Chapter 1

Time-Critical Media Processes

LEVELS OF MEDIA-ARCHEOLOGICAL TIME ANALYSIS

Technological media always take place in the temporal dimension, regardless of whether they are understood through epistemological reflection. Technical constellations are only operative when actualized in time. Time-critical processes—such as delicate electronic synchronization between image senders and receivers ("television") and the exact orchestration of binary instruction cycles ("computer")—occur *in* electro-technical (commonly called "analog") and techno-mathematical (commonly called "digital") media. The signal-technical discovery of time-critical processes *through* measuring media (like chronophotography) revealed for the first time a corresponding epistemological sensitization.[1] A second level of investigation involves the temporal affects in people that are induced by the *re-play* of stored recordings. People are addressed through media in their existential (not historical) sense of time. Lastly, the question concerning the cultural ways in which media process time does not seek to prove "medial historiographies"[2] or the role of media as a history-making power acting in concert with the historical discourse; rather, it reflects on the proper time of media. Technical media are not only reconfigured repeatedly in the course of time; they also serve as models for the conception of emphatic time itself through their timing *specifications*, which is how the concept of "real time" came into our current vocabulary. While the role of media as agents in historical processes has been sufficiently examined,[3] time-critical analysis focuses on the genuine event-like nature of media on both sides of the concept of history. It thus encompasses signal-technical, electro-mathematical, and media-epistemological time series analyses. Such studies do not approach this structure historiographically; rather, they allow media-induced temporal processes themselves to be addressed.

Technical time critique reveals a microcosm of time figures that are usually concealed in media apparatuses; it is assisted by a phenomenology of the temporal affects that media induce in people. This raises the question of which representational form of the temporality of technical media is expected, and thus how *not* to write media *history*. The operative linking of these different levels of temporal knowledge, whose agents are often technical media themselves, calls for differentiations. "A micro-temporal level of physical and techno-physical processes, a meso-level of psychic-cognitive processes, and a macro-level of social systems and discursive formations as well as macrophysical processes."[4] Gilbert Simondon thereby systematically divides the temporal modes of existence of technical objects into intrinsic machine realities, human-machine relations, and the genesis of technicity.[5]

Time-critical media processes are first and foremost dedicated to analyzing the specific ways of processing time that were and are introduced into culture through techno-mathematical media. This includes the smallest temporal events, which are essential for the realization of sound, image, and computing processes as well as the cognitive disruption of the human awareness of time through media of time axis manipulation. This also includes the challenge not to write media archeology and genealogy exclusively according to the model of history, as this ignores their unique chronopoetics.[6] That "technical objects embody complex temporalities" is an insight of Simondon's philosophy of technology.[7] Instead of describing how technical media are part of cultural history, media-induced alternatives to history itself thus emerge.

A MEDIA THEORY OF THE TIME-CRITICAL

The time-critical is a field of knowledge originated by media and their analysis. It includes concepts like real time, time axis manipulation, as well as the actualization of stored time signals and the temporalizing variants of Aristotelian *metaxy*, which in this sense means not only the spatial in-between as media channel, but also media-technically the temporal in-between, the smallest memory buffers and signal delays. Time-*critical* processes, interpreted literally, *determine* the overall process and success of systems in electronics and informatics; on a functional level, the concept is familiar enough in all related disciplines. In industrial process control, the time-critical is understood simply in terms of punctuality. Heathrow Airport in London advises arriving guests to "follow the time-critical flight connection streams"; as with Internet communication, connections are not only spatial but also temporal nodal points. For a long time, however, the time-critical element, which is characteristic of operative systems, has lacked a fundamental media-epistemological meaning. Signals, defined electrophysically as genuine time

events, are the chief subject of media studies in contrast to a cultural semiotics of sign relations. A premise of cybernetics, which still remains current, is thus also evoked for the technosphere. "No analysis of natural science, whether it be physics or biology, is complete unless we possess a proper analysis of its appropriate time-concept."[8] Media archeology, which is based not only on philosophy but also on the mathematical and natural sciences and thus belongs to the humanities as much as it understands itself as a science, drew the obvious conclusion from this insight. The literally critical point here is the category of time, which oscillates between micro- and macro-temporal levels, between moment and history. "We observe a temporal sequence of events, and our experiments are attempts to reproduce at various times that which we have observed at one particular time. Therefore, all the improvements and modifications which have been made in the theory of time itself are relevant in the study of all the sciences."[9] A theory of measuring media is thus always also a theory of time.

If media events are firmly understood as micro-time-critical processes, then they refer to processes on this side of the "historical" field. Media history deals with the actual implementation and thus the temporalization of logical relations in physical materiality in the double sense of techno-logy. If the implementation turns a technical-symbolic constellation into a media process, then being-in-the-world means being-in-time. This also applies to cellular automata. Every binary switch of discrete information consumes a minimal time interval, which can literally be counted on and which tends toward infinitesimally small moments. "Switching time is inversely proportional to the energy expended. . . . This theorem has consequences for the geometry of spacetime and the computing power of the universe."[10] In addition to this binary moment of time, signal analysis primarily deals with time series, which Wiener formulated for the electronic anti-aircraft predictor under wartime conditions: the lightning-fast extrapolation of measurement data for the purpose of statistical prediction, which from the outset refused to make any claim with regard to an exact predetermination of concrete events. Certainties and causalities (the event concept of history) were thus replaced by probabilities and correlations.

SIGNAL TIME

If media were for the longest time simply mechanical extensions or amputations of human organs and senses—to borrow loosely from Marshall McLuhan—electronics and their mathematization introduced a new situation: electronic media are extensions of the central nervous system itself. "The human—and also his pride: fantasy, art—is divided into physiology and

data processing, which can only be reintegrated through a media theory";[11] however, this theory must be time-critical. It delineates the field in which the alliance of electronics, physiology, and data processing takes place.

Forms of time implemented in the real, thus time-critical processes, long remained undiscovered as objects of knowledge in the Western temporal economy because they were hardly measurable with human senses and mechanical instruments; Leibniz anticipated their discovery as *petites perceptions*. When light shined, it appeared as a pure emanation and not as a vibration in the electromagnetic spectrum. Reality, insofar as it consists of the smallest time-critical moments, eludes symbolic notation. Time analysis has long confined itself to historiography. "This indescribability only disappears when a time range is successfully transformed into a frequency range entirely without metaphysics or a philosophy of history," wrote Friedrich Kittler, with regard to the techno-mathematical process of fast Fourier transformation, which indeed replaces the time axis as the classical abscissa of causal chains with a frequency axis, whose units are inversely proportional to its units of time as evidenced metrologically on an oscilloscope. "On this axis everything that brought even only a trace of periodicity or regularity over time appears as ordinate values."[12] Yet, in order for all of the sampled values to be calculated at the same time within a time window, they must remain temporarily stored; real time analysis is based on latency in the present. The space of the archive and the actuality of the present are thus no longer strictly separate, but rather a mutual condition. "All of the circulating theories that seek to distinguish between historical and electronic time as between delay and simultaneity are myths."[13] In the time sense of highly technical media, space and time are dynamically relative in terms of the electromagnetic field, which is why the concept of media-induced time ratios seems more plausible than the crude concept of a media age. Pass a magnetic tape by the tape head of a magnetophone and there is precisely no immediate contact between the magnetic charge on the tape and the coil of the ring head, but rather an electrodynamic process is *induced* without contact. Waves and particles converge in technical sound. "The magnetic field lines that change with the rhythm emerge at the gap, penetrate the passing tape, and leave behind a magnetic remnant. A sine-shaped recording signal can thus be conceived as a series of infinitesimal bar magnets."[14]

During playback, conversely, this differential calculus literally becomes media-operative: on their way through the core of the tape head, the field lines cut into the coil windings and induce an electrical current in them that corresponds to the temporal changes. Hermann Minkowski's concept of spacetime entanglement thus takes place *de facto* at the most concrete level of electrodynamic processes. As a result, it is necessary to think about the time of technological media differently than in narrative figures. The temporal form of implementation is the central criterion of media-being (*Mediendasein*).

An anthology on early digital valve computers with the time-critical title *Faster Than Thought* explains: "All the operations . . . carried out by these valves could equally well be achieved by the use of ordinary switches and variable resistances, but for one thing—time. Valves can be switched on and off almost instantaneously. . . . The fastest mechanical switch is a thousand times slower than this."[15] State metaphors, which correspond to their respective current technical systems, are also formulated as temporal events. In his third letter "On the Aesthetic Education of Man," Schiller writes: "When the mechanic has the works of a clock to repair, he lets the wheels run down; but the living clockwork of the State must be repaired while it is in motion, and here it is a case of changing the wheels as they revolve."[16] This practice first became a reality as real-time programming or *live coding* (as in the programming environment SuperCollider)—a dynamic temporal mode based on the programmable memory of digital computers.

CHRONOS AND KAIROS

Time is generally conceived as chronological in Western culture: a continuous stream. On the other hand, there is a time horizon that extends between two extremes, which ancient mythology designated as antipodes to the God Chronos, who devours everything (even his own children): Aion and Kairos, the Gods of time, who are reflected in the etymological entanglement of apparently distinct categories (ancient Greek *rhein* as flow, *rhythmos* as its derivative). It is characteristic of the internal embargo on time epistemology in early Greek thought that the word *kairos* initially meant "right position" and "proportion," and in Homer, it served as the designation for a vulnerable body part. With the Pythagoreans, the basic measurement of cosmic rhythms has a geometric rather than a dynamic meaning; if anything, according to ancient Greek accounts, dynamics revealed themselves in the musical technique of glissando. The time-critical is an object of knowledge that is largely un-Greek, as it originated from extremely technical (measuring) media. However, *one* archaic concept comes close to the temporal essence (*Zeitwesen*) of technical media: the phenomenology of *kairos*. "Aion shines at the transcendental dimensions: time that stretches far, far beyond the life span of humans and planet Earth; pure time, like that of machines. . . . By contrast, Kairos's time is doing the right thing at the right moment: he is the god of the auspicious moment. . . . He challenges us to make a decision. . . . Once Kairos has passed by, it is too late."[17] In contrast to linear, arithmetical time (*chronos*), kairotic time is the time of contingent dramaturgies, narratives, decisions. However, the fleeting moment loses the non-binding character of this mythological entity as soon as he is chrono-technically mastered.

Culture first diagnosed the common temporal process: planetary orbits, seasons, "historical time." With the electromechanical measuring media of the nineteenth century, a mirror image of this process revealed itself at the micro level. Media history itself could be reformulated kairotically.

> Is there actually a suitable time and a correct place for an invention or are such . . . statements paradoxical due to their implicit belief in a directed and compulsory technical progress? . . . The adoption of the mythic or synchronic time *kairos* instead of the diachronic arrow of time *chronos* is sensible in so far as one can speak of it as *right* or better still *critical* time.[18]

Technical media emerge in this time field.

TIME AXIS MANIPULATION AND DASEIN-CRITIQUE: THE EXISTENTIAL AWARENESS OF TIME-CRITICAL PHENOMENA

Time etymologically means a cut in a continuum; the Latin *tempus*, derived from the Greek *temnein*, means parts, and thus an act of discretion, discontinuation, "critique" in its most fundamental form. However, human perception is hardly capable of consciously registering the smallest slices of time as discrete events; instead, cognitive time awareness calculates with intervals.

> Events can only be synthesized as perceived shapes after a period of roughly three seconds. The three-second segmentation is considered a neuronal correlate of attention, and indeed also with regard to the perception of aesthetic objects as aesthetic objects (hearing melodies, viewing images, reading, etc.). Aesthetic perception can serve here as a mirror of the experience of time in relation to the production of units of meaning, rhythm, time intervals.[19]

The ability to fix moments is a condition of the analyzability of temporal processes. Self-writing measuring media register fleeting moments that human senses are unable to capture. Time is transformed from a metaphysical signified to technical availability. "It is no coincidence that in the modern era the development of techniques of acceleration was accompanied by the development of techniques of controlled deceleration that serve the targeted interruption and the collective production of stasis in the temporal sense."[20] Time figures used in linguistic articulation (*lógos*), such as ellipses and pauses, have long since found their techno-logical correlate in the epoch of electromechanical and electronic recording media. Chrono-techniques like freezing, fixing, replaying, decelerating, and accelerating are practiced with the stop, play, rewind, and fast-forward buttons on tape recorders, video recorders, and their iconic emulation as software.