a central concern for chronophotography (Marey, Charcot, Gilbreth), psychotechnics (Munsterberg) and in the new modes of perception sought by the various film movements of the 1920s (Vertov).

- media-active archaeology: cinematographic analysis gave access to the 'optical unconscious' (Benjamin, Epstein), a different kind of "archive", through the means of the close-up, slow motion, repetition and frozen movement; cinematographic camera, especially in slow motion (akin to "photofilm") gives

access to different kind of nature than is usually disclosed to the human eye; thus it opens a different kind of archive of the present (Benjamin's "optical unconscious"), which turns out to be technological in the literal sense of Sigmund Freud's (and Jacques Lacan's) notion of the psychic *apparat*

- photo-cinematographical mode of sampling the present moment relates to the analysis of movement in the digital domain. "In the biometrics of digital video surveillance, the analysis of the gesture becomes automated pattern recognition. Motion capture is a decisive breakthrough in this analysis, as it separates the motion pattern from the photographic representation" = Trond Lundemo, lecture "The (Un-)Attainable Gesture: Two Modes of Motion Pattern Recognition", colloquium *Medien, die wir meinen* (Media Studies, HU Berlin), 15 June, 2011, abstract; formerly iconic film image, as algorithmically "reasoned" sequence, becomes "diagrammatic iconicity" (in terms of Charles S. Peirce)

- "The difference between silver-based film and digital is the absence of the shutter. No more flicker"; literally film is made of still photographs after all. "But the digital film is not. Underneath there is a grid of pixel-size slots, and it is fixed" = Babette Mangolte, *Afterwards: A Matter of Time*, in: Richard Allen / Malcolm Turvey (eds.), *Camera Obscura, Camera Lucida*, Amsterdam (AUP) 2003, 261-275 (264)

### **"Sampling" the visual present (recursive images, thumbnail movies, cinematographical projection)**

- phenakistiscope discs once providing for a real animation device, presented to the public by Joseph Plateau in 1833. "The artist(s) only had 8 to 12 frames to work with and these had to form a loop. The results are quite compelling and surprisingly fluent, although many movements are incorrect [...] more than 40 years before Muybridge started his photographic motion studies" = McLeans *Optical Illusions*: <http://www.youtube.com/watch?v=3JeN3uk2CIE>; such for-running of cinematography proper does not extend to archaeological dimensions in the literal sense, such as an ancient Oriental ceramics decoration depicting a chrono-photographical sequence of movement states; <http://www.youtube.com/watch?v=lpAFmuSehRg> <http://www.cais-soas.com/CAIS/Art/porada/porada-akkad.htm>; such "animated" image sequence the starting of the "moving image" for media history? In his classic "archaeology of the cinema" C. W. Ceram puts the prehistory of the motion pictures straight: neither the baroque automata and marionette theatres led to genuine moving picture sequences. When tracing such perceptual shocks of "cinematography" *avant la lettre* backwards, another flash-back leads to an archaeological scene proper. An irritation of the visual immediacy of the present can happen within one image scene itself (as known from psychological experimentation)

- retracing the "moving image" already trapped by the historical discourse with its obsession for origins; flipbook not a media-historical improvement of "animation" scenarios on ancient pottery; the relation is rather pre-historic in a structural, that is: media-archaeological sense

- media archaeological analysis developing a special sensibility for

discontinuities, ruptures, thresholds, limits and series; "Introduction" to Michel Foucault, *The Archaeology of Knowledge* [FO 1969], London (Tavistock) / New York (Routledge) 1972

<http://www.marxists.org/reference/subject/philosophy/works/fr/foucault.html>;  
re(oc)curs such non-narrative shapes of time within the cinematographic apparatus itself: dis/continuity (with the slash signifying the cinematographic cut itself) is the very essence of the mechanical movie apparatus, of its dialectic of movement and stillness, halting the single frames of the continuous celluloid reel for a moment in order to evoke the physiological after-image and neuronal image-blending within the observer

- transitoriness of human perception of a landscape passing by (out of a train window as *dispositif*) differs from the filmic registration and projection of the same scene, as expressed in Haiko Daxl's video installation *Le Cinéma – Le Train*: "Film leads and film takes of railways are the raw footage of this work. By manipulation and montage in relation to the musical composition there are points for thoughtful excursions, roundabouts, dreams, curves, imaginations and lost memories" = commentary in the exhibition catalogue *Media-Scape* (the Biennial for Time-Based Arts), Zagreb, September / October 2012, edited by Ingeborg Fülepp, 25

- as long as human perception not yet media-culturally *trained* and accelerated and finally used to rapid cinematographic image sequences (both on the single frame projection level and the filmic montage), it could not distinguish the discrete elements passing by. Indeed, Walter Benjamin insisted on the historicity of human sensation - which is, among others, a function of its technological conditions

- first generation of passengers using trains for transport not yet prepared for cinematographic perception: "The flowers are not flowers anymore, but spots of colour, or better to say red and white stripes. There is no point, everything turns into stripes. Cornfields like long yellow strands of hair and meadows like long green plaits. Church towers and trees start to dance and merge in a lunatic way with the horizon. Sometimes a shadow appears, a ghost (...) and disappears like a flash" = Victor Hugo in 1837; "ghost" became an electronic being with Vladimir Zworykin's Iconoscope (1923) where the image through the lense is projected upon a mosaic plate of glimmer, to be scanned by a cathode ray beam in order for the emitted electrons to be amplified. This an invisible image consisting of electrons which only exists in intermediary storage = Wolfgang Hagen, *Das dritte Bild. Kontingenzen und Zäsuren in der Technikgeschichte des Fernsehens* (2003, lecture University of Basel); see <http://whagen.de/main.php>

- exhibition *Vom Funken zum Pixel*, 28 October 2007 til 14 January 2008, Martin-Gropius-Bau Berlin, curatierted by Richard Catelli

- photo-filmic "moving still" remaining an oxymoron

- relationship with moving and non-moving images essentially altered by mobile recording and playback technologies; permitting to immediately process and forward in real-time the material being record already in moment of observation; merging of the image-producing devices, no more hardware-based con-



scious / alternating decision whether to shoot photos or film = conference draft *Photofilm. Sampling the Archives*, Budapest, November 2017)

## **Digital sampling of "analog" moving imagery**

- "digital" (time-discrete) sampling (A/D) radically alters the media-ontological quality of "analog" signal transduction

- "analog sampling" in electronic imagery (video / television): capturing the value of the smoothly varying signal by transduction into voltage at regular intervals. "The frequency at which we sample the signal has to be sufficiently high to collect enough samples to build up a picture. Too few samples and we miss information; too many and we waste memory storage" = McLean 2000: 108; bandwidth as precondition for re-generating the signal in time-critical fidelity is defined by the so-called Nyquist criterium: "The frequency for sampling a signal should be a minimum of at least twice the maximum frequency within that signal" <ibid.>. Digitizing signals as analog-to-digital conversion is achieved in the core electronic "sample-and-hold" module, which is micro-kinematographic by ultra-short intermediary storage of time-discretely sampled values - the time-tricial micro-intervall. "Taking samples of the voltage at regular intervals gives us a sequence of stable voltage values that we feed to the converter hardware. Each stable voltage value is converted into a number, represented in binary notation to reflex the hardware implementation. The scale of these numbers is adjusted so that the extreme numeric range represents the extreme range of brightness values. For an 8-bit wide binrary number, those extremes are 0 to 255, equivalent in binary notation to 00000000 and 11111111 respectively" = McLean 2000: 108

- enigmatic metamorphosis from signals into information with its smallest units, the bit. By quantizing the sampled values, "the stream of numbers is created into a list of values that are stored in the computer as a data file holding the raw, unprocesse data. The signal is now digital and is the starting point for digital signal and image processing" = Mclean ibid.; extended to digitizing video images, "line by line, the correction values plot out the profile of errors in the signal's timing" = McLean 2000: 93

- "memory" from the archive of earliest recorded television images depends on computer algorithms as true nonhuman archaeologists: "If it were not for computer technology, Baird's grammophone 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 compeltely unknown" = McLean 2000

- archaic TV: "In these early prototypes, a transmission could be considered successful as long as an image took shape against the choppy grey static. [...] But if these images rush to make a claim on reality, it rests on the fact of transmission - reproduction at a distance - not on the veracity of its representations" = Richard Dienst, *Still Life in Real Time. Theory after Television*, Durham / London (Duke UP) 1994, 20

- computer-augmented Heideggerian *aletheia*; "radical" media archaeological investigation stays close to mathematics, a necessary answer to the turn from video as electronic "image" (signal) to codecs (coded symbols)

- McLean resisting the "digging" metaphor from Classical Archaeology: "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 as latency time. Consequently, Baird's *Phonovision* is no "dead medium" (Bruce Sterling) at all, but a technological aggregation, waiting for its re-enactment as operative signal processing which is the definition of its "medium" state - which is no frozen "state" but a temporal form of existence

## **Digital moving image compression**

- digitization of analog electronic video signals, like the CCD chip in digital photography and movies, results in a grid, filtering temporal flow into a Cartesian matrix which makes signals addressable as numerical objects for computing

- MPEG's "temporal correlation" between frames, its past, presents and futures shrinking into technical re- and protentions, and predictive algorithms; no technological manifestation of human time consciousness as expressed in Husserl's phenomenology at all; digital *imagenesis* (neologism created by Jon Inge Faldalen) radically differentiates the still from the moving image; Jon Inge Faldalen, Still "Einstellung": Stillmoving Imagenesis, in: Discourse. Journal for Theoretical Studies in Media and Culture, vol. 35 (2013), Iss. 2, Article 5

- I-frames setting the scene "with a single key frame. Thereafter, in the relentless pursuit of shrinking bandwidth, the P- and B-frames, within their macroblocks, change that initial key frame whenever there's movement (...). Fixed digital IP cameras are only concerned with movement within the area of coverage" = Anthony C. Caputo, Digital Video Surveillance and Security, Oxford (Butterworth Heinemann) 2010, 36

- video compression "to reduce the spatial redundancy among the picture elements and to reduce the temporal redundancy between successive frames, i. e. interframe coding" = Tomas Fryza, A Complete Video Coding Chain Based on Multi-Dimensional Discrete Cosine Transform, in: Radioengineering Bd. 19, Heft 3 (September 2010), 421-428 (421), and *predictive coding*

- MPEG-2 as standard for image sequences on DVD defining a bitstream, with its computing absorbing time: "Motion video can be manipulated as a form of computer data" = Adrian Mackenzie, entry "Codecs", in: Matthew Fuller (ed.), Software Studies. A Lexicon, Cambridge, Mass. / London (MIT Press) 2008, 48-55 (50). "Algorithmically, MPEG-2 combines several distinct compression techniques", *inter alia* "converting signals from time-domain to frequency domain using discrete cosine transforms, quantization" = *ibid.*

- "A sky could be mostly blue. Rather than transmit an exact replica of the sky, why not use an algorithmic process that transforms the blue sky into a quasi-

statistical summary of the spatial distribution of blueness?" = Mackenzie 2008: 50 f.; a child's pragmatic graphic abbreviation of a ketch of monotonous window series in a sky-scraper building by simple changing the repetitive window drawing by writing "etc.", in: Rudolf Arnheim, *Entropy and Art*, xxx

- Discrete Cosine-Transform encodes complex time-/space-variant signals into a series of discrete frequency components which can be added together to reconstitute the original signal during decoding. "Nearly all video codecs transform spatially extended images into sets of simple frequencies" = Mackenzie 2008: 51 - kind of *implicit* sonification, a time-critical operation and its inverse frequency space: "This allows them to isolate those components of an image that are most perceptually salient to human eyes" (ibid.). Counter-intuitively, a videoframe can thereby be seen as a waveform (ibid.). This implies a notion of sonicity which is liberated from its grounding in acoustics, referring rather to the musicality of "time" events itself.

- inner-image data compression accompanied, in MPEG-2, by *motion prediction*. "Interpicture motion prediction compression relies on forward and backward correlations, [...] in particular on the calculation of motion vectors for blocks" = Mackenzie 2008: 53; a techno-mathematical escalation of one of the most archaic analytical cultural techniques in the occident, the breaking down of oral language flow into smallest, in themselves meaningless vocal-alphabetic symbols? "Rather than the raw pixel being the elementary material of the image, the block becomes the elementary component" = ibid.

### **Asymmetries with Photofilm: photosound?**

- an asymmetry within the so-called audio-visual media disclosed in the filmic genre of "still movies", known as photofilm = Gusztáv Hámos / Katja Pratschke / Thomas Tode (ed.), *Viva photofilm. bewegt/unbewegt*, Marburg (Schüren) 2010; long shots with quasi-photographic endurance. One can cut out a single frame in a film, copy it and produce a long (seemingly) immobile sequence (in fact, the medium - be it mechanically for the cinematograph, be it electronically for the video monitor - moves constantly), but the accompanying audio track, cut out of one frame, in fact is a sample in its technical sense (the sampling theorem) which - being reproduced, would rather result in a single signal of sinusoid quality. An image (f. e. a portrait) can be visually preserved in the "photo film", but not a spoken word - unless the cinematographic apparatus is explicitly used for sampling sound into "grains" for resynthesis, Denis Gabor's "acoustic quanta"

### **Film versus video: Memory on demand?**

- video camera and recording, in surveillance or as media-art, a combination of visible reality and its storage. If only used to transport electronically generated pictures, the video tape can not be the original

- some videos obviously an attempt to make a film; regard video simply as a medium for recording, producing and projecting or its specific unmistakable medial aesthetic. Especially in comparison with film, videocity is profiled

- fundamental aspect of film, i.e. montage (a segmentation in time), was interpreted by the fundamental aspect of the early TV, the live-recording (a segmentation in space) in a key element of the studio equipment: the video change-over switch. A simple switch represented Eisenstein's most important montage, i.e. the cut, and with a simple switch on each camera, cuts to every conceivable point of view could be made. Griffith's "fade-to-black" became a gradual diminution of the signal tension with a variable voltmeter. (...) That is how, without the possibility to record, a simulation of cinematically treated time could be produced by an electronic live-instrument" = Viola, Bill (1993) Der Klang der Ein-Zeilen-Abtastung. In: Theaterschrift 4: The Inner Side of Silence. Brüssel, 16-54 (24)

- video-art still distinguished from other media art as long as the specificity of its technology maintained instead of becoming nothing more than another digital format. Nam June Paik pursued proper media-archaeology - a surgical operation in the medium itself. "In the late Sixties this imitation of film was overwhelmed when artists began to poke underneath the surface in order to reveal primary characteristics of the medium and to release the unique visual opportunities of the electronic image" = Viola 1993, 24 f.

- initial fascination at techno-qualities of video – the "scandalon of the medium" (Irmela Schneider) – increasingly let (mostly narrative) contents go first. The law that media-archaeology ends where 'content' - as a distraction from the medium as defined by Boris Groys' (the submedial) – begins

- acoustic character of video as a reverberative image. "From the point of technology, video has evolved from sound(electro-magnetical), its association to film leads into a wrong direction, because film and its grandfather, the photography, are members of completely different branches of the family tree(the mechanical/chemical one). Electronically transforming a kind of physical energy into electric impulses, the videocamera is originally related to the microphone, not to the movie camera" = Viola 1993: 20

- with application of magnetic recording in television production since 1958/59, "the viewer is not in the position" any more "to judge whether the programme he watches is a live or a recorded one" = Knut Hieckethier, Fernsehen, Modernisierung und kultureller Wandel, in: Flach, Sabine / Grisko, Michael (eds.), Fernsehperspektiven. Aspekte zeitgenössischer Medienkultur, Munich 2000, 18-36 (32); reversed case occurs when video cameras are placed onboard a missile, there is a coincidence of event, transmission and reception; difference of the act (*res gestae*) and its narration (*historia rerum gestarum*) implodes. Different quality of informational image: satellites do not send video signals but data, that become images during the process of *imaging*; the limits of videocity with pixels; 'video' in digital space will be just an anachronistic name. What, in case of the BK 3000 Colour by Grundig, called 'VCR', will disappear is the cassette. If the chip replaces the carrier media, the recording, the processing and the saving - the three components of a technical definition of media - converge in one material form of existence, the closed integrated circuit.

## Photographic in/formation

- complementary approaches to the conservation of analogue memory carriers: preserving the physical, especially chemical and electro-magnetic properties of the concrete media body - since all media technologies are hardware in the first place; opposing approach to preserve media-based memory as information, up to the extreme point of view that the material body might be abolished after its essential transformation into its pure binary information units

- two photographs of chapel of St. George near Dobralak in the Rhodope mountains of Bulgaria (near Plovdiv); one from Mai 2004 showing the unrestored chapel, the other (August 2010) its renewed state; the medium of photography indifferent against the tempor(e)ality of its referent; its historicity lies in the entropy of its own physical state; against this, digital photography a-temporal, carrying the temporal trace not in its information (which is its binary essence), but in the hard- und software into which this information is embedded - thus linking to the scriptural, alphabet-based, that is: coded systems of symbolic records

- Foucauldian sense of *archive* in digital, that is: computational photography: "[I]n our time, history is that which transforms documents into monuments. In that area where, in the past, history deciphered the traces left by men, it now deploys a mass of elements that have to be grouped, made relevant, placed in relation to one another to form totalities. There was a time when archaeology, as a discipline devoted to silent monuments, inert traces, objects without context, and things left by the past, aspired to the condition of history, and attained meaning only through the restitution of a historical discourse; it might be said, to play on words a little, that in our time history aspires to the condition of archaeology, to the intrinsic description of the monument = Michel Foucault, *Archaeology of Knowledge*, transl. A. M. Sheridan Smith [\*1972], London / New York (Routledge Classics) 2002, "Introduction", 3-19 (7f)

- "Evidently a different nature opens itself to the camera than opens to the naked eye" = Walter Benjamin, *The Work of Art in the Age of Mechanical Reproduction* [1936], in: Hanna Arendt (ed. and introduction), *Illuminations*, London (Fontana Press) 1973, 238; significantly, in English translation, Benjamin's term "technische Reproduzierbarkeit" turned into "mechanical reproduction", thus unwillingly reminding of the difference which opens with digital reproduction: a mathematization of the photographic process, a different archive. Media archaeology is about the mathematical / symbolic logic as well, not just about engineering in the traditional sense any more; mechanical (and then techno-mathematical) gaze opening an archive by making visible to humans what otherwise escapes the human optical sense: photo-micrography and the dynamical time axis manipulation by photography (chronophotography, slowing down and fast forwarding of motion), Emely Godbey, *The cinema of (un)attractions: microscopic objects on screen*, in: John Fullerton / Jan Olsson (eds.), *Allegories of Communication. Intermedial concern from cinema to the digital*, Rom (John Libbey) 2004, 277-298; archive of different temporalities opens, "declassifying" time-deferred worlds: an world of what has been hidden (*secretum*) while existing nonetheless - photo-*aletheia*. Technical *poiesis* in the sense of ancient Greek *techné* as re-defined by Martin

Heidegger. Both artistic and technical creations are modes of bringing forth, interrelated within the machine = Martin Heidegger, *Poetry, Language, Thought*, trans. Albert Hofstadter, New York (Harper and Row) 1975, 64; Malin Wahlberg, *A Relative Timetable. Picturing time in the era of new media*, in: John Fullerton / Jan Olsson (eds.) 2004: 93-103 (101 f.)

- in *The Gutenberg Galaxy*, McLuhan linking the triumph of Renaissance perspective to the rise of print culture, which correlates the mathematization of the image (previous to digitalization) with symbolical / combinatorial machines (the *abecedarium* of the printing press)

- Wolfgang Tillmans' image universe (photocopy, photography, video et al.) in fact "diagrams of forces that [...] somehow indicate that the age of the view of the world is over: There is no *view* of the world" = Yazdani 2018: 179 (closing remark), if not in Heidegger's sense "Zeit des Weltbilds": rather machine vision since Renaissance perspective

- once signals mechanically engraved (phonograph) or magnetically embedded (magnetophon, videotape) on material carrier have been transformed into digital, immaterial information, can be (virtually lossless) "migrated" from one storage computing system to another

- archival endurance not monumental fixation any more (*stasis*), but by dynamic refreshing

## NOTES ON THE ELECTRONIC IMAGE

### **Implicit sonicity: No "still" with(in) the electronic image**

- moment that a cinematographic image sequence comes closest to the photographic still - in the genre of "photofilm" -, it most radically differs from it: "Das Stilleben ist die Zeit, denn alles, was sich verändert, ist in der Zeit, nur sie selbst verändert sich nicht [...]. In dem Augenblick, in dem das kinematographische Bild dem Photo am nächsten kommt, unterscheidet es sich zugleich am radikalsten von ihm" = Gilles Deleuze, *Das Zeit-Bild. Kino 2*, Frankfurt/M. (Suhrkamp) 1997, 31; the real medium message which articulates itself between the lines of Deleuze's analysis of the film image, is the video image already. The tempoREAL of electronic *imaging* is transitory itself, a true time image, since it is never in the present, only before and after in the "flying spot" of the cathode tube ray for transduction of celluloid film frames into video signals = Webers 1991: 557 ff.; actually recalls Zenon's philosophical paradox that one can never capture an arrow while on the fly, since at every moment it would appear standing still - which triggered Bergson's critique of the chronophotographic effort to catch the essence of movement (as expressed in chap. 4 of Bergson's *L'Évolution créatrice*)

- the photographic *punctum* (as described by Roland Barthes) corresponds with the temporal *momentum*; the decisive difference is between the photographic print (or negative) and the videoframe *still*. Is there (a) stilled time in electronics? Videodisc can contain tens of thousands of stills; but an electronic "still" (different from a print taken out of a chemical film) never still, always

flickers, as a function of the pure time of the cathode tube ray, thus:  
permanently being re-generated

- in every digital video beamer projection, even the "still" image a function of data arrays which are permanently being refreshed ("the enduring ephemeral", according to Wendy Chun)

- time which passes can be either analytically measured (discrete clocking / chronophotography / cinema) or experienced as endurance in human "inner time consciousness" (Edmund Husserl 1927). Once a "born digital" or digitized film image is projected on screen by a beamer, what still seems like a photographic image reveals its processual character; it has to be re-generated out of computer storage permanently / dynamically; there is no "still image" in analogue video space and digital representation

### **The impossible "still" image in video / television**

- an electronic image never in identity with itself since line by line it is constantly being (re-)written and refreshed (in computing imagery)

- electronic image (in video and television) a chrono-ontological hybrid; "still" consists of quasi-photographic frames, but split into half images which are interlaced in TV, therefore an optical illusion, and they are essentially time-image instead of simply stepwise moving still images (not in the dramatic sense of Deleuze but electro-technically) - in fact closer to the Bergsonian *durée* than ever expected (an argument in Maurizio Lazzarato's *Videophilosophie*)

- the conceptual, but not electronically existent "frame" in (analog) television and video consists of strictly sequential signals (lines), interlaced into what slow human retinal and cognitive perception fuses into the impression of a coherent moving "image"

- technology itself becoming the true image archaeologist; earliest known recording from a Television Transmission the revue *Looking In*, performed by the Paramount Astoria Girls on the BBC Baird television system (30 lines) in April 1933; has been preserved by an enthusiastic amateur on his recording equipment on aluminium disc, in fact the Baird *Phonovision* system; restored video recordings 1927-35 <http://www.tvdawn.com/recording.htm> Media-archaeologically processed and restored by digital filter algorithms, the key to iconic clarity is movement itself - which can not be arrested in a photofilm-like still image. Any photographic reproduction of one of the 30-line television broadcast as stills in a printing medium gives a wrong impression of what had been actually seen. Here the time-critical comes in, since printed records (be it texts, be it images) miss a crucial element: time. "A single frame of the Paramount Astoria Girls may be crudely recognisable, but when seen as a moving dynamic television image, / the girls come to life before our eyes. [...] it has much more to do with what we perceive than what is there in pixels, lines and frames. What we are experiencing is not the detail that the eye sees, but the recognition of movement that the brain sees. [...] our brain [...] builds up a

model of what we are looking at" = Donald F. McLean, *Restoring Baird's Image*, London (The Institution of Electrical Engineers) 2000, 211 f.

- Baird's very *terminus technicus* "Phonovision" hinting to the signal-ontological gap between the photofilm "still" and "sonic" silence (pause); signal transmission in early electro-mechanical 30-line television is closer to gramophone and medium wave radio than to the photographic "image"; video art protagonist Bill Viola defines the electronic image explicitly as "The Sound of One Line Scanning" = in: same author, *Reasons for Knocking at an Empty House. Writings 1973-1994*, London (Thames & Hudson) 1995, 153-168

- Bill Viola's "drone" aesthetics of the electronic image and his notion of the "sound of one line scanning" not just an allusion to the music aesthetics of India but a precise "phonographical" interpretation of the time-linear scan process. The implicitly sonic essence of the video "image" gets further support from the fact that composers and musicians (like Paik and the Vasulkas) were among the first to understand the performative principles of this technology in its fundamental difference from film; even a "silent" video image is still implicitly sonic

- oxymoron in TV production "live on tape"; magnetic recording (time signal) vs. on celluloid (time-discrete)

- upper edge of an analog video tape containing audio information; the bottom edge control track information. Physical damage to either the upper or lower edges results in playback problems. If there is noise in the area of the tape which contains the color information, the colors appear to be moving inappropriately. If the chroma level is too low, the colors look faded. If the chroma level is too high the colors are overly saturated = Johannes Gfeller / Agathe Jarzyk / Joanna Phillips, *Kompendium der Bildstörungen beim analogen Video / Compendium of Image Errors in Analogue Video*, Zürich (Scheidegger & Spiess) 2012, xxx

## **Re-presencing Baird's television signals**

- Media from the past "re-presenced" (Sobchack) not only by their materiality; they rather require operative re-enactment, operative presence (which is the ratio for assembling techno-epistemological "toys" in the Media Archaeological Fundus and the Signal Laboratory at Media Studies, Humboldt University, Berlin)

- Media archaeography as writing mode for analysis of technological heritage *close to the signal* implies that instead of writing "about" past technologies (that is, intransitively) in a language which itself is foreign to the circuitry (textual description / narrative), it rather aims at *writing the media diagram* (transitively), akin to the circuit diagram (analog) or the source code (digital).

- consequences for communication with technologies from the past. Instead of "historicizing" in its epochal context (which is necessary but concerns rather cultural historical interests), media archaeology aims at "re-presencing" inherited technologies; see Vivian Sobchack, Afterword. *Media Archaeology and*



Re-presenting the Past, in: Erkki Huhtamo / Jussi Parikka (eds.), *Media Archaeology. Approaches, Applications, and Implications*, Berkeley / Los Angeles / London (University of California Press) 2011, 323-333. This approach is based on the media-theoretical assumption that a technological artefact (be it recordings or the actual player) is in a "media" state only when signal processing (or rather: signal transducing, in the "analog" electronics case). Therefore, different from most other artefacts in the museum ("archive") of cultural history, such archaic technologies need to be "re-enacted" (historian Collingwood's term for negotiating evidence from the past, though textual in his case).

- McLean's book occasionally referred to as 'industrial archaeology', 'technological archaeology', and the author as a 'television archaeologist'. In terms of Media Science, McLean's methods of artefactual research is "more like a forensic-level investigation" (McLean); this relates to the "twin" method of media archaeology which is media philology indeed: paradoxically, only from critical, "forensic" signal analysis results true media-philological insight (not traditional philological criticism related to the con/textual metadata); "forensic" analysis of the computer hard disc: Matthew Kirschenbaum, *Mechanisms. New Media and the Forensic Imagination*, Cambridge, MA (The MIT Press) 2008

- Donald McLean's achievements in "bringing these images to light and unearthing the back-story from the video faults" (communication September 2017) - even "vaults"; at first glance may look like an archaeological metaphor, but calling the signal restorations 'archaeology' is not misleading at all but both a method and an aesthetics of practicing media criticism. Against archaeology as metaphor borrowed from the classical academic archaeological discipline related to the act of unearthing material artefacts underneath the ground, media archaeology is understood rather in Michel Foucault's sense who in his *Archaeology of Knowledge* defines archaeology as foregrounding the conditions of possibility for perception to happen at all (the *a priori* in philosopher Immanuel Kant's sense); this corresponds to the non-phenomenological inquiry into archaic 30-line television; signal and electronics investigation surrounding the Phonovision restoration revealed the details and frictions in the methods and mechanisms by which the material was originally recorded. "So there was far more than just the visual imagery as output from this research" (communication McLean, September 5, 2017)

- Inbetween archaeology as misleading metaphor (regarding technological forensics) and active media archaeology indeed: magnetic prospection methods in archaeological field research as part of *imaging science*

- chronopoetically, media time as time of archaeological latency (more precisely: delayed transfer, *Delta-t*)

- as a "monument", Baird *Phonovision* recordings have become part of the archive (by inventorisation and curatorial preservation) such as any other classical paper record. The difference is *operative*: as a "document" it comes only into being (i. e. "readable", recognizable for the eyes) when being processed / played a) by a technical medium (first the Phonovision electro-mechanical Baird equipment, now the digital restoring computer) and b) when kept operative by an on-going medium, which requires the technical hardware

itself to be co-archived processually (such as by "emulation" for computational objects).

## NOTES ON DIGITAL IMAGERY

### **The archival from within photography (the digital regime)**

- with mathematization of matter into informational bits, its entropic temporality transforming: "Time no longer has physical meaning" = Elizabeth Skadden, *Collapsing New Buildings*, Master Thesis, Rhode Island School of Design, 66 ; Skadden's installation *Steenbeck Loop* reminding of a time figure which literally adheres to the materiality of celluloid film: "I made 16mm films and became enamored with its ability to express time with a physical presence. Film is measured in feet; it gives time a measure of distance" = *ibid.* ; Steenbeck film editing desk allows for cutting but is time-consuming, requiring rewinding of the spool. In digital editing (AVID), cutting becomes non-linear, allowing for instant addressing of the image data memory

- analogue photography by its very materiality inscribing traces of time, whereas in digital photography, the temporal index becomes a stamp, a date without physical evidence of aging

- notion of "digital photography" metaphorical, since its digitality can (in HD resolution) hardly be perceived by human eyes; a former single physical medium like the photographic image as print does not exist behind the surface of computer interfaces but as a data format, an array of bytes which are addressed and processed algorithmically

- digital photograph preserving the iconic quality while losing the indexical trace; indexicality itself of a different kind. While the analogue photographic print keeps a physical trace of the past / passed light signal, recording the light intensities, the digital pixel keeps a schematic, mathematically abstracted relation to their generating (and then sampled) analogue signals - *diagrammatic indexicality*; digital image: raw pixel data as nondiscursive units; behind: binaries. "[W]hile the pixel can be conceptualized as the technical basis for the meaning contained in the image, from a still lower level, the pixel *is* the meaning contained within the lower level system" = Rory Solomon, *Last In, First Out. Network Archaeology of/as the Stack*, <http://amodern.net/article/last-in-first-out>

- Foucault's "archive" a diagram (Deleuze); computational networks embody an operative machine, still topological (graphs, nodes) but with the additional dimension of temporal processes

- with electronic television, the human eye synthesizing the "flying spot" into an image. "A machine can capture the same image, without any consciousness or experience of the form" = Harun Farocki, *Reality Would Have to Begin*, transl. Marek Wieczorek / Thomas Keenan / Thomas Y. Levin, in: *Documents 1/2* (Fall / Winter 1992), 136-146 (142), referring to: Vilém Flusser, *Für eine Philosophie der Fotografie*, Göttingen (European Photography) 1984; televisual image "has to be established and sustained onscreen moment by

moment. With transmission, images and sets of images pass the time and fill out the current: in this sense television is always "live". [...] scanning cannot deliver an image all at once - its composition is always in process, and a "stable" frame can be instantaneously switched midway through"; different from digital image: "Although pixels can retain luminosity long enough to await the next scanning cycle and thereby approximate the succession of discrete filmic images, the fact that no image is ever constituted entirely in a single instant grants television a range of technical options for framing and editing, including incision and torque of the image's surface" = Richard Dienst, *Still Life in Real Time. Theory after Television*, Durham / London (Duke UP) 1994, 20 f.

- Photographic signal recording discrete (silver grain crystals) but stochastically distributed; no coded "elements", therefore no "inscription" in the alphabetic sense of writing; an analogue measuring of time, opposed to the familiar symbolic registration of past events in alphabetic writing. The non-linearity of photo-archival memory separated this aggregation from the smooth continuity effects of historiographical narrative

- digital media a techno-logical marriage between the symbolical order and the signal-based "real", miraculously converge; computer, by digital signal processing (DSP), is capable of emulating all "analog" happenings in the real physical world (which before only the "analog media" like gramophone and video could perform) by means of algorithmically processing the strictest of all symbolic, in fact: alphabetic regimes, which is the binary code; ultimate algorithmic temporalization of photographic memory

- "found footage" having been input for renewed film compositions within the same technology and celluloid materiality; with computing digitized film, the old medium format itself becomes "footage" for the Universal Turing Machine; con-temporary of three layers: 16 or 35 mm film, produced for television programs, broadcasted after signal transduction (scanning) as electronic "image", which is finally sampled onto computer screen

## **Satellite "imaging"**

- project Experiments in Satellite Media Arts (ESMA), June 18 - July 1 at migrating art & science lab MAKROLAB, curated by Marko Peljhan and stationed in rural Scotland from May through July 2002, "[...] downloading and manipulating satellite images, raw satellite television feeds, and electronic/digital sounds in an effort to generate a series of "orbital animations" that represent and comment upon contemporary global conditions" = <http://www.artscatalyst.org/htm/makrolab.htm>

- satellite "image" not existing in the iconic sense any more, rather dissolves into various practices of sensing, sampling, computing, cache storing, transmitting to ground stations; only there the data stream is processed into image format (directed to human perception), altered, combined, colorized, "and stored / archived or put into circulation" (communication Lisa Parks, December 2000)

- media-archaeological vision of the "scanner" aesthetics of technically reading images (with the satellite camera being the archaeologist, like for Cleopatra's underwater traces)

- technical *archive* (in Foucault's sense of that which defines what can be seen at all) is neither masculine in the traditional way nor feminine in a post-structural way, but unfolds an area of techno-machinic neutrality like mathematics before

- Galilei's use of the telescope: see what no human eye could have seen before, and at the same time; the authority of such telescopic images questioned the human ways of authentication. Looking into the sky, the telescope made him see things otherwise unimaginable; at the same time, Galilei already envisioned the reverse point to view, how the earth might look from the moon's perspective (his book *Siderus nuncius* from 1610)

- satellites "extend" - or rather genuinely new form of *imaging* - epistemologies of the visible and the real because they have been used to produce / expose matter that was never imagined before as part of a field of vision including phenomena in deep space, layers of the earth's surface, weather patterns. Satellite sights radically disembodied vision like radio / television previously; closer to abstract expressionist paintings of Mark Rothko than to photographic realism; technical process of signal transduction (analog) and signal sampling (digital) that occurs with the flow/transfer and encoding/decoding of electronic im/pulsees; rather translating than simply transferring signals from one site to another = notes on Lisa Parks, lecture *Mixed Signals: Media Infrastructures and Cultural Geographies*, Einstein-Forum, 20th June, 2xxx; Lisa Parks, *Cultures in Orbit: Satellites and the Televisual* (Duke University Press) 2003

- Horst Völz' development of a digital data tape recorder for intermediary image storage (delayed / suspended transmission) in outer space (the Phobos mission)

### **Between reading and scanning the image**

- once digitized into discrete elements of a grey shade / colour alphabet, images visually calculated and internally navigated; instead of forcing semantic / cultural (iconological) criteria of human image understanding upon the computer, entirely different criteria of image similarity in computing induce unexpected insights *from within* visual culture, adopting to its inherent technol-ogics

- analog approach: no longer subject images to a foreign symbolic order (textual / alphabetic metadating), but approach within their signal values (video synthesizer, oscilloscope analytically); digital approach: address images in their second-order alphabet (re-entry of "textual" ratio)

- some perceptual processes operating upon data on the screen in a direct, „bottom-up“ manner "by examining the data in very brief periods of time (utilizing little or no associated memory) and organizing it automatically into

such features as edge, color, depth, motion, aural pitch"; bottom-up perception serial and „data-driven“, and produces only short-range effects" = *ibid.*, 37

- electronic tunnel microscope not actually transferring images of the atomic surface of matter, but analyses its object by matching data statistically and representing these calculations as images - just like bats don't perceive space iconically, but by echo orientation in space

- pixel as smallest conceivable *digital* picture element, which makes sense in an iconic way only when appearing within a group; "I want control over every pixel" (Andreas Menn); option for search engines: visual search with precise targeting, down to each pixel in an image

- Angela Bulloch's Pixel Works dissolving a cinematographic frame, after digital sampling, into technically engineered macro-pixels. With the neon-light emitted by an enlarged single material pixel block of 50 x 50 cm, the distance between the viewer and a group of pixels must be large in order to discern fractals of a cinematographic "image" / frame. Bulloch refers to a sequence from Michelangelo Antonioni's film *Blow Up* (1966) where the protagonist, a photographer, hiding behind a tree, unintentionally seems to have recorded a murder when later developing the negative. But in trying to identify the spot, the closer the camera looks, the less is the apparent murder an evidence. The artist extends this process of identification by yet another magnification, enlarging the digital scan of this scene in great blocks of its single pixels and thus exploding the image within a sequential modular system of her purpose-built so-called *pixel boxes*, where one pixel is represented in a 50 x 50 cm monitor which are attached to complex RGB lighting systems which can be generated and programmed with any digital information; installation BLOW\_UP T.V. of Angela Bulloch in the gallery Schipper & Krome, Berlin, September to November 2000; desillusioning the image betrayal of the human eye, revealing the discrete scanner-gaze of the computer which is media-archivological, looking at the discrete units of the archival regime, not looking just for letters any more. The pixel modules also point at the fact that digital images are hyper-indexically composed by pure information, as opposed to the referential image like the classical photography which still suggest a pre-discursive real

## **Images from data**

- histograms in image processing to calculate the entropy value of a (digitized) image

- media archaeology observing images not iconologically, but with the "cold gaze": as lots of data (once scanned into digital space), thus calculable (rather than akphrastical narrative). "Evidently a different nature opens itself to the camera than opens to the naked eye" = Walter Benjamin, *The Work of Art in the Age of Mechanical Reproduction* [1936], in: Hanna Arendt (ed. and introduction), *Illuminations*, London (Fontana Press) 1973, 238; Ernst Jünger, *Der gefährliche Augenblick*

- media archaeology akin to the gaze of the optical scanner; "culture-free images" (Claus Pias); close to radar which is rather a "system of measurement rather than communication" = Woodward 1950: 108, as quoted in: Friedrich Wilhelm Hagemeyer, *Die Entstehung von Informationskonzepten in der Nachrichtentechnik*, PhD thesis Berlin (Freie Universität, FB Philosophie u. Sozialwissenschaften) 19xx, 341; Radar = analogue imaging technique rendering on-screen the surrounding area of an antenna, while on the level of signal transfer it operates with discrete impulse- and duplex technology. Thus the radar image is rather analytical (a measuring device) than a medium of representation, of projection (like mass media)

- gaze of the camera (Dziga Vertov, "Kinoglaz") or the monitoring system (instead of the panoptical regime: data patterns, clustering, punched cards; poster DEHOMAG Hollerith; "sehende Maschinen")

### **Physical "space" and logical map: de-iconizing cartography**

- "cyberspace" not cartographic but mathematic, thus  $n$ -dimensional; each 3-D-navigation on interfaces reduces the  $n$ -dimensional potentiality to spatial metaphors. Maps always took place on flat surfaces, depending on their material support for inscription; the crucial quality of digital calculation; mapping metaphor seductive but misleading when it comes to computing; trajectory of a ballistic missile not a function of space any more but of numerical tables; a missile corrects her trajectory "on the fly", by instant numerical feed-back

- 3D computer graphics at first glance corresponding with Panofsky's concept of Renaissance "systematic" space which exists prior to the objects. Indeed, the Cartesian coordinate system is hardwired into computer graphics software and often into the hardware itself. When a designer launches a modeling program, he is typically presented with an empty space defined by a perspectival grid, the space that will be gradually filled by the objects. If the built-in message of a music synthesizer is a sine wave, the built-in world of computer graphics is an empty Renaissance space, the coordinate system itself

- still based on referentiality, maps represent real or imagined territories; *Aspen Movie Map* developed by the MIT Architecture Machine Group headed by Nicholas Negroponte in 1978 still based on input taken by photographs of places in real Aspen, Colorado; the resulting interface thus is a metaphor (or rather simulation) of moving in real space. In Geoffrey Shaw's interactive *Legible city* installation from 1989, urban architecture consists of letters; here, the Gutenberg Galaxy (McLuhan) returns from within the alphanumeric code, a re-entry on the user interface level. The spatial imperative is hardware architecture; alternative model has been developed by Knowbotic Research, for a Tokyo re-building quarter, ideas of "non-located online" - a cloudy challenge to the mapping paradigm

- against the theatrical paradigm of "computers as theatre" (Brenda Laurel), Manovich naming "die Unterschiede zwischen dem isotropen Raum und dem der menschlichen Anthropologie" = 89

- "cyberspace" purely relational; Martin Dodge / Rob Kitchin in *mapping cyberspace* (London / New York: Routledge) 2001, 69 f.; essential for Cartesian grids: mnemotechnical images as technology of knowledge order and memory common in antiquity and the Renaissance are being replaced by numbers on the vertical and horizontal axis - un-iconic; "mapping" therefore taken in its mathematical, topological sense, in order not to confuse imaginary (iconic) with symbolic (indexical) operations in cybernetic aggregates and physical networks. Only computing can actually perform trajectories in  $n$ -dimensional calculation; really relevant maps have always been hidden, kept secret like the programs hidden behind cyber-spatial interface metaphors of "navigation"; new horizons for search operations in the Media Arts Net: Not just linking images and texts by alphabetical tagging, subjecting images and sound to words and external meta-data once more (the classification paradigm), but addressing digital images down to the single pixel from within, in their own medium, allowing for random search (apparent disorder as alternative economy of information = the unexpected) - literally "bit-mapping", mapping (by) bits

- essential feature of networked computing its dynamic operativity; spatial order biased by "mapping time", that is: mapping temporal, processual operations

- time-critical von-Neumann-computer architecture, dissimulating its operative character in favor of images, maps

- Michel Foucault, "Other Spaces": 19th century dominated by concern with time; 20th century concerned with space. 21st century concerned with topologies: mathematics, coupled with the materiality of cables, circuits, processors

- data visualization corresponding with the sublime, making visible the invisible (Lev Manovich); the "mathematical sublime" (Immanuel Kant)

- installation *Polar* by Carsten Nicolai / Marko Peljhan for the Canon ARTLAB (Tokyo) in 1991, referring to the changing process of invisible information; idea from the novel *Solaris* by Stanislaw Lem (1972): the "Ocean", a sea-like substance of an unknown planet Solaris reflecting human thoughts

- not just visualization of data or metaphorization; (Benôit) Mandelbrot's fractals not conceived on mathematical grounds; the insight into the correspondence between macro- and microscopic processes originated on the interface figurative level, on-screen; aesthetics as insight; Heinz-Otto Peitgen / Peter Richter, *The Beauty of Fractals - Images of Complex Dynamical Systems*; visual display of quantitative or quantifiably information a by-product of Cartesian modernity (Tufte)