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1.

The question concerning digital being

The question concerning digital being is posed, for its origin, which lies ultimately in Western metaphysics, is by no means clarified in a philosophical sense. What is digital is usually counterposed to what is analogue. This amounts to a technical definition. Nowadays, this distinction relates primarily to the difference in electromagnetic signals of all kinds, whether it be in telecommunication, electronic music or in computer data processing. Digital beings are characterized by the fact that they are composed of binary digits or bits. Signals in telecommunications, for instance, are transmitted in a digital or binary form through a medium (cables of many different kinds, the air, space). Basically, an ordered sequence of zeroes and ones (nothing and something, pure difference) is transmitted which at the other, recipient's end can be and must be recomposed in such a way that the appropriate result (a voice, a text, an image, a sound, a TV spot, a control command, etc.) is brought about. The difference between 0 and 1 may be any arbitrary difference in physical beings such as transmitting a signal with two different frequencies or two arbitrarily different energetic states of an electromagnetic system such as the orientation of iron molecules. The difference *as* a difference is something that we humans understand, i.e. we are able to understand (binary) difference *as* such and thus to bring forth digital effects. Already in Greek metaphysics, the category of τὸ ἕτερον (the other) vis-à-vis τὸ αὐτό (the same, identical), the difference of the one from the other, plays an important role in the thinking of being and non-being, especially in Plato's dialectic.

Electromagnetic signals as physical beings (φύσει ὄντα or beings that of themselves stand in presence including, in this context, also produced things, cultural things), however, in their natural state are not structured or discretely articulated in any form, but continuous. They can be represented mathematically by continuous functions of time ($\psi(\tau)$). Aisthaetic beings (Gr. αἰσθητά, sensuously perceptible beings) are naturally or of themselves (φύσει) continuous. At first we always perceive a whole (ὅλον) that is not articulated, e.g. we see a car drive past down the street. This is a continuous

happening in time. A video camera can record this scene, and the video film can be broadcast on television. The television viewers will still perceive a whole, namely, the scene of a car passing by. Between the live scene and the perceived television sequence there lies the articulated dissolution or taking-apart or decomposition of the scene and its technical reconstitution as a moving image.

So far, so good. This articulated dissolution of what is perceived requires, however, ontological clarification. What is happening, i.e. what must be already given a priori, for digital technology to understand and gain an effective grasp? What does it mean for a being to be whole or one (ἓν)? What does dissolution, decomposition or taking-apart (διαίρεσις) mean ontologically? What does it mean for a being to move continuously in time, i.e. what is *movement*, *continuity* and *time*? What does the discreteness of digital beings have to do with beings as such? What does number have to do ontologically with beings as such and with movement? And what is the connection between digital dissolution and λόγος (language, reason, knowledge)?

It is impossible to explain, say, the perception of a whole as a temporal process in the brain, for the categories of the whole (ὅλον), of something (τί) are already 'visible' to the mind's eye in advance, i.e. before any 'data' have been 'registered' by the brain. This a priori dimension—the very general and universal schemata or scaffolding of the categories (cf. also the *as*-structure with its "pre-structure" (*Vor-Struktur*) as the "scaffolding" (*Gerüst*) "from which something becomes understandable as something" (aus dem her etwas als etwas verständlich wird, SZ:151)—must be attributed to the metaphysical (or ontological) power of human vision and has been traditionally the subject of metaphysics today despised by the modern sciences, which have long since staked their pretension to be *the* 'natural' locus of truth. The sciences investigate their respective subject matters on the basis of an a priori, presupposed understanding of the being of the region of beings into which they do research. Thus the mathematical casting of nature—which made possible modern physics from the seventeenth century on as one of the most momentous events

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in the history of Western thinking and, in view of its far-reaching consequences, in the history of the world—is not itself a question within physics but rather is presupposed by it. The same holds true of the digital dissolution of beings in progress today which, as we shall see in more detail, is the consummation of the mathematical casting of being. These interrelations with metaphysics willfully suppressed, denied and dismissed as ‘non-verifiable’ and ‘speculative’ guff by modern scientific thinking must be brought expressly to light in order to see the cast of being on which digital technology is unknowingly, unwittingly based.

2.

Being and Number

2.1. Aristotle’s ontology of number and geometric figure

In Aristotle’s thinking, number is something distilled out of, drawn off, abstracted from physical beings. The distilling or abstracting consists for Aristotle in a being becoming placeless; i.e. it is separated off from its surroundings (*χωρίζειν*), in order to become a number in the abstraction. Whereas physical beings (*φύσει ὄν*, beings that come to a stand in presence of themselves) are characterized by *continuity*, the numbers which originally arise by counting, i.e. an iterative procedure, are *separated* from each other, *discrete*. The geometrical figure of a physical being is likewise abstracted from it, but the figure’s points, although placeless, still have position, and the figure, like the physical being itself, is continuous. Continuity consists in the way the points (*στίγματα*) of a figure or the parts of the underlying physical being, which all have a position and are thus posited, hold and hang together. The points hang together by touching each other at their extremities (*ἔσχατα*). They even share their extremities. The points are all identical but are differentiated through their differing positions. On the other hand, the numbers are without place and also without position but are differentiated within themselves. They bear the difference within themselves, whereas the points can only distinguish themselves one from the other through a difference in position. For instance, 3 is to be distinguished from 5, but two points on a line are identical (*αὐτό*). The distilling of numbers out of physical beings opens up the possibility of calculating with numbers; they are open to *λογισμός*, but at the price (or the advantage) of becoming placeless and positionless. Such a lack of place and position, it seems, characterizes also the digital beings which we deal with today. For them, matter in its continuity and its fixedness of place becomes indifferent.

What is ontologically most complex in the way it hangs together, i.e. the continuous geometric figures and physical beings, is most simple for sensuous perception, but is very unwieldy for calculation. And conversely: what is ontologically more simple, i.e. the arithmetic entities in their ordered, countable succession, is not as

easily accessible to sensuous perception but can be calculated (*λογισμός*) without any difficulty. This means that the arithmetic entities and their interrelations can be more easily brought to presence by the *λόγος* (or the *λογισμός* in this case) than geometric entities which, in turn, are closer to sensuous experience, i.e. not so abstract. Herein resides the calculative power of mathematical analysis which reduces the geometric to the arithmetic, the continuous to the discrete, irrational (real) number to rational number, by conceiving real numbers as (Dedekind) cuts or partitions in the (infinite, but countable) sequence of rational numbers. The reduction facilitates calculation in the mathematical language of algebra, and, conversely, the results of the calculation can be translated once again back into the sensuously aisthaetic intuitions of geometry which have a representation in the imagination. With the arithmetization of geometry, the mathematico-logical manipulation of beings thus attains a hitherto unprecedented power.

For Aristotle, the *μονός* (unit) is the *ἀρχή* (principle, starting-point) of arithmetic. It must not be confused with the *ἔν*, which belongs still to physical beings as an ultimate categorial determination of their being. When some people say that, according to Aristotle, numbers have to be plural, i.e. at least 2, in order to be numbers, this is only sensible when one proceeds from the *counting process* (cf. *Phys.* D 12;220a27). If, however, a number is the answer to the question, How many?, then 1 is already a sensible answer and hence a number. The distinction between *μονός* and *ἔν* is more important in demarcating arithmetic from ontology. Proceeding from the *mona/j*, one comes to two as the first successor in the counting process, and this may be taken as the first counting number. But the *μονός* itself must already distinguish itself from something else, from nothing, a nil number, i.e. there must be a difference between 1 and 0 which corresponds to the difference between a unified something (*τί, ἔν*) and nothing, emptiness. Only from the principle of unity (*monad*) can arithmetic, i.e. numbers in the Greek sense, be built up one by one through the iterative counting process. In a further development, and because the base for counting, in principle, is arbitrary, today, all numbers can be represented, manipulated and calculated on a binary basis. The Greeks thought number from the counting process and therefore had no zero, which prevented the assimilation of geometry to arithmetic. To do so would have required the insight into the correspondence between the geometric point and the number 0.¹

Aristotle sees that there is a smallest number, and, proceeding from the geometric line, also that there is no smallest magnitude, but does not resolve the disparity (12;220a30). Even continuity can be captured by a process of limitless approximation by binarily represented numbers, since modern mathematics demonstrates that the continuum consists of the limits of infinite, countable, rational number series. The analytic geome-

try and differential calculus which Descartes, Newton and Leibniz discovered and developed in the seventeenth century makes geometry itself a matter of *calculation*. We will have to investigate further (cf. **2.5 Bridging the gulf between the discrete and the continuous**) the ontological conditions of possibility for bridging the gulf between Greek arithmetic, which was conceived as a discrete counting process, and Greek geometry, whose sensuously imaginable figures are all representable in continuous magnitudes.

2.2. The crucial analogy between logos and number: arithmological knowledge[

Whereas the λόγος, as Aristotle discovered, is always a λέγειν τὸ κατὰ τινός, and thus is *articulated* by way of the apophantic As or Qua as a “saying-something-about-something”, νοῦς (reason), by contrast, is a direct looking-at or intuition (Anschauung) of the most general and universal ideas, εἶδη or sights, i.e. the categories, which cannot be broken down any further and articulated through a dissolution as saying something about something.

If number and logos are both abstracted (‘drawn off’) from aisthaetically given, sensuous beings, then in this discrete taking-apart or dissolution of beings there is simultaneously a distancing from beings which makes it possible for beings to be made present by the logos (and by number) in a *different* way from the way they show themselves of themselves (aisthaetically). With the logos, another way of making beings present is given. Heidegger writes, for instance, in a striking formulation, “*This invasion of the λόγος, of the logical dimension in this strict Greek sense, into this question concerning the ὄν is motivated by the fact that the ὄν, the being of beings itself, is interpreted primarily as presence and the λόγος is the way in which I primarily make something present, namely that about which I am speaking.*”²

As we shall see (**2.6 Cartesian rules for an algebra of magnitudes in general as foundation for the modern mathematical sciences**), this “invasion of the λόγος” that articulates beings discretely is exponentiated when paired with the discreteness of the ἀριθμός which enables also a *calculability* of beings in their being with historically far-reaching consequences of such *arithmological knowledge*. The pinnacle is reached when the ἀριθμός and the λόγος fuse into abstract algebra in the nineteenth century.

2.3. Prelogical access to beings in their being

The primary sense of being according to Heidegger, οὐσία or what underlies, i.e. the ὑποκείμενον, is what lies at hand for speaking about it in the present. What is of interest here is that the early Heidegger is seeking an access to the phenomenon of truth without the logos. What does he have in mind? This mode of access is not simply Aristotelean νοῦς, i.e. the immediate intuiting of

the categories, but the two fundamental modes, understanding (Verstehen) and attunedness (Befindlichkeit, Gestimmtheit) in which world opens up to Dasein. To start with, this search can be marked off against Gadamer’s:

Being that can be understood is language. The hermeneutic phenomenon throws, so to speak, its own universality back onto the ontological constitution of what is understood by determining this ontological constitution in a universal sense as *language* and by its own relation to beings as interpretation. [...] For, the human relationship to the world is, quite simply and from its foundations, linguistic and thus understandable.³

Gadamer’s hermeneutic approach makes it manifest that his starting-point is not as originary as Heidegger’s, for the latter is essentially concerned with breaking the hegemony of the λόγος in philosophy after two-and-a-half millennia precisely by situating the originary disclosure of the world prior to the articulate interpretation of the world in language. Heidegger’s “hermeneutic as” (SZ:158) is prelinguistic. Dasein has always already discovered the world and interpreted it in dealing with practical things “without losing a word” (‘ohne dabei ein Wort zu verlieren’, SZ:157). When the world comes to language, articulating itself in the λόγος of the proposition, beings are shown up in saying something about something. This is the phenomenon of “something as something” (‘etwas als etwas’, SZ:159) or the “*apophantic as*” (*apophantisches Als*, SZ:158) which itself is derivative of the more originary “hermeneutic as”. In uncovering a prelinguistic access to the world in its truth, Heidegger follows the guiding thread of the sense of being as presence and comes upon time as the originary transcendence to the world. Now, instead of presence as the temporal sense of what lies to hand *for* speaking about it, the phenomenon of time itself in its *multidimensionality* (enabling also a simultaneous presencing and absencing) comes into the intense focus of thinking. It is thus not a matter of Heidegger’s having set his gaze on something resembling a “Ding an sich” (Kant), i.e. something which he properly cannot speak about, which he cannot grasp and conceive, but which he names nevertheless, nor is it the immediate, intuitive, noetic sight of the most universal ideas, but rather it is a matter of a world-opening which lies prior to speaking-about, as demonstrated in the equipment analysis in *Being and Time* and in which the sense of being is no longer restricted to presence, but is fully temporal, encompassing all modes of presencing and absencing.

Equipment (practical things, πράγματα) in its being-(good)-for... (Um-zu) is discovered, understood and interpreted in its being prior to any grasping in language by Dasein, and Dasein’s taking care of daily life using practical things is interpreted ultimately in its temporality as the everyday sense of Dasein. In *Being and Time*, Heidegger takes great pains with a “demonstration of the derived nature of the statement” (Nachweis der

Abkünftigkeit der Aussage, SZ:160), i.e. of the λόγος, in order to “make it clear that the ‘logic’ of the λόγος is rooted in the existential analytic of Dasein” (deutlich zu machen, daß die ‘Logik’ des λόγος in der existenzialen Analytik des Daseins verwurzelt ist, ibid.). He wants to retract the “λόγος as the sole guiding thread for access to beings proper and for the determination of the being of beings proper” as it “functioned in the decisive beginnings of ancient ontology” (in den entscheidenden Anfängen der antiken Ontologie der λόγος als einziger Leitfaden für den Zugang zum eigentlich Seienden [...] fungierte, SZ:154). A corollary of this is the future historical possibility that calculable, discrete number as the hegemonic “guiding thread for access to beings proper” in the mathematico-scientific age could also be retracted. The ‘one-dimensional’ sense of being as standing presence or “standing presence-at-hand” (ständige Vorhandenheit, SZ:96) is unfolded into the full three-dimensionality of temporality.

2.4. The ‘illogical’ nature of time

Time, being-in-time enables an access to being, i.e. it holds it open, without the logos, or prior to the logos. After Heidegger’s momentous incursion into Western metaphysics, the temporality of human being (Dasein) can no longer be clarified by following the guiding thread of the logos, but rather, the logos and its hegemony as ontology can only be clarified by starting from the multidimensional, temporal meaning of being and Dasein’s temporality. Time, however, is neither linearly continuous nor logically discrete; it therefore cannot be dissolved and grasped digitally, because it does not lie before us as something present from the start. It does not lie before us like a ὑποκείμενον to be spoken about; it is not a something (τί, οὐσία) lying before us to be spoken of, for a something lying present at hand is only present, which would reduce time proper to the instantaneous now (νῦν) which, tellingly, has the ambiguous ontological characteristics of both discrete presence-at-hand or standing presence, and fleeting continuity or non-being. Time is and, simultaneously, is not. “From the hegemony of this concept of being it becomes clear why Aristotle interprets time itself starting from the present, the ‘now’.” (Aus der Herrschaft dieses Seinsbegriffs wird deutlich, warum Aristoteles die Zeit selbst aus der Gegenwart, dem ‘Jetzt’, auslegt. GA19:633) Does this mean that the decomposing taking-apart (διάρρησις) of physical beings, including practical things, performed by the logos and mathematics depends essentially on the state of beings as things lying before us as present? Yes, indeed. Whereas Dasein has to be interpreted in the full temporal three-dimensionality of its existence as a cast and casting already-being-with... (entwerfend-geworfenes Schon-sein-bei...) that understands and interprets the world in attunement with it, in order to adequately capture the phenomenon as it shows itself of itself, what is already lying ready before us to be

spoken about can be clarified, starting from this fully unfolded interpretation of Dasein, as present merely in a derivative mode of temporality. As we shall see (cf. 2.8 **Time and movement in Aristotle**), the phenomenon of time itself cannot be interpreted within the metaphysical framework which has only been able to grasp time ontologically on the tacit assumption that it could be captured as standing presence.

The hegemony of the meaning of being as presence-at-hand οὐσία as Vorhandenheit or standing presence) tacitly assumed and established already in ancient Greek ontology carries over to how the λόγος as proposition itself is understood, namely, as something present-at-hand that can be taken apart into its components, the (syntactical) sequence of words and in particular the sequence of subject and predicate joined by the so-called copula, “is”. A simple proposition of the form, S is P, is then taken as the starting-point for all philosophical reflection on the λόγος, starting with Plato and Aristotle themselves. The proposition, however, is rooted more originally in the “phenomenon of ‘something as something’” (Phänomen des ‘etwas als etwas’, SZ:159) according to which something—a hammer, for example—is understood and interpreted wordlessly as being something, namely, “too heavy” (“zu schwer”, SZ:157) for the job at hand. Whereas Aristotle at least still saw the paradoxical simultaneous putting-together and taking-apart, i.e. the σύνθεσις and διάρρησις, characteristic of every lo/goj as proposition, later philosophy formalized this to a relation in a “system of attributions” which “becomes the object of a ‘calculating’, but not the topic of an ontological interpretation” (in ein System von ‘Zuordnungen’ aufgelöst, es wird zum Gegenstand eines ‘Rechnens’, aber nicht zum Thema ontologischer Interpretation, SZ:159). From here it is not far to interpreting the merely formal copula as an equals sign in an equation or as the subset sign in a Boolean algebra of sets. The proposition, S is P, hence becomes interpreted as the statement, ‘S is an element of the set of all things having the attribute P’. Such sets and their interrelations can be calculated in a formal algebra that presupposes that the S, P and sets of such-like are all things present-at-hand open to such calculative manipulation. Finally, in particular, the elements of the lo/goj thus decomposed and formalized are all representable in binary code that can be organized into a calculus. The incompleteness theorems of Gödel within mathematical logic point to an excess of the truth or otherwise of what can be said (predicated) that always remains outside what can be grasped calculably by the λόγος, thus vitiating the dream of total machine calculability within mathematics (through recursive functions).

2.5. Bridging the gulf between the discrete and the continuous

From the logical side, the side of the λόγος, there is no difficulty in representing any statement in numbers, and, in particular, in numbers to the base 2, i.e. binary

code, since both number (ἄριθμός) and λόγος are discrete. But how was it possible to gain a mathematical hold on real, physical beings? For this, the geometric (based on points, lines, planes and solids) and the arithmetic (based on counting starting with the unit) had to be brought together. As Jacob Klein's thorough study shows, this process of historical transformation passes through the key figures Diophantos, Vieta, Simon Stevin, Wallis and Descartes. The difficulty obstructing this convergence resides in the circumstance that the Greeks thought the ἄριθμός as countable, starting with the unit or μόνος. As unit, the unit is indivisible, discrete, so the best Greek mathematics could do was to form proportions of natural, counting numbers, that is, positive fractions, broken integers or so-called rational numbers. From the geometric side, however, the Greeks were aware that somehow there were some numbers missing from the countable integers and fractions, namely, those numbers 'in between' the fractions that could not be brought into the form of a fraction, i.e. a ratio of two whole numbers. They were therefore called irrational numbers or surds. The simplest irrational number arises already in considering the diagonal of the unit square, whose length is the square root of two. These irrational numbers are the magnitudes arising from geometric figures which, in turn, are obtained by abstracting the contour outlines of continuous, physical entities. Geometric figures clearly (i.e. for the visual imagination) hold themselves together; they are continuous. How are all the points on the fundamental geometric figures of a line or a plane to be captured numerically if number is conceived as fundamentally countable? This countability, in turn, derives ontologically from the implicit Greek preconception of being as presence-at-hand: a definite number arises from actually counting the things lying present at hand. For Greek thinking, that which lies present at hand is the ὑποκείμενον, and such ὑποκείμενα in a multitude are countable. In his *Physics*, Aristotle thinks the phenomenon of continuity ontologically progressing from discrete beings which touch, to those lined up in succession, that hang together and, finally, hang tightly together.

The counting unit is indivisible, whereas the unit line is infinitely divisible. Not all the possible magnitudes contained in the unit line can be captured by countable, i.e. rational numbers. The rational numbers have to be complemented by the irrational numbers to attain the entirety of a continuous line with all the possible magnitudes it contains. Although rational numbers can be made to approximate each other as closely as one likes, between any two rational numbers whatever there is an irrational number, i.e. a magnitude that cannot be expressed as a fraction of two integers. How are the countable, rational numbers to be completed to get the real numbers? Real number is an appropriate term because only by means of these real numbers can *all* the magnitudes of sensually perceptible, real, physical bodies

be assigned a number. The task is how physical *res* can be captured mathematically by number, and not merely by geometry. Only number opens the possibility of calculation, whereas geometry has to rely on intuitive proofs for which the geometrical objects have to be imagined sensuously in an immediate intuition. To be continuous, and thus to capture *all* physical magnitudes of any kind, number has to become real, uncountable. Uncountability implies that, since the rational numbers are countable, between any two rational proportions of integers, no matter how minimal the difference between them, there are always non-rational numbers, i.e. rational numbers can come infinitely close to one another without ever gaining continuity, i.e. there is always a gap between them that is not rational (i.e. irrational), and in this sense they do not hang tightly together like the geometric line. Richard Dedekind's small but crucial step in the second half of the nineteenth century was to fill in the gaps between the rational numbers by conceiving the real numbers as the limits of infinite, but countable sequences of rational numbers.

2.6. Cartesian rules for an algebra of magnitudes in general as foundation for the modern mathematical sciences

So the problem becomes, how can there be a mathematical calculus of uncountable, real numbers, and what is the ontological (pre-)conception or (pre-)casting of number on which such a calculus could be soundly based? That is the problem of the ontological recasting of mathematics as algebra in the modern age. Number has to become magnitude pure and simple, which is uncountable, but nevertheless calculable. Magnitude is the quantity pertaining to any extension whatsoever of a real, sensuously perceptible being from which sensuous data, and therefore quantifiable data, can be received. Such extension need not be only spatial extension such as the three Euclidean dimensions of length, width and depth, but can be any one of the countless dimensions whatsoever of a perceptible *res* such as colour or "weight" (*gravitas*, XIV.16). Thus, Descartes writes in the twelfth of his *Regulae*,⁵ "For example, you may suppose whatever you like about colour, but you will not deny that it is extended and consequently has figure" (*Verbi gratia, colorem supponas esse quidquid vis, tamen eundem extensum esse non negabis, et per consequens figuratum, XII.6*). A figure is geometric, and a geometric figure of whatever kind has magnitudes. The Cartesian ontological casting of beings as *res extensa* is essential for their reduction to figure and thus, since figure is grasped as a simple manifold of magnitudes, to mathematically calculable magnitude.

Descartes goes on to show in Rule XII.6 that the dimension of colour (of any kind of physical beings), for instance, can be represented simply by different figures which amount to different symbols representing the various colours. And he notes, "The same can be said of all

things since it is certain that the infinite multitude of figures suffices to express all the differences of sensible things” (*Idemque de omnibus dici potest, cum figurarum infinitum multitudinem omnibus rerum sensibilibus differentiis exprimendis sufficere sit certum*, XII.6). When the intellect is examining something “that can refer to bodies, this idea must be formed in the imagination as distinctly as possible; to bring this about comfortably, the thing itself which represents this idea must be exhibited to the external senses” (*quod referri possit ad corpus, ejus idea, quam poterit distinctissime, in imaginatione est formanda; ad quod commodius praestandum, res ipsa, quam haec idea repraesentabit, sensibus externis est exhibenda*, XII.11). But if the intellect is to think through and deduce (deducat, XII.11) from a plurality, “everything not requiring attention at present is to be thrown out of the ideas of the things” (*rejciendum est ex rerum ideis quidquid praesentem attentionem non requiret*, XII.11). Therefore, “then the things themselves are not to be laid before the external senses, but rather certain abbreviating figures” (*non tunc res ipsae sensibus externis erunt proponendae, sed potius compendiosae quaedam illarum figurae*, XII.11). These “abbreviating figures” are then elaborated in Rule XVI as “the briefest of signs” (*brevissimas notas*) which enable the intellect to think through things without being distracted by concrete details. All the dimensions of beings thus become insofar representable in a manifold of quantities represented by symbols.

No matter whether the aid of the imagination is required to represent a state of affairs to the intellect, or whether this can be done through concise symbols, if the state of affairs is not simple and immediately apparent to intuition, it can only be clarified, as Descartes prescribes in Rule XIV, by comparing it with a known state of affairs. Such comparison consists in establishing that “what is sought is in this or that respect similar or identical or equal with some given” (*quaesitum esse secundum hoc aut illud simile, vel idem, vel aequale cuidam dato*, XIV.2). Equality, however, immediately becomes the standard of comparison between the unknown and the known. Where the comparisons of equals are not “simple and open” (*simplices et apertas*, XIV.3), but are concealed in “some sort of relations or proportions” (*quasdam habitudines sive proportionones*, XIV.3), the task of the human intellect lies in “reducing these proportions in such a way that the equality between what is sought and something known becomes clearly visible” (*in proportionibus istis eo reducendis, ut aequalitas inter quaesitum, et aliquid quod sit cognitum, clare videatur*, XIV.3).

The culmination is then to note that the kind of equality required between the sought and the given, the unknown and the known, is an equality of magnitudes: “It is to be noted finally that nothing can be reduced to this equality if it does not admit a more or less and that all this is to be comprehended under the term ‘magnitude’ so that [...] we understand that from here on we are involved only with magnitudes in general” (*Notandum est*

deinde, nihil ad istam aequalitatem reduci posse, nisi quod recipit majus et minus, atque illud omne per magnitudinis vocabulum comprehendendi, adeo ut [...] hic tantum deinceps circa magnitudines in genere intelligamus nos versari, XIV.4). This holds true no matter whether the intellect is assisted by the imagination or is employed purely (intellectu puro utamur, XIV.5). The aim is to find a relation of equality between something unknown and something known, where both these somethings are nothing but “magnitudes in general”. The “relations and proportions” that at first conceal the equality between the unknown and the known must be *equations* in “magnitudes in general” that can be reformulated so as to finally bring forth the required equality. But this is a description of the general algebraic procedure, no matter whether an image is used to assist the procedure or not. Magnitudes in general are represented in the equations by “brief signs” or symbols, and the equations themselves can be manipulated by the pure intellect to reformulate them in such a way that the unknown, x , is brought into equality with what is given and known. This amounts to solving a set of equations for the unknown, x .

“From here on” we are dealing only with sets of equations in “magnitudes in general” which are to be solved by algebraic methods. These magnitudes are the knowns and unknowns occurring in equations. They are no longer pinned down as continuous geometric quantities or discrete arithmetic ones but are simply *the data and solutions to sets of equations of such and such a type*. The data given by real beings are all quantitative by virtue of casting the being of beings solely as extension, so that all the many qualitative dimensions of a being, no matter what it and they may be, are reduced to magnitudes that can be inserted into equations as knowns. What is unknown is then discovered by solving the equations for x . The behaviour of real beings must therefore be described in equations, and certain knowledge is to be gained by solving equations of certain kinds. Mathematics itself can then become the motor driving the quest for knowledge through the investigation of kinds of equations with the aim of being able to solve them algebraically for the unknown, x . Whether the magnitude in question is geometrically continuous or arithmetically discrete is no longer crucial, because magnitudes in general can be represented by symbols, and these symbols may be defined simply as the solution to a certain kind of equation within a certain kind of mathematical entity such as a field, ring or group defined solely by a set of logically consistent axioms whose validity relies on immediate intuition. The steps beyond the natural numbers to the rational numbers and on to the real numbers need not stop there. The complex numbers, for instance, can be introduced simply as the solution to certain kinds of equation that do not have solutions among the real numbers, but require the square root of minus one, the imaginary number i . And even these complex or

imaginary numbers can still be represented to the imagination as planes, which themselves are imagined as extended. The quest for knowledge (starting with, but soon proceeding beyond, classical mechanics in the natural science of physics) is then guided by applying the mathematical intellect to finding solutions to ever more complex systems of equations in abstract, algebraic symbols standing for magnitudes in general. The future historical trajectory of mathematics for the next few centuries as an abstract symbolic discipline is fore-cast by the Cartesian ontological rules, thus laying down the blue-print for the modern age.

2.7. The calculative assault on movement and time through infinitesimal calculus

To launch the calculative assault on movement and time, time itself must be conceived as a magnitude that can enter into equations as a variable. This was first achieved through Cartesian analytic geometry. In the classic case of the movement of physical bodies, movement is reduced to movement with respect to place, i.e. to locomotion, within a three-dimensional Euclidean space specified by the co-ordinates (x, y, z) . Time is added as a fourth dimension, the variable t , which is represented to the imagination geometrically as a straight line. A four-dimensional space of space-time arises in which each co-ordinate point is an “event” called the “here-now”.⁶

Time is thus thought in the interstellar cold of this natural-scientific ontology as a manifold of *now-points* or *instants*, i.e. as presence; both future time and past time are only now-points greater than or less than a given now-point, respectively. Time is measured empirically by gathering the countable data now-points of some very regularly periodic physical process (just as Aristotle’s *Physics* laid down: “Not only do we measure movement through time, but also time through movement because they mutually determine each other.” (Ὁ μόνον δὲ τὴν κίνησιν τῷ χρόνῳ μετροῦμεν, ἄλλὰ καὶ τῇ κινῆσει τὸν χρόνον, διὰ τὸ ὀρίζεσθαι ὑπ’ ἀλλήλων *Phys.* D 12;220b15). Equations of motion in (x, y, z, t) arise according to physical laws of motion whose solution can be sought, depending on which variables are known givens and which unknown.

When the mathematically formulable Newtonian laws of classical physics are modified to take into account that there is no absolute time variable, t , but rather that there are differences in time between two inertial frames of reference (the ‘proper time’ with the symbol τ , t) which are determined mathematically by the Lorentz transformations involving the speed of light, c , the movement of bodies (particles) in such a (Minkowski) space-time is still formulable in four-dimensional equations in which the resemblance to the classical Newtonian laws of motion is still clearly recognizable.⁷ Calculation with both classical Newtonian and relativistic equations of motion requires the use of *infinitesimal*

calculus because the velocity of a body is the derivative, and its acceleration is the second-order derivative of a space 3-vector (with respect to time, t) or a 4-vector (with respect to the time-difference, t), respectively. Rates of change of continuous mathematical variables of whatever kind necessitate a calculus with infinitesimal magnitudes to gain a calculative hold on the phenomenon of movement (strictly: locomotion, i.e. only one kind of movement or change) through real, continuous variables such as space and time co-ordinates.

Space-time—no matter whether Newtonian-Galilean, Minkowski-relativistic or Riemann-relativistic (including gravitational mass points)—is the context for the motions or, more precisely, locomotions of physical bodies which may be celestial bodies, including stars, planets, galaxies, black holes, supernovae, pulsars, etc., bodies moving on Earth such as cannon balls, ballistic missiles, ships, etc., or those peculiar invisible particles of quantum physics whose motions are governed by complex differential equations. As Descartes’ *Rules* already prescribed, however, extension is not restricted to spatial dimensions, but covers anything admitting of “more or less”, including time, colour, weight, stress, pressure, reproductive potency (biology), emotional tension (psychology), propensity to consume (economics), ad infinitum. It depends solely on scientific ingenuity whether any phenomenon at all can be reduced, or led back, to the movement of a magnitude. Such quantification demands a mathematics to calculate such movement through the appropriate equations. It makes no difference whether the magnitudes are exact or inexact, or the equations involved can be solved uniquely, approximately or only within certain ranges of probability. Mathematical statistics as a calculus of probability distributions is the way, in the modern mathematical age, of making those phenomena that do not move with necessity, but only with regularity (Aristotle’s category of ἐπι τὸ πολὺ), calculable nevertheless.

Because of the universal applicability of quantitative mathematical methods to all regions of phenomena, it was crucial for mathematics to put the infinitesimal calculus on a firm foundation. This was begun by Augustin Cauchy in the nineteenth century and finally accomplished by Karl Weierstrass with the rigorous, epsilon-delta definition of limit, which obviated having to introduce infinitesimals as mathematical magnitudes smaller than any real number. Any number on the real continuum can then be defined as the limit of a countable, infinite sequence of rational numbers. Continuity and differentiation (and its inverse operation: integration) could then be rigorously formulated within the real numbers, perhaps with the aid of the imaginary number i , and the historically momentous nineteenth century program of the arithmetization of geometry, or the convergence of the discrete and the continuous, consummated.

All mathematico-scientific treatment of movement

of whatever kind requires at least a quantifiable concept of time, which may be conceived, or rather: imagined, as a simple, continuous, ‘linear’ variable of now-points. No matter whether an absolute or relativistic time is assumed, this time is regarded as scientifically ‘objective’, as opposed to the so-called ‘subjective’ time of psychological, cultural, historical, poetic, etc. experience. But objective time is the conception of time employed by a certain kind of thinking in order to make movement (change) of all kinds calculable and, in many cases, predictable. That is, the concept of objective time is such only for a subject, viz. human being, underlying this kind of calculative will to power over movement. The ontological casting of the phenomenon of time quantitatively as amenable to mathematical calculation is a determinate historical conception of time that determines, i.e. truncates, also the possibilities of the human experience of time and hence also of the human experience of movement.

2.8. Time and movement in Aristotle

If in the modern age, the phenomenon of movement has been reduced to a differential ratio $\delta\mu\delta\tau$, where m is the magnitude lifted off any phenomenon at all, and t is the continuous variable measuring the uniform passage of the time variable conceived as a continuum of now-instants, for ancient Greek philosophy, all the terms in this conception, i.e. movement, magnitude, continuum, time, were still questionable phenomena with which it grappled. This may allow us to come to a more adequate understanding of movement and time, of their paradoxicality that defies an all too self-confident, arrogantly narrow-minded, ‘logical’ rationality. Aristotle’s *Physics* represents the culmination and consummation of the Greek attempts to think through the ontology of physical beings, whose being is characterized by their being kinou/mena or “movables” (*Phys.* A 2;185a13).⁸

On pronouncing that “it must not remain hidden what movement is” (*Phys.* G 1;200b13), Aristotle proceeds to introduce the ontological concepts that will allow him to overcome the shortcomings of his predecessors, namely, above all, the famous triad *δύναμις*, *ἐνέργεια* and *ἐντελέχεια*. Although we are entirely familiar with the phenomenon of movement, Aristotle claims that it remains hidden to us. This is the classic situation for philosophical thinking: it starts with what is most familiar, and thus in some sense known, in order then to show that we have always already skipped over the simplest of questions and appeased the understanding with only apparently adequate notions that take the phenomenon in question for granted.

In the following I will provide a condensed re-run of Aristotle’s stepwise unfolding of an ontological concept of movement.

Movement concerns all beings in the world, not just beings in some kind of ‘nature’. In the Greek understanding of being, that which is present *ἴσ*, and what is

present most of all is the *εἶδος*, look or sight that a being presents of itself. The *εἶδος* is *ἓν*, one, i.e. a well-defined, single look or Gestalt that can also be addressed by the *λόγος* through the manifold of simple categories that define (*ὀρίζειν*), predicate the being in how it is present in its predicament. Movement is the phenomenon of change (*μεταβολή*), and that with respect to four categories: a being can change with respect to what it is (*τόδε τι*, οὐσία), how it is (*ποιόν*), how much it is (*ποσόν*), and where it is (*που*, *κατὰ τόπον*) associated with the phenomena of becoming/decay, mutation, waxing/waning and locomotion, respectively.

The peculiarity of the phenomenon of movement is that it cannot be pinned down to the present. Anything in movement has a *twofold* (*διχῶς*) presence: first of all it shows itself in the look of its *εἶδος*, but secondly, it also has a lack (*στέρησις*) that points to something absent which it could also *be*, i.e. which could also be brought into presence. For instance, a full moon has the lack that it could also be a new moon, or vice versa. In what it *is*, it is also in a certain way, i.e. potentially or ‘absently’, what it is *not*, a *μη ὄν*. Or a piece of timber presents itself in its *εἶδος* as timber and also as lacking what it could also be, namely, a table, for instance. What/how/ how much/where something could be through the appropriate movement is its *δύναμις*, i.e. its potential, potency or power to be something else, which is more than a mere formal or so-called ‘logical’ possibility. The thing itself has an *inherent* tendency to become other than it is; it is not yet finished. Aristotle conceives the lack in the twofold presence of a being in movement through the pair of concepts, *δύναμις* and *ἐντελέχεια*. A being with a potential, a *δυναμει ὄν*, has the power to become something else, but as it is in its presence, it is still *ἀτελής*, unfinished. It could only *have* itself in its finished presence in achieving *ἐντελέχεια*, i.e. through its having-itself-in-its-end. Thus does Aristotle come to his first definition of the being of movement. It is the presence of the potential being *as such*, stretching itself toward its finished presence, and thus a peculiar *twofold* presence of both presence and absence in which the potential being is *on its way* to becoming other than it is, in a finished state in which the movement will have ceased and come into its end. In achieving its presence *as* a potential being, the *δύναμις* is already fully present, i.e. in its *ἐντελέχεια*, insofar as it is *δυναμει ὄν*, but it has not yet attained finished presence as something else in its realized potential. In movement, the potential being is still exercising its power of change. “The finished presence of the potential being insofar as it is such is movement.” (*ἡ τοῦ δυναμει ὄν ἐντελέχεια*, *ἢ τοιοῦτον, κίνησις ἐστίν.* *Phys.* G 1;201a10f). In movement, the being’s power to be what it *can* be is *at work*, i.e. it is *ἐνέργεια*. Therefore, Aristotle can say that movement is the *ἐνέργεια* of a *δύναμις* in its *ἐντελέχεια*. Movement itself is a phenomenon that cannot be defined by a single category; it has, at least, a

twofold presence and therefore must be addressed by a *double* concept, i.e. by a pair of ontological concepts, δύναμις and ἐντελέχεια as lack (στέρησις), whose unified twofold presence is a third phenomenon, namely, the at-work-ness of the potential *under way* or *in transition* to finished presence.

Now, if the being does not have the source of its movement within itself, which would make it an ensouled (ἔμψυχον), living being, it suffers itself to be moved by something else. A being with the potential to be moved has a δύναμις παθητική, whereas a being that is potentially a mover has a δύναμις ποιητική. A piece of timber has the *passive* potential, or power, to suffer itself to be transmuted into a table, and the know-how of carpentry has the *active* power to move or transmute the timber into a table. Despite this twofold, passive-and-active, aspect of movement, the movement at work, its ἐνέργεια, is still just one movement, and not two.

Moreover, movement is a continuous (συνεχές, *Phys.* G 1;200b19) phenomenon which means that it is connected (ἐχόμενον) and also that it holds itself together within itself (συνέχειν). The continuum is that which can be divided limitlessly (ἄπειρον διαίρετόν, 200b21), i.e. for which there is no discrete limit where the division has to stop. The indefinite, double or twofold determination of movement as both δύναμις and ἐντελέχεια at once would seem to have to do with its continuous, limitlessly divisible nature. The presence of the δύναμις cannot be separated from the likewise present absence or lack of the ἐντελέχεια as the perfect, finished present toward which the δύναμις in its ἐνέργεια is stretched. Instead of a well-defined, unambiguous presence of one (ἓν) that could be captured by a single category, we have an ambiguous, inseparable presence of *both* a power and the not-yet-finished end-presence of its being-at-work. Even more than that, with the advent of ἐνέργεια, there is a *triad* of elements whose unity constitutes the full ontological structure of movement of all four Aristotelean kinds.

With this triad, Aristotle has all the elements in his hand to think through also the ontology of the phenomenon of *time*, albeit he goes a completely different path in his chapters on time in *Phys.* D Chaps. 10-14.⁹

There he notes that “it is obvious that time is not without movement and metabolism/change” (φανερόν ὅτι οὐκ ἔστιν ἄνευ κινήσεως καὶ μεταβολῆς χρόνος. D 11 219a1). The gateway to the phenomenon of time is thus through movement: Something present has the potential, the power to be something else, which ¹t can become through the appropriate movement which itself comes to presence when the potential achieves its finished presence *as* a potential, namely, in being at work as movement itself toward its end. *What was (past) a potential power at rest is now (presence) a power at work toward (future) a realization of the potential in a perfect presence.* The three ontological elements of movement thus

map onto the three dimensions or ‘ecstasies’ of time itself which, two-and-a-half millennia later, and foreshadowed by Husserl’s phenomenology, will be explicated as the temporality of Dasein in *Sein und Zeit*, whereas the Aristotelean conception of quantifiable time, now designated as the “vulgar conception of time” (vulgäres Zeitverständnis, SZ:428 §82a), will be shown to be derivative of a more primordial conception of the phenomenon of time (cf. *Sein und Zeit* Division 2, Chap. 6). When a power is at work, all three elements of movement are present, albeit that two of them, namely, the power as potential and the power realized in a finished presence, are present *as* absence, i.e. *as no longer* and *not yet*. This ontology of time is therefore thought on the basis of the *paradigm of production*, a *particular* kind of movement. A piece of timber, for instance, has the potential to be a table. This potential becomes present *as such* when the timber is worked upon by the carpenter on its way to attaining a perfected presence in a finished table. The piece of timber is thus *stretched* in time between what it *was* potentially and what it *will be* finally, and only in this transition as a simultaneity of presence and absence is it in movement. Being itself is thought in Greek ontology as a pro-duction, a *Her-Stellung*, namely, as a coming from an origin, a whence (ἀρχή, γένος, τί ἦν) into the perfected presence of its sight (ιδέα, εἶδος) most succinctly summed up in Aristotle’s famous formula for the beingness (οὐσία) of a being: τὸ τί ἦν εἶναι.

Aristotle eschews the possibility residing in the triad of concepts he has fashioned to grasp the ontology of movement, and famously determines time instead *quantitatively* as the number (ἀριθμός, 219b2) or measure (μέτρον, 221a1) of movement: “This namely is time, the number of movement with respect to earlier and later. Time is therefore not movement but movement insofar as it has a number.” (τοῦτο γὰρ ἔστιν ὁ χρόνος, ἀριθμὸς κινήσεως κατὰ το πρότερον καὶ ὕστερον. Οὐκ ὄρα κίνησις ὁ χρόνος, ἀλλ’ ἢ ἀριθμὸν ἔχει ἢ κίνησις. 219b1ff). And “time is the measure of movement” (ὁ χρόνος μέτρον κινήσεως, 221a1). The now (τὸ νῦν) divides the earlier from the later like a point (στιγμῆ, 219b18) divides a line (γραμμῆ) into two parts (220a21). The succession of *nows* counted off as ‘now’, and ‘now’, and ‘now’ is the progress of time coming to presence and simultaneously disappearing from presence. Aristotle raises the *aporia* that only the now is, so that time consists predominantly of that which is not, namely, the no-longer and the not-yet. As a quantity lifted off the phenomenon of movement, “we measure” (μετροῦμεν, 220b15) time; it is a number, a measure, a magnitude (μέγεθος, 220b27), and, like movement itself, it is continuous. Insofar as it is simply a number, time is unmoving, i.e. outside time, so it is crucial that the counting of *nows* in the progress of a movement refers to the *transitional* character of the *nows* that they are *underway* from...to, i.e. always both present and absent.

As a *continuous* magnitude, there is no smallest time, because any continuous magnitude can be divided further, but as a number (ὀριθμός, 219b2), there is a smallest one, which Aristotle takes to be two (220a28) because that is the first number one comes to in the act of counting, starting with the one (μονός). Time is counted by saying ‘now’ at least twice in succession, thus marking an earlier and later.

But why should time be quantitative at all?¹⁰ Time is something lifted off (ἀφαίρεσις) movement itself in its transitional character and, as such, is an abstraction. Saying ‘now’, or a succession of ‘nows’, is an abstraction from any particular quality of the movement concerned, capturing only the phenomenal moment of transition from what was to what is to what will be. The only difference between successive ‘nows’ is earlier and later, which makes of the counting of now-moments passing through, the abstracting counting of time itself. Hegel determines quantity aptly as the abstraction from all quality,¹¹ and the counting process of successive ‘nows’ is indeed an abstraction from all quality of movement apart from its transitional, never-to-be-pinned-down character ‘between’, underway, or as *both* presence and absence. A kind of ordinal counting as a steady drumbeat of successive nows can therefore be phenomenally justified, and the successive nows can be added up to attain a succession of (ordinal) counting numbers going on indefinitely, which is the counting of time that can be made mechanical and arbitrarily refined in a clock (beyond the rough counting of days, months, years, which are all regular movements of celestial bodies). The difference between any two counted now-moments can be measured, and since they are read off movement, which is continuous, the measured magnitude of time itself is also continuous. Why the passage of time should be *uniform* at all is a question taken up at a later stage of our investigation (cf. **5.4 Time in a capitalist economy**).

We conclude this section by noting that the quantitative ontology of time has its origin already with Aristotle. The ontology of time offered in Heidegger’s *Sein und Zeit* implicitly breaks with this quantitative ontology but remains within an ontology of time still determined by the paradigmatic movement of *production*. Now it is not a piece of timber that is produced into a table through the realization of a potential, but Dasein itself that casts its self into the future in a kind of self-production: “Preparing its potential for being, Dasein comes to itself.” (Das Dasein *kommt*, sein Seinkönnen gewärtigend, *auf sich zu*. GA24:375) Is there a possibility of an alternative ontology of time residing in the paradigm of social interchange, according to which each human being finds its self as it comes about as a who-stand in the intricate, haphazard interplay with others? We shall return to this question in **5.4 Time in a capitalist economy** and **5.6 Recovery of the three-dimensional, complexly interwoven social time of who-interplay**.

3. Digital Beings

3.1. The digital interpretation of world-movement and its outsourcing through executable, cybernetic machine-code

In order to clarify the essence of digital beings, they have to be viewed from digital technology which up until now has been left out of consideration. The binary code of a digital being is writing, script, i.e. it is the inscription of a λόγος into a medium where this λόγος can also contain numbers, i.e. ὀριθμοί, and thus can have mathematical character in the narrower sense. This logos is that of a techno-logical know-how, which is a special case of the λόγος as conceived since the Greeks.¹²

Technology is essentially a knowledge which provides insight into beings with a view to their manipulation. Productive technology or τέχνη, i.e. knowing poi/hsij, is a knowledge of *how* an envisaged product (a change or movement of any envisaged kind, which may be regarded simply as an effect or a result) can be brought forth.

Here a distinction must be drawn between digital beings which are in some way or other read by humans, and digital beings which are employed to automatically control some process or other. Productive know-how can be written down. Written-down knowledge was first of all read by humans who appropriated and applied the knowledge for their own purposes, e.g. in artisanal production. With digital technology, however, knowledge is not only written down in a written script legible to humans, but in a written script which can be read by a machine as a sequence of machine commands bringing forth envisaged results in a certain, determinate context. The written script itself can be input into a machine to control it. Written script thus becomes a digital program, or literally, a pre-writing or pre-script, which controls a machine of one kind or another and is ‘productive’ in the sense of bringing forth an effect which is always some sort of change (μεταβολή). Written script as binary code, i.e. as a finite sequence of discrete binary numbers (for any written script at all can be represented in binary code), is ‘read’ sequentially by the machine as an algorithm, i.e. each digital character or each string of digital characters taken together (i.e. syllables in the Greek sense of sullabei=n, aor. inf. act. ‘taken together’) serves to control the machine’s movements by means of commands that the machine (its ‘chip’) has been preprogrammed to ‘understand’ and ‘interpret’. The hardware and software mesh together like a ‘symbol’ in the Greek sense, as in two pieces of code that only make sense when fitted together.

An elementary example of such control is when a binary-coded, digital text is ‘read’ by a digital device such as a word processor, mobile telephone or PC, etc. in order to represent or reproduce the text on a screen through an ordered sequence of pixels. The pre-script in

this case is not merely the text itself in a digital form, but the word processing program and the control characters embedded in the text which together enable the text to be reproduced on a screen by means of control instructions. The program pre-script used to control a machine is always a 'logically' fixed knowledge insofar as the lo/goj appropriates beings in their truth with a view to some practical end (in this example, an electromagnetic state of matter interpreted as an ordered sequence of pixels and legible to the eye as text).

The essential and immensely powerful characteristic of digital technology is that human knowledge can be *outsourced* by the pre-script of a program into a machine where it then automatically brings about effects at any place whatsoever. The knowledge is a theoretical pre-understanding of a certain matter or state of affairs which, as a digital program, enables certain predefined procedures to be automated. In principle, *all* human tools are the outsourcing of a knowledge or know-how. A tool as simple and banal as a potato peeler, for instance, is the outsourced knowledge of how to peel a potato effectively embodied in a practical thing designed for the specific purpose. A better potato peeler is the embodiment of a better, more efficient potato-peeling know-how.

But digital technology opens up hitherto inconceivable possibilities for outsourcing (segments of) practical world-understanding in such a way that movements of all kinds (e.g. the motion of a door, the movement producing the result of a calculation or a signal that a predefined state has been achieved) can be automatically brought about. Computer programs inscribe a partial practical understanding of world, say, into the hard disk of a network server, and make the interpretation of this understanding processable and calculable by a micro-processor, thus producing functional effects (such as the 'production' of a search result by a digital search 'engine'). The digital capture and taking-apart of the totality of beings thus goes qualitatively beyond mechanical technology, which is still oriented toward physical (loco)motion, into the dimension of the automated control of systems of movement and change of all kinds, including the human body.

Since the onset of modernity, in which beings were cast as *res extensa* for the first time, the theoretical access to beings in their being has been enabled through measurability. The theoretical appropriation of beings is then a disclosing of beings by quantitative measurement, both practical (e.g. empirical data collection) and theoretical (e.g. postulating algebraic variables for all kinds of physical dimensions). The way a given matter behaves is then graspable and knowable theoretically through quantitative relations (equations), and this knowledge can then be programmed into computing machines of all kinds which further calculate what is measured on beings in accordance with a theory. For instance, digital photography is enabled firstly by casting colour itself ontological-

ly as a purely quantitative multi-dimension (i.e. a triple of positive integers plus other numerical parameters to form a colour vector in a chromatic vector-space). The further calculation then serves either a deeper knowledge of the matter (e.g. digital chromatic rendering) and/or the (possibly automatic) control of a process already set in motion in which the measured or further calculated matter or state of affairs is fed back into the process as a control variable (e.g. to produce a colour print).

Whereas the written, legible logos preserves knowledge—in this context, primarily technical knowledge —, with executable digital character sequences, knowledge is converted into an functional form that allows it to bring forth effects and to control processes automatically. The logos in the form of digital code is thus fed back into beings in order to manipulate them in a kind of self-poiesis. Digital beings legible for humans comprise not only text-like files, but all code sequences such as images, sounds, moving images which, when they are represented by the appropriate hardware, have effects on the senses and can be taken in by sensuous perception and understood *as* a meaningful whole. Machine code, on the other hand, controls processes in pre-conceived and pre-calculated ways. To do this, the process itself must have been already understood and taken apart in a mathematically calculable way which itself builds on various natural and technological sciences such as physics and electrical engineering. The programmer transforms this understanding into machine-readable, sequential, algorithmic, digital code (for every programming language must be ultimately translated into digital machine code in the narrow sense which consists exclusively of binary bits to be processed stepwise by the digital processor or 'chip' as executable commands) which then brings forth calculable control effects in a definite, foreseen context. Thus, cybernetic-technical knowledge becomes automated and tendentially makes itself independent vis-à-vis humans for, although each program can still be read and understood individually, the possible implementations of automatic control are well-nigh unlimited and thus lead to intricate, intermeshed, non-transparent control complexes that may even feed back automatically into each other in feedback loops—including in unforeseen ways.

Control processes that are no longer co-ordinated with the particular context foreseen, automatically bring forth nonsensical or even harmful effects. An understanding programmed into digital code can thus possibly turn into a severe misunderstanding with serious consequences. If each digital program can be conceived of as the implementation of a partial understanding of the world, then the possibility of arbitrary replication of binary code means that the digitized cybernetic knowledge transformed into software is available and can be called up anywhere, including in wholly unintended contexts.

The *interpretation* of the world through executable machine code takes place *factually* and *mechanically* (i.e. without understanding) in the interpretative processing of what is given by the world (data) and this interpretation is already latent in the pre-script of the program itself that just ‘mechanically’ processes the data. Viewed thus, a computer program pre-script is not only a productive technical know-how producing functional effects, but, more deeply and prior to that, a *pre-interpretation* of (a restricted segment) of the world written down by human beings which is ready to receive data at any time in order to calculatively interpret the world, on the basis of the data fed in, in a certain preconceived direction and to control some system or other on the basis of this interpretation. Human being, for which the world opens up in understanding, can today outsource to a computer its interpretation of the ontically understood world in segments into binarily programmed, functionally effective pre-interpretations of the world, where the understanding of world itself already has to be compatible with a digital decomposition (e.g. time has to be conceived quantitatively as a continuum of timeless now-points that can be counted, and thus digitized, to any desired degree of approximation). Such a world-understanding as a whole is oriented toward setting up and controlling the various kinds of *movements* of beings in their totality.

3.2. Loss of place in the electromagnetic network

Digital technology lifts a logical-digital structure from physical beings where there is no longer any topos, i.e. specific place (i.e. apart from the electromagnetic medium in general), where the digital being would ‘naturally’ belong and toward which it would ‘naturally’ ‘gravitate’ and upon which it were dependent for coming to presence at all. Like the logos of communication through which human beings can share an understanding and interpretation of an aspect of the world in its disclosure, and which can be degraded into mere hearsay in being prattled on (especially in the modern media), so too is the passing-on of digital code as something available to hand devoid of any understanding of the originary appropriation of beings in their calculable truth achieved by the digital technological logos. The knowledge embodied in digital computing machines is totally inconspicuous; the user appropriates only the desired, useful functions and effects of such machine-embodied know-how without any insight even into its technological truth. Digital beings still require a material, namely, an electromagnetic medium, which is situated somewhere, but, since this medium is homogenous, this place is arbitrary and stands at the disposition of Dasein (human being) which, as the modern subject, orients its world as it sees fit. Or, even more, digital beings are placed at the disposition of the set-up and drawn into the circling of the endless movement in quest of gain (cf. 5.5. **The global, gainful power play measured by**

money-value and its movement). Cyberspace itself has its own peculiar spatiality; it is not merely ‘virtual’ but has its own orientation and dimensionality, and in this cybernetic space, the digital beings can be arranged, moved and reproduced arbitrarily at will. Cybernetic (from κυβερνᾶν, ‘to govern’) space is called thus because it enables total control through digital know-how. In a certain way, digital beings, insofar as they are viewed merely as ordered sequences of binary code, are nothing other than written ‘texts’ stored in the electromagnetic medium which can be called up arbitrarily at will, including by that automated will preprogrammed into computer programs. Because the electromagnetic medium is homogenous, and digital beings are nothing other than an impression or imprint in this medium, any topologically continuous network of such electromagnetic medium, such as the internet, potentially facilitates total control through total traceability, for each and every digital being leaves its *calculable* ‘footprint’ in the electromagnetic medium.

Such arbitrariness of place stems from the circumstance that, viewed ontologically, logos and number are both attained by being ‘lifted’ from physical beings. The placelessness of the logos thus assumes a new meaning: not only is arithmological knowledge attained by an abstraction that ‘lifts’ measurements from beings, but this knowledge now assumes the garb of binary code in a technically ubiquitous form. Binary code as a pure form impressed in an electromagnetic, ubiquitously present medium is entirely compatible with all kinds of *formalistic thinking* that abstracts from the *particular situation*. These include especially the formalistic bureaucratic and legal thinking that the state employs to impose its rule ‘neutrally’ and inexorably over its subject populace. Knowledge is then not only universal in the sense of a universal comprehensibility and applicability but also materially universal in the form of universally accessible binary code that can be embodied arbitrarily as executable code in the homogenous electromagnetic medium of the appropriate digital devices for the control of movements of all kinds.

A medium is something through which other beings can move. The technically produced electromagnetic network technically enables the arbitrary movement of digital beings through the medium of the network. Every place in the network can be specified by co-ordinates. Since the electromagnetic medium is homogenous (every place is thus equivalent to any other place), each place in the network can be specified by purely numerical co-ordinates. These co-ordinate places are therefore not places in the Aristotelean sense to which a digital being inherently belongs and to which it owes its presence, nor even geometric positions, but rather, paradoxically, merely positionless, placeless, numeric n-tuples enabling calculation (cf. 4.4. **The global network: geometric or purely arithmetic?**).

3.3. The forgetting encouraged by digital code, and automated cybernetic control in the robotic age

Whereas the logos that is spoken and read by humans calls the beings which are spoken of to presence for understanding, binary cybernetic machine code executes control processes unseen in the background. Only the effects of cybernetic processes are brought forth into presence, bypassing understanding. The technical knowledge hidden behind these cybernetic processes can be ‘forgotten’ since the processes themselves proceed automatically. Only the programmer, technician or engineer needs to know how these cybernetic processes technically produce their effects. Understanding itself has passed over from human being into electronic digital devices. Such forgetting of technical knowledge in the broadest sense can be observed today everywhere, such as in the circumstance that people are no longer able to carry out even simple arithmetic operations in their ‘heads’, but rather have to reach for a digital pocket calculator to do so.

In a computer program, technical knowledge itself translating a partial understanding and interpretation of some aspect of the world is made into something lying present at hand and to hand, and it is a being which is good for something (mode of being as being-(good)-for...). Whereas the ‘logical’ or logos-like call-up of beings takes place through language calling beings to presence by addressing them, with digitally decomposed beings this presencing is different, for here, binary code is called up through the electromagnetic medium, in order to be processed further, e.g. read by a human, or to unfold automatically its programmed effects in a cybernetic loop. Physical beings are brought to presence in knowledge through the numbers and language ‘lifted’ from them in a way different from their presencing of themselves unmediatedly for aisthaetic perception in a situation. The knowing re-presentation of physical beings in executable digital code depends on both the geometric abstraction from physical beings and the discrete arithmetic abstraction that is able to algorithmically approximate physical continuity to any desired degree of accuracy.

When the knowing, disclosing appropriation of beings through *arithmological knowledge* is inscribed in a computer program, physical beings too then become cybernetically manipulable by automatic machines controlled by binary machine code. As cybernetic programming, arithmological knowledge intervenes ‘in writing’ in the world of things. Arithmological knowledge not only enables a technically productive manipulation of things, but arithmological script as cybernetic program code transforms this arithmological knowledge *automatically* into effects. Such automated cybernetic systems represent a hybrid between $\Phi\Upsilon\sigma\iota\varsigma$ in the sense of beings which bear the governing source of their own movement within themselves, on the one hand, and a technique under the control of a human hand in which the govern-

ing source of movement lies in another being (the producer, the programmer), on the other, for these automated systems have something $\Phi\Upsilon\sigma\iota\varsigma$ -like in their nature, where $\Phi\Upsilon\sigma\iota\varsigma$ is understood as self-poiesis.

Tellingly, Aristotle conceived *fu/sij* precisely as self-poiesis, so the cybernetic, auto-poietic systems confronting us today are the consummation of his ontological dream which is now revealing its ambivalence as a sometimes nightmarish dream. We may as well call these auto-poietic systems and things *robots* and note that we have long since been living in the *robotic age*, the epoch unwittingly long since fore-cast by arithmological ontology. In automated cybernetic systems, the governing source of movement no longer resides in a living, breathing human operator, but has been outsourced knowingly (i.e. through knowledge) into material beings insofar making it seem that these systems themselves had souls and were in this sense alive, animated (*anima* = soul). Such outsourcing introduces a split between the knowing designer (electrical engineers, programmers, etc.) of the cybernetic system, and the users, who need know nothing about how the system works, but only its operating instructions, thus deepening the gulf between technically skilled labour and unskilled labour. Unskilled workers have not even forgotten something they once understood in principle or in technical detail, but inhabit the cybernetic world as if in a fog in which things are discernible only in fuzzy outline.

The phenomenon of digital automation also reflects back, through the inevitably *totalizing tendency* of the digital cast of being, onto the self-conception of human being itself: a science of neurophysiology arises which preconceives even human thinking itself *as* an intricate, auto-poietic computational program, embedded in the brain, which reacts to sensory impulse-data given by the outside world. This is a kind of forgetting of an entirely different order: truth is understood then only as effective knowledge, and human thinking is (unwittingly) preconceived ontologically as the effectivity of its functionality, i.e. through the interconnections between cause and effect, stimulus and response, data input from the environment and brain-calculated reaction. The thinking human brain is then considered to be simply extremely good in calculating given inputs, but in principle (i.e. ontologically) as the same as a digital computing machine. In this kind of effective scientific thinking, the ontological difference between ontic knowing and ontological insight into the ‘scaffolding’ of being itself has been consigned, not without a sneer of ‘hard’ scientific superiority, to oblivion.

3.4. Cybernetic control and arithmological access to movement and time

Sober Cartesian ideas setting down the rules for modern mathematical sciences precipitate in material beings themselves insofar as (fragments of) human understanding of the world, borne tacitly by the implicit

digital-ontological thinking that has made the dissolution of beings in the world (ontologically) conceivable, can be encoded (piecemeal) into executable binary computer code. Human subjectivity in the modern age has insofar assumed god-like cybernetic powers. But this engenders only the *illusion* that we human beings are in control. It is not simply a question of complexity that, say, because of the countless aspects, we cannot see through what computing machines of all kinds perform and hence become entangled in an intransparent, automated, cybernetic web, but already, prior to that, there is the primal onto-arithmological casting of access to the world which today enables the outsourcing of productive world-interpretations in a digital form. These automated systems now turn upon us, challenge us. And even more, the arithmological way of thinking is an access to disclosing beings as such that also *obscures* the phenomena. It is important to recover from historical oblivion that the ontological origins of the powerful onto-arithmological casting of the world lie in Greek metaphysics that implicitly understood being as constant, standing, defined, and therefore unambiguous presence that underlies beings' as such themselves being addressed as 'one' (ὅν = ἕν) and as a well-defined look (εἶδος). As we have seen (cf. **2.8. Time and movement in Aristotle**), the categories appropriate to grasping ontologically the phenomenon of movement (κίνησις) are not just one, but at least two, thus reflecting its ontological ambiguity

The achievement of metaphysical thinking has been to grasp the phenomenon of movement in terms of both presence and absence (εἶδος and στέρησις) in such a way that the ontological ambiguity of movement is overcome, so that what is present (τὸ δυνάμει ὄν, the force or power) *governs* the productive coming-to-presence of what is absent. This is the *Western will to power over movement* of all kinds. Access to the world through the λόγος depends on beings' being grasped in a well-defined, discrete way as ὄν λεγόμενον, and the discrete λόγος ultimately, in the digital age, can be broken down into countable, finite, calculable number as binary code that articulates numerically a piece of world-understanding in executable digital program, thus mirroring our world-understanding in automated processes/movements. Such logical pre-script is outside of time; it is timeless. Why? Because time is conceived simply as the real variable, *t*, consisting of pure now-points which are either present or absent, but not both. The unity of time in its ambiguity as both presence and absence simultaneously eludes pure number which, as the Greeks knew, is outside time.

It is therefore an historically momentous *obscuring* of the phenomena of time and movement to conceive time as a mathematical variable. If, however, human being itself is, in truth, exposed to three-dimensionally stretched, ecstatic time, then the productive power enabled by metaphysical thinking that culminates in today's digital technology, is a narrow-minded access to

the world that makes certain phenomena *inconceivable*, i.e. *invisible* to the mind's eye. It thus fails to allow room to move for those movements, including the movement toward death and the movements in interplay with free others, that are beyond the reach of the Western will to epistemic power over movement including, in its latest historical garb, as automated cybernetic systems of myriad kinds.

4.

Spatiality of Cyberspace

4.1. Abstraction from bodily experience in cyberspace through reduction of place to numeric coordinates

If digital technology 'advanced' so far as to be able to decompose the body itself into electromagnetic waves (and not merely take measurements on the body by 'lifting' numbers from it) and to reconstitute the body at will (through a conversion of energy back into matter), then, to this extent, there would no longer be any *bodily* experience of space at all, but there would still be an experience of space in the sense of *Dasein* or existing-in-the-world. Then, the finger movements of clicking on the pointing device, which serves to orient and near in the electromagnetic medium, would also be done away with. The history of the technical overcoming of distances is simultaneously a history of the smoothing out and elimination of the bodily experience of space. Even with the transition from the horse to the automobile, the bodily experience of space through nearing regressed, for there is a difference between riding on a horse and gliding through a region sitting comfortably in a motorized limousine. On the internet, spatial orientation is provided by URLs (= DNS = a number) and signposts (with numerical links). Nearing is done by clicking a pointing device. The pointing device points to what is to be neared. Insofar, cyberspace is a very simple space, but nevertheless a space to which both the essential existentials of orientation and nearing have to be attributed.

In Heidegger's *Being and Time*, the place where equipment belongs is given through the totality of applicability in use (*Bewandtnis*), which is the understood interconnection in which the various useful things stand in relation to each other. Equipment must be in its proper place for it to *be* to-hand and so that it *can* be put to use. Each piece of equipment thus belongs somewhere in its place. This is quite different from the way in which Aristotle thinks the belongingness to place of physical beings. We also do not cease to be in the mode of taking-care-of (daily life) when we near things in a different way in a digital, electronic medium. When, say, we call up a digital being which then flickers on the screen and can seem to us to be very near or very far, this seeming is not merely virtual or 'subjective', but rather: "*Only in such 'seeming' [...] is the world in each particular situation properly to-hand.*" (SZ:106, italics in the original) This means that digital beings and the electromagnetic media can also be interpreted from being-in-the-world and not

merely from the standpoint of the arithmological casting of being. This also implies *inter alia* that the electromagnetic medium enables a mode of Dasein's being together with other Dasein. Insofar it is erroneous to speak of a merely virtual being-together in the network, for being-together means fundamentally a sharing of the truth of being by Dasein and other Dasein and not merely a bodily adjacency at one place in space. Communication by no means requires a bodily togetherness of human beings, nor even a simultaneity of presence, whether bodily or otherwise. Communication can take place across centuries and epochs through legible signs in various media.

4.2. Dreaming in cyberspace

It is not uninteresting to note that whilst *dreaming* we are situated in a medium in which some of the remarkable properties of cyberspace occur such as the immediate, 'instantaneous' relation to spatially far-off places. These remarkable properties have something to do with our bodiliness, for normally, in a waking state, we move bodily through space; our body participates in this movement and itself performs movements through space. This bodily co-performance of movement, however, is obviated in both cyberspace and when dreaming. Cyberspace has a genuine spatiality in which we orient ourselves and near beings, but in this space we move bodily by merely clicking with a finger and do not experience any bodily presence of what is called up. Even bodily clicking could be made redundant by having signals sent directly from the brain to the computer, which, for instance, is already the case today for some severely disabled people. The movement of an eyelid or even mere brain activity is then sufficient for steering oneself through cyberspace. The parallels to dreaming are thus pronounced. Lying in bed, we fly to any arbitrary place and near anything in the world without having to make a passage through time or through physical space—which we can also do on the internet as long as there are no technical disturbances in the network. Movement and nearing through the electromagnetic medium is ghostly and banal at one and the same time. It is ghostly or eery because a space is opened up in which we can move without our bodies, and it is banal because we move in this space so matter-of-factly, without really knowing (neither technically nor ontologically) in what kind of dimension we are moving.

4.3. Spatiality of human being in the global electromagnetic medium

What is fundamental to spatially existing in the global electromagnetic medium is Dasein's (human being's) potential to be *there* with far-off beings *as such*. Only because Dasein *is* always already *there*, is it able also to perhaps near the beings situated *there* in various ways by physically going there or by acquiring or bringing the beings situated there to itself. Bow and arrow is a

physical way or a means (but not a medium) of nearing, say, a bird. Reading news about a far-off city is another way of nearing, or acquiring, through the appropriation performed by the logos. Dasein's bodily nearing by reaching out for, grasping, going to, etc. is only one mode of nearing. The appropriation of beings through the logos, i.e. by speaking of things, is another. Dasein participates in the openness of being in which beings show themselves as such. This openness of being is spatial (and also temporal). Being-in-the-world means also being-spatially-in-the-world, and this spatiality of Dasein constitutes the condition of possibility for Dasein's being able to near any being as such. Nearing is a fundamental, namely, the spatial way in which Dasein comports itself toward beings *as such*. The 'as such' is essential in this connection because, say, other living beings do not comport themselves toward beings *as such* even though they obviously participate in some kind of openness. Nearing via the logos (and here this means: bringing to presence, *vergegenwärtigen*) takes place, for instance, through letters and newspapers. Here, the words written on paper is the *medium* in which the nearing takes place. The logos frees itself from the beings about which it speaks and makes itself independent vis-à-vis the physically given, bodily experienceable beings. A medium is fundamentally a dimension through which beings (here: written or printed words on paper) can move. Words enable a different mode of being-with-beings from bodily presence alongside them.

What can be designated as a technicization of nearing is the point where τέχνη comes into its own with regard to spatiality. Τέχνη ποιητική always rests upon a mode of disclosing beings and therefore also on an understanding of being which is mostly implicit, taken for granted and thus forgotten *as such*. It is always a knowledge enabling a know-how, and can and must be implemented in technical devices. In particular, the various media such as paper, the printed word, etc. are enabled by technical knowledge such as printing technology. The digital electromagnetic medium is the summation of all technical media insofar as it not only appropriates beings in arbitrary far-off places through the logos, in 'lifting' the logos from beings, but also appropriates them through numbers which then also enables further calculation for cybernetic ends. The beings situated *there* are given a digital (i.e. basically arithmetic) representation through calculation, whether it be in words, sound, images, video, electromagnetic spectra, etc. which can then be sent at will to any place through the electromagnetic medium. Thus, digital, electromagnetic nearing arises which of course presupposes the knowledge of digital technology as well as the mathematical casting of the totality of beings. I.e., situated a priori or 'before' technical knowledge is the (invariably implicit) ontological understanding of the arithmological decomposition and appropriation of beings which has come down to us from Aristotle via

Descartes.

There are thus two steps: first of all, the digital, calculative appropriation of beings through which they attain a purely numerical representation in digital code, and secondly, the digital medium through which the digital beings can pass through and ‘measure through’ as their own dimension. Because digital approximation takes place through the electromagnetic medium without bodily experience of space, this kind of spatial experience is somewhat ghostly. Dasein spirits bodilessly through the electromagnetic medium without having to leave its place bodily. This signifies in a certain way a collapse of all places into one place which insofar destroys the possibility of farness. But that has always been the case with technology; it destroys an old world by opening up a new one. The special feature of the digital, electromagnetic medium is that it is a *mathematical* space which can also be represented numerically, thus opening hitherto unheard-of possibilities of calculation and cybernetic control. Since, however, numbers are not only placeless but also without position, the movement of Dasein in cyberspace is reduced to a game of numbers even though the user interface presents itself to Dasein in a sensuous form, say, with 3-D graphic elements, etc. The interface with Dasein must adapt itself to the sensuous, bodily givens of Dasein, which is, however, only an illusion. Behind the interface there is merely a numerical representation of the beings shown along with the network which is physically spread over the entire globe without the geographical scattering being sensuously experienceable *as such*, and without the user having to understand anything at all about digital code. Nevertheless, Dasein knows that it is nearing beings from all over the world (or even outer space) and thus appropriating them.

The two steps named are supplemented by a third which, however, goes far beyond the first two. This third step, as already explicated, is the further cybernetic calculation of the beings appropriated in digital form in computing machines of all kinds, such as PCs, movement sensors, robots, implanted microprocessor chips. I.e. it is not simply a matter of presenting the appropriated being merely as linguistic or image information (which, of course, also presupposes a certain amount of further processing of the digitally captured beings), but, furthermore, the measurement data obtained are processed further in a digital program (which always represents a certain, fixed pre-understanding of the data) in such a way that control functions are triggered in a cybernetic system. For instance, numerical data on traffic flow on various roads are automatically gathered through electronic sensors by telematics services, and calculated and processed in such a way that the driver of an automobile can be offered a graphic representation of a congestion-free route on the screen of the car’s navigation system. This example shows how the spatiality of the digital-cybernetic network intermeshes with and feeds back into the spatiality of bodily being-in-the-

world. *The will to power over movement and time thus extends also to a will to power over space on a global scale.*

4.4. The global network: geometric or purely arithmetic?

Does the electromagnetic medium as a global network have a geometric or a purely arithmetic character? If one conceives of or represents the network as points which are connected or not connected by lines, then it has a geometric character which is called a ‘graph’ in mathematics. Graph theory today is an autonomous area of mathematics. But is the specifically geometric character of networks relevant here, or can the points and lines of a (global) network be represented purely arithmetically or numerically? This is indeed the case, since we do not at all have to conceive of the electromagnetic network in a geometric or aisthaetic way, but rather, it suffices to represent the network with its connections by numerical co-ordinates (vectors or k-tuples) such as $(n_1, n_2, n_3, \dots, n_k)$, i.e. only the numbers and an ordering of these numbers is necessary along with a mathematics (a calculus) for calculating with these numeric entities. Can the network be represented as a kind of matrix calculus? Indeed it can! The electromagnetic medium is representable as a matrix where the matrix = mother = Plato’s “wet-nurse of becoming” in a binary numeric guise. So-called analytic geometry, which was developed by Descartes (today we still speak of Cartesian co-ordinates), is based on the fact that all geometric objects can be dissolved into (a calculus with) numbers if the numbers assume the form of co-ordinates. Co-ordinates, however, are simply ordered numbers which can be computed in a matrix calculus within a vector space. What remains of the posited character of geometric figures is the indispensable ordered sequence of the co-ordinate numbers, e.g. the point $(2, 5, 5)$ differs from the point $(5, 2, 5)$ even though the same numbers occur in both co-ordinates. The task of mathematics consists in calculating with these co-ordinates whilst respecting the ordered sequencing of the numbers contained therein. This problem has long since been solved by mathematics. Only for this reason can arbitrary geometric figures in n dimensions be represented via equations in computers, for computers only *compute, calculate*; they cannot deal with geometric figures *as such* because computers *are* not aisthaetic but rather purely calculative (in their mode of being). A microprocessor can only work through consecutively a countable number of arithmetic operations—in an algorithm.

A necessary precondition for breaking down networks into a matrix calculus is the study of networks through graph theory, combinatorics and topology. Topology as a branch of mathematics clearly shows its geometric origins, and it deals especially with the connectedness and non-connectedness of geometric objects (therefore covering also problems of graph theory) easily representable sensuously to the imagination, but very

hard to calculate. The topographical objects of geometry therefore had to be reduced to a kind of calculus by abstract algebra in which not merely numbers play the key role, but symbols representing the placeless and positionless elements of abstractly defined mathematical objects such as groups. The elements of a group are abstract symbols representing magnitudes in general, and therefore can be calculated. Whether a given geometric object is connected or not is converted into a problem in abstract algebra involving chains of groups. The geometry of a space thus becomes *algebraically calculable* (more powerful than arithmetically calculable, because more general) which, in turn, is a precondition for it becoming amenable to digitization and specifically digital calculation.

If place in the global network is made mathematically calculable, the electromagnetic network is placeless, and positional only insofar as the co-ordinate numbers or symbols preserve an order (τάξις). It is not a genuine geometric structure, or rather: all geometric structures can be represented algebraically and thus become representable and manipulable by computing machines. Hence, the global electromagnetic network itself can be represented as a mathematical, i.e. digital, structure which accordingly can be controlled in a mathematical, calculative way. The technically constructed world of cyberspace is thus a mathematically comprehensible space in which beings appropriated by mathematical knowledge circulate. But the reduction of physical beings to geometric figure and further to algebraic magnitudes accomplished by modern mathematics is not a one-way street: the calculative manipulation of digital entities in the global network also has a translation back into a sensuous form. This is the so-called graphic interface that makes the handling of computers and the ‘sojourn’ in cyberspace itself more natural for Dasein. Dasein can therefore experience cyberspace from the non-technical ‘inside’ as an independent spatial dimension in which it can orient itself and also near digital beings, and which also maintains easily negotiable interfaces with the surrounding sensuous physical space of the world.

5.

Digital Technology and Capital

5.1. Globalization driven from afar by the digital cast of being¹³

The entire phase of economic globalization we are going through today is borne by the digital casting of being (whereas the historically first phase of globalization was enabled inter alia by the knowledge enabling the technical development of ships, i.e. by an approximating technology with global reach). It is this casting of being which, through digital technology, abolishes distances and levels time differences and enables the world as a unified, ‘simultaneous’ globe in the first place. In

corresponding to the digital casting of being, we humans are forced to keep up with the new opening of world and the new, digital beings that take shape in it. One aspect of this is that, because of the acceleration brought about by technologies of nearing and cybernetic automation, we have less and less ‘time’. The time-saving technologies do not lead to any time-saving for humans, but a time-saving for capital, such as the reduction of turnover time for the circuit of capital or the just-in-time production-flow that reduces costly inventory (cf. below). The digital cast of being is ambivalent; it opens up existential possibilities for us on the one hand, through digital “conveniences of living” (Adam Smith), and on the other, it makes us into mere cogs in developments which roll in over us. We mesh in like cogs and run along, somewhat breathlessly, behind ‘developments’.

In all the hype (idle chatter) about globalization today, the essence, of course, is not seen at all. People, including the scientifically sophisticated, are ontologically completely blind and forgetful in this regard and are satisfied with narrative and sociological explanations. What is most questionable is that the origin of digital technology as a *mode of being* is not a question at all. We have lost sight of the indispensable role of philosophical knowledge which, in Hegel’s words, consists in

...investigating what is normally regarded to be well-known. [...]But such well-known phenomena are usually the most unknown.[...]The business of philosophy consists only in bringing expressly to consciousness that which, with regard to thinking, has been valid for human beings from ancient times. Philosophy thus does not set up anything new; what we have brought out through our reflection is already the immediate prejudice of each individual.¹⁴

Instead of telling the story of the sequence of events through which globalization has been enabled by a string of certain key (digital) technologies and other events (the ontic narrative so amenable to normal understanding), the deeper, philosophical task is to uncover how the digitization of the world is enabled by a certain, historical way of thinking the being of beings:

5.2. Does the essence of capital correspond to the essence of technology?

We still require further consideration of the essence of capital and how it corresponds, or does not correspond, to the essence of technology.¹⁵

Both are associated, but in different ways, with the Aristotelean-Cartesian, ontoarithmological casting of the totality of beings and its consummation in the dissolution of beings into logical bits which, as placeless, calculated beings, can be inscribed arbitrarily in the dimension of the electromagnetic network whence they can be called up to present themselves anywhere, anytime. In particular, *in money, the value of beings, their valuelessness, is embodied quantitatively in a reified way, i.e. in a*

separate thing (res). Money as the “universal equivalent” facilitating universal exchange is an arithmetic (and therefore positionless and placeless) abstraction which can be calculated, and insofar it corresponds to the digital casting of being and thus also to the world-encompassing, unified, techno-arithmologically produced cyberspace. Digitized money can be embedded in this medium and the circuits of capitals can assume in virtual reality, too, their own, independent life, just as Marx analyzes in the fetishism section of *Das Kapital* and elsewhere. This is an autonomization of capital vis-à-vis human existence and it is enabled in a consummate form through the digital cast of being, for both capital and digital beings are in their essence arithmo-logical, i.e. they both have a numerical, calculative, calculating nature.

So one might be tempted to think of capital and capitalist economy like a machine that can be controlled calculatively, just like a technological cybernetic system. In this case, the essence of capital would correspond entirely to the pro-ductive, calculative, controlling essence of technology that sets up the totality of beings as a standing reserve for endless circuits of production, and the political polemic against the machine-like ‘capitalist system’ would have some justification. To clarify this, and without yet having answered the question posed in the subheading, we have to dig deeper into the essence of capital and tease out two quite different meanings of ‘calculating’. To this end, we first consider what it means for beings to be *valuable*.

5.3. The casting of the totality of beings as valuable and capital as value power play

Everything that *is* opens itself to us as valuable in the broadest sense (including also that which is valueless, worthless or even detrimental, harmful), since everything that *is* has a relation to human being, either enhancing, detracting from or being indifferent to a possibility of existing in the world. The valuableness of beings, in the first place, is their use-value, their being-good-for a definite, concrete application that contributes to living well. In the second place, however, (as already Aristotle teaches us) such use-values are also good for *others*, and because this is so, they have the *power* to acquire something else of use in exchange for it. This is their *exchange-value*, and it arises just as naturally from human being itself as use-value does through the sheer fact that we human beings are a plurality and can enhance our living by acquiring use-values that others can provide for us. Hence both use-value and exchange-value are categories conceptualizing the relation of human being to beings in the world on a simple, fundamental level.

The exchange of use-values is the exercise of a certain *power* inhering in the use-values concerned to exchange or *interchange* for each other. The exchange-values possessed by the exchangers constitute starting-

points (ἀρχαί) governing an exchange (μεταβολή, which can signify both ‘change’ and ‘exchange’) and insofar fulfil a *modified* ontological definition of power as laid down by Aristotle in his *Metaphysics*, where only a *single* starting-point is considered. The exchange of use-values for the sake of enhancing living (which Marx calls “simple commodity circulation”, *einfache Warenzirkulation*, MEW23:164) is therefore already a *power play* in the strict ontological sense of the term, ‘power’, signifying as it does the power to bring about a change, including an interchange. Money arises (both ontically and ontologically) as the *universal equivalent* facilitating the exchange of everything offered for exchange. As a *thing (res)*, it therefore itself embodies the *power of exchange* for everything with a price, i.e. it is the reified crystallization point for *exchange-value* which is nothing other than an ongoing power play of the exchange of everything valuable. Since use-values are generally (i.e. apart from purely natural products that ‘come forth’ entirely without labour) the result of the exercise of *human labouring powers*, i.e. of human *abilities* and *excellences*, the power play of exchange is fundamentally an interchange of human labouring powers, so power is implicated even on the most ‘innocent’ level of exchange.

Whereas the power play of the exchange of use-values can be viewed as the *metabolism* of the goods of living to enhance living, i.e. exchanging one use-value for money in order to acquire another, desired use-value, or $C - M - C'$, the play of exchange can also be inverted in order to make more money from money, or $M - C - M'$, where $M' > M$. This is the simplest formula for *capital*: advancing a principal sum in order to have it return augmented from its circular movement. A production process P may or may not be incorporated in this simple circling of exchange-value as capital, thus distinguishing between industrial and mercantile or finance capital. The power play played by exchange-value advanced as capital is subject first and foremost to the simple rule that $M' > M$. Otherwise, if $M' < M$, the power play would consume itself until eventually nothing more were left to advance. The power play of capital as a *movement* from M to M' requires at least two, and in general many, exchanges, each of which is a power play between the exchangers, most notably between the capitalist (large corporation, small firm, or whatever) and the hirers of labour power, the workers, who comprise *all* those (including even the top managers and executives) contributing to this movement.

5.4. Time in a capitalist economy

Like all movement, insofar as it is determined and therefore *measured* according to the Aristotelean casting, the value-movement of capital is *counted* by *time* (cf. **2.8 Time and movement in Aristotle**), which in this case is the *turnover time* of capital, the measure of a circular movement from M to M' . The success or otherwise of

the circuit of capital can thus be *measured* by the simple finite-difference formula $dM/dt = (M' - M)/(t' - t)$, where t and t' are the points in time at which a capital sum is advanced and returns. Such a formula measuring the result of the capitalist value-play relies, of course, on the reduction of the phenomenon of time to a linear variable consisting of now-points and also on the reduction of the phenomenon of value to a quantitatively determined money-value wherein the power play underlying value becomes invisible. The differential calculus developed by Cartesian (Newtonian/Leibnizian) mathematics in the modern age for physical movement therefore applies also to the social movement of value as capital, albeit without necessarily requiring infinitesimals but only a calculus of finite differences. This lends economics the semblance of a 'hard' science.

In decisive and essential contrast to the movement of physical bodies described by Newtonian (or Einsteinian) laws of motion, however, there is no formula to compute the difference $M' - M$, because this difference is merely the outcome of a value power play in which exchange-values are actually exchanged. There is no intrinsic potential exchange-value inhering in a use-value that could pre-determine its quantitative exchangeable value, simply because exchange-value itself only *comes about* or *happens* in a power play on the market among at least two, and usually many players. *Such is the power play played by capital in its plurality whose ontology represents a rupture with traditional metaphysics because it can cope only with mono-archic movement, not with the poly-archic, 'playful' movement of social interchange.* Capital is therefore *calculating* in that it reckons with a surplus value at the end of its circuit, but it cannot *precalculate* this surplus with calculative certainty, for the gainful interplay on the markets is essentially risky and uncertain.

Moreover, the *time* required for the movement of an exchange transaction also has no ground in a law of social movement according to which it could be calculated, nor is this time interval uniform. Commodities offered for sale on the market are at rest ($\eta\rho\epsilon\mu\epsilon\iota\nu$, *Phys.* D 12;221b28) with respect to their value-transformation and only jolt into movement upon being sold. They are nevertheless at rest only within the overall movement of capital, so that this their being-at-rest is only a limiting case of their movement as value, just as, analogously, a piece of timber at rest on the carpenter's bench is still within the overall movement of being made into a table. The movement of a single capital involves many individual transactions and therefore many individual value transformations, each of which takes its own time, so that the overall movement of one turnover of capital depends on many, even myriad value transformations being achieved before the advanced money-capital returns. This circumstance implies already that the circular movement of even a single capital comprises a series of jerky movements of value transformation plus the movement of production itself, which may be organ-

ized technically to run smoothly. Especially at the interfaces where commodity-value has to be transformed into money-value, the movement of value comes to rest for a time which may be brief or extended depending upon market conditions.

The circular movement of a single capital is hence both *incalculable* and *uneven*. The reproduction of an entire capitalist economy involves the intricate inter-meshing of many individual circuits of capital. The turnover of the total social capital is therefore even more complicated and intricate than that of a single capital, so that the counted number or time associated with this total social movement is both *incalculable* and *non-uniform*, since the underlying movement of total social capital itself is both *incalculable* and *uneven*. This contrasts with Aristotle's determination of the measure of time as an "even circular motion" ($\kappa\upsilon\kappa\lambda\omicron\phi\omicron\rho\iota\alpha \delta\upsilon\alpha\lambda\eta\varsigma$, *Phys.* D 14;223b19). The regular period of even circular (above all: celestial) motion makes counting easier and its number, viz. time, easier to deal with calculatively, and a *public measure of time* in a standard periodic movement (such as the Earth's daily rotation) facilitates the co-ordination of movements not only of capitals but among the economic players in general. A uniform measure of time, such as the year (abstracted from the Earth's motion around the sun), can be imposed on the movements of value as capital in order to make them comparable, but this is only the abstract subsumption of many complicated, uneven movements under a convenient standard read off the heavens.

If the turnover of the total social capital is the basic, underlying movement of a capitalist economy, the measure of this turnover also provides the basic measure of time in such a society whose rhythm is determined by the circular, augmentative movement of capital. As we have seen, this underlying social movement is uneven, which implies that time in such societies is also uneven (not like the more regular movement of, say, a simple agricultural society in tune with the movements of the seasons). Furthermore, the measure of the success of a turnover of capital is not only the amount of surplus value it throws off on its return as money capital, but also the turnover time taken for this circular movement, i.e. the faster the turnover, the more profitable the capital. Since capital is this augmentative movement from money to more money, it achieves greater augmentation by shortening as far as possible its turnover time, thus reducing the denominator in the 'success formula' $dM/dt = (M' - M)/(t' - t)$ and increasing it overall. If the turnover time of total social capital is an underlying, basic measure of time in a capitalist society, the tendency of capital to shorten the turnover movement means that *time in such a society becomes shorter and shorter*. That is, a capitalist society tends to continually *accelerate* time, even though such acceleration is not precalculable (but at most postcalculable), depending as it does already on the simple, but nevertheless incalculable transformation of

commodity-value into money-value (sale of the finished product on the market) and money-value into commodity-value (e.g. if supply on the market is short).

5.5. The global, gainful power play measured by money-value and its movement

Today, at the culmination of the modern age, the power play of capital has become *the* global gainful game in which *everybody* is entangled as a player. The players are not merely the capitalists, but everybody who has an exchange-value with which to play on the markets, especially working people from the unskilled to the highly skilled, and the entrepreneurs. Everybody, whether on a modest or grand scale, is caught up in the game of acquiring exchange-values either to use them or to accumulate savings, wealth and capital itself. Therefore, everything that *is* (including, say, icons, art works, white beaches, ‘untouched’ nature in general, etc. etc.) appears in the light of the global, gainful power play as a value, and everything is viewed from the viewpoint of its value for the power play in which value is augmented, for it is not only the capitalists who are involved in gainful activity, but *everybody*. The world therefore opens up in such an age as the *gathering of all the opportunities for gain to be had through the interplay of powers of various kinds*, starting with *labouring* powers. The world is therefore a *global power play promising gain*, and, due to the incalculable nature already of the simple exchange-value relation, the power play itself is essentially *incalculable* and a *successful* outcome cannot be precalculated or guaranteed. The ongoing power play of value in movement has both winners and losers, although not necessarily winners only at the ‘price’ of others losing, for there are also mutually beneficial or win-win situations. In particular, the working class itself is not necessarily the loser in this gainful game, and the quantitative comparison of incomes gained is only on a superficial level the yardstick for success or failure.

Money is the mediator in this dimension of quantified value, the medium of power which enables universal access to acquiring what is valuable. It is inconsequential in this context whether what is valuable is a thing, a human service (i.e. the exercise of labour power of some kind or other), a piece of nature or—in a derived way and, so to speak, of second order—money itself (interest). Money is then, as the representative of wealth in general, the universal key, by means of exchange, to all that is valuable, i.e. the universal social *power* over, it. Money is reified social power par excellence. All possibilities of existing in the world are enabled by valuable things and therefore entertain, directly or indirectly, relations with money as mediator. In any appropriation of valuable things in the broadest sense by human being, a more or less is disclosed from the perspective of the gainful game through the proportions in which they are exchanged on the market.

Therefore money, as universal mediator of exchange

and the abstractly universal representative of what is valuable, is abstracted from any quality and is thus only quantitatively distinguished within itself. Hence it can assume the form of pure countable number (ἄριθμός) which, in turn, of course, can also be digitized. As universal mediator for the exchange of what is valuable, money itself is valuable, i.e. a social power, and therefore access to it must be regulated. Money must be acquired according to certain rules of play for acquiring it (*property rights*, especially those pertaining to *contracts* of all kinds that regulate the interplay). The rules for exchange and acquisition constitute the framework of the gainful game in which human beings must participate insofar as they exploit their options for existing well.

The way of viewing everything from the perspective of money, which allows beings to *be* in a certain mode of quantitative valuableness, means that money is something resembling the material precipitate of a homogeneous, universal, quantitative dimension in which value discloses itself, including quantitatively. Even when we send a satellite into space or make observations of distant galaxies, etc., or do research into the sub-atomic world, we are guided and constrained also by flows of money, i.e. money mediates, through enabling and constraining, the dimension within which we also measure and fathom our existential possibilities and activities, our movements as social beings, as well as their limits. It is a medium for the movement of human living itself. Money and value, too, distinguish us from animality insofar as we are exposed to fathomless value and thus also to limitless *greed* and *desire*, thus becoming consumed by the gainful game. Animals do not have desires, but only limited drives which can be satiated by their environment. They do not look at anything *as* valuable; they are not exposed to the apophantic *as* which shows up beings *as* such and in such a way that they can be addressed by the λόγος, including in the category of quantity (ποσόν). Only we humans can *be* voracious and greedy, and voracity as a mode of human being’s comporting itself is a possible way of responding and corresponding to the gathering of promising possibilities of gain (including also the ‘negative’ or detrimental possibility of losing, of failing to achieve success).

Money has assumed historically differing garbs such as gold, silver, state paper money and today, strictly guarded numbers stored in the electromagnetic medium. Digital money is the pure consummation of money in its purely quantitative value-being for it hardly requires matter at all, only the electromagnetic alignment of a couple of molecules. These numbers and their flow (cash flow) encompass, and insofar steer, all possibilities of human existence either directly or indirectly. Without a flow of money mediating the gainful power play, human being itself cannot move in its existence, something that becomes painfully experienceable in every severe economic downturn in phenomena such as the so-called ‘credit crunch’.

We could also formulate the fundamental condition of a capitalist world (i.e. of a world that is sustained in its movement through the power play of gain) in the following way: *Nihil est sine valore*—Nothing is without value, in resonance with Leibniz’ *principium grande*: *Nihil est sine ratione*—Nothing is without ground or reason. But value itself is not a ground, coming about as it does groundlessly in the interplay only as a promise. This means that everything has its value in the sense that all beings are open, disclosed, first of all as use-values, but also as exchange-values suitable as pieces in the gainful game. Like every ontological world-opening, this casting of world as a value game is itself ungrounded, i.e. there is no founding ground or reason why all beings should be caught up in the gainful power play of values and also no reason or ground for value, measured in money as price, having a definite quantitative magnitude. The principle, *nihil est sine valore*, posits of itself—fathomlessly, from the very depths of being—a mode of disclosing beings as a whole and setting them into motion in the gainful game whilst enticing human beings as the players in this game. If the use-value of a commodity, depending as it does on the constantly shifting ways of living in which human beings customarily live, is without ground and thus also quantitatively indeterminate as an exchange-value, then it is also the case that *nothing is without risk*, for the values are determined only through the interplay among many players in which they are exposed to validation by others. The circling of value as capital has to pass through several or many value-validations on various markets before the success of its circuit is ‘home and hosed’. Risk is that which cannot be brought under the control of a governing starting-point (ὄρχή), but just comes along contingently (τὸ συμβεβηκός).

The entrepreneurial risk familiar to capitalism itself derives from the fundamental groundlessness of values as they come about in the power play of exchange-values of all kinds. Above this groundless abyss and before the horizon of the being of exchange-value, all the players in a capitalist economy play, above all, however, the entrepreneurs themselves who, as the lead players and initiators of a circuit of capital, are exposed to the essential contingency of value. Having and spending money is indeed a deeply rooted historical custom enabling our existential options. Money, however, is not simply a technical instrument but the ontic, material, thingly precipitate of an ontological dimension, namely, the dimension of value, which is an historical way in which world opens up for human being. Money as capital is the autonomized movement of the augmentation of money with its own simple, finite-differential formula for success or failure denoting the accumulation or destruction of value as capital. Since money and capital as embodiments of value are infected with the groundlessness of the *interplay of powers*, there are no laws of motion for the economy analogous to the laws of motion for physical

beings investigated by physics.

5.6. Recovery of the three-dimensional, complexly interwoven social time of who-interplay

The global gainful game that assumes the form of the movement of value as capital has a Janus face. On the one hand, it shows the face of the striving for the limitless accumulation of value as capital, the modern consummation of Aristotle’s *chrematistics*. On the other hand, the simplest of exchange relations in which one use-value is exchanged for another is already, at root, when deciphered, the interchange of human *powers*, i.e. human *abilities*. Such an interchange—a power interplay—can be, and often is *mutually beneficial*. This is the fair face of Janus. As the movement of social life itself, this interchange of powers is endless, limitless, for there is no end to how human beings can exercise their powers for each others’ benefit. Thus there are two different perspectives for looking upon the constellation of being called the gainful power play of value, one fair, and one not so fair, and sometimes even downright ugly, that consists in employing our powers *against* each other, to unfair advantage. There are countless ways of playing the gainful game unfairly, both subtle and blatant.

To bring the fair face into perspective requires, as an ontological condition of possibility, reappropriating the time that has been quantified as a mere mathematical (and hence timeless) variable *t* in the formula given above for the success of a circuit of capital, for the time in which we play the gainful game is our own, finite lifetime of our own finite life-movements. Firstly, as elaborated in *Being and Time*, the mathematical variable *t* has to become thought and experienced as the three-dimensional ecstatic, finite time of human being itself that casts its *self* into the open dimension of the future by retrieving who it has been and fashioning its ownmost, *singular* possibility of existing. Such self-casting, however, is close to being misunderstood as auto-production. Therefore, in a further twist, this three-dimensionally stretched time has to become thought and experienced as the *social time* of social movement itself, which is not just the measurable movement of total social capital, but the immeasurable, complexly interwoven movements of social interplay in which each individual haphazardly comes to stand (or fall) as someone, to gain or lose its self, in the power play of social recognition and social validation of its powers and abilities.

5.7. A capitalist economy is not merely complex, but simply ontologically playful

Early on in the analysis of the essence of capital in *Das Kapital*, capital is determined as an “automatic subject” (automatisches Subjekt, MEW23:169) in the sense of the self-valorization of value. Capital is not anything resembling a cybernetic subject controlling a total-social economic reproduction process. Rather, the subject-character of capital must be sought via the concept and

dimension of value. Capital is then subject only in the sense of the underlying (ὑποκείμενον, συβξεξτυμ), incessant and therefore “automatic” movement of value through the value-forms of money, commodity and back to money in the striving for an augmentation of value. Gainful value interplay itself is, in nuce, the game of mutual recognition of powers, starting with individual human powers or abilities, but including also derived powers inhering in property and money as exchange-values. Value can therefore be thought of in the first place as the dimension of *mutual social recognition*, a *simple* phenomenon lying at the basis of all human sociation: we *estimate* and *esteem* each other’s powers, abilities (even, and especially, when we are *indifferent* to or *detract* from each other’s powers and abilities).

As we have seen, capitalist economic activity is undertaken under the principle (ὄρχή) that from advanced capital (money M), more capital (money M’) is supposed to flow back, which is a kind of rule of play, constraining boundary condition or condition of existence for capital: $M' - M > 0$. This principle is by no means complex but rather, extremely *simple*, and its origins do not lie in the nineteenth century but already in ancient times. Aristotle already thinks about the endless striving for the augmentation of riches by way of chrematistics. The principle of the valorization of money, its self-augmentation when viewed from the standpoint of advanced money-capital bending back onto itself to determine a difference, comes to us from a far-off origin (as a sending from destiny), just as modern technology comes from τέχνη ποιητική as a poietically knowing mode of disclosure that was taken as the foundational, paradigmatic phenomenon for Western (productionist) metaphysics that has subterraneanly shaped Western history. Marx says that since Aristotle not a single step has been taken forward in clarifying the concept of value, the key to deciphering the ontology of our social being. That sounds similar to Kant’s parallel remark regarding Aristotelean logic.

“Destiny” here does not mean anything like a fate in the sense of an alien power that decides our fate, but rather the historical disclosure of a world sent, or eventuating, from being (hiddenness, nothingness) which we can never completely fathom nor control. This disclosure comprises the various historical ways in which we can encounter phenomena and address them and also be addressed by them. Certain simple ‘ideas’ form the ontological ‘scaffolding’ on which an historical world hangs. A world shapes up for us as historical beings existing in time, and *as* time, and the shape this historical world assumes is determined first of all by our deepest and simplest shared ways of thinking, the ones most unquestioned and apparently unquestionable in any given historical epoch which seem absolutely self-evident (such as ‘objective’ scientific truth seems to us today). The ground-categories of an epoch are also those with which our thinking *identifies* and hence those with which our

very identities, i.e. *who we are*, are bound up. A shift in historical destiny is always a matter of a *disquieting, conflictual transformation* in the way in which world discloses itself to us and also of *letting go* of how we have understood ourselves hitherto in our self-standing.

Marx investigates the complexity of capitalist economies only in the second volume of *Das Kapital*, *The Circulation Process of Capital*, where the opaqueness and intricate complicatedness of the economic whole is dealt with, which leave open many possibilities in the overall process of reproduction of the economy for frictions to arise in the intermeshing and intertwining of the many individual capitals, etc. But already the simple value-form itself (which presupposes a *plurality*, a *sociating* of commodities) is essentially contingent and incalculably unpredictable, since what or how much a commodity is worth is determined only in the exchange interplay itself on the market. The analysis of the essence of the commodity, money and capital (their socio-ontology) is carried out already in the first two chapters of the first volume of *Das Kapital*. In the determination of the essence (the socio-ontological principle) of capital as self-augmenting value, it becomes apparent that this circling principle confronts humans as an alien, alienated power, not because of the complicatedness of the economic system, but because of the fathomlessness of *value* as the ongoing outcome of an interplay of powers and ultimately of the *gainful game* itself, to which, however, human being in its desirous striving for the goods of living, and evermore thereof, *belongs*.

5.8. The gainful value-play an essential limitation to cybernetic technology

In the capitalist casting of being as the gainful game, as we have seen, commodities have to ‘prove’ or ‘validate’ themselves on the market, and whether and at what price commodities can be sold remains exposed to a fathomless incalculability. *Herein lies already an essential limitation to cybernetic technology*. The endless circuits engendered by “standing orders”, which Heidegger speaks of extensively¹⁶ in connection with the essence of technology and its eery will to will, according to which all beings are set up sense-lessly for endless production, do have a kinship relation with the circuits of capital, and this not even necessarily in another phenomenal guise, *insofar* as it is the capitals, that is, the enterprises themselves, which forcefully promote the development of technology and control technicized production in order to stay ahead in the competitive, gainful game. Not only with technical progress, but also with capital accumulation there is an endless progress for the sake of progress at work where the two tendencies intermesh with each other, for staying ahead technologically is *one* major way in which an individual capital, through increased productive efficiency, enhances its *chances* of survival in the competitive power play of exchange-values. But the kinship in essence between technology and

capital, between precalculative, productive setting-up and calculating, risky valorization of value *breaks down* and an estrangement between the two emerges *insofar* as the will to productive control so exquisitely consummated in automated digital cybernetics is the very opposite of the willingness to risk engagement in the incalculable play for gain with its many, competing players. Insofar, in answer to the question posed above (cf.2.2 **Does the essence of capital correspond to the essence of technology?**), we have to say that the essence of capital (whose ontological structure is that of poly-archic interplay) *does not correspond but runs awry* to the essence of technology (whose ontological structure is that of mono-archic production) which, especially since the advent of the Cartesian mathematical casting of world, seemed to be close to fulfilling the dream of total, calculable, even materialized, automated control, the ultimate consummation of the will to power as productive power governing the movement that brings beings to stand in presence. The essence of capital, by contrast, is playful, and this playfulness leaves room for the plural play of human freedom.

What, then, do the essential contingency and incalculability of the value-form have to do with Heidegger's characterization of the consummation of subjectivity as the "securing" of the will to will. He writes, for instance, "Humans of themselves align their essence with security in the midst of beings, against them and for them. They seek security amidst beings through a complete ordering of all beings in the sense of contriving a planned securing of standing reserves, which is how setting up in the correctness of security is to be performed."¹⁷ First it should be noted that security is the antithesis to the groundlessness of *freedom*, so the passage points to the headlong rush of human being from the possibility of freedom into a subjugation to calculable security, above all in the guise of so-called 'social justice'. Moreover, Heidegger's gaze is directed at totalizing cybernetics which, however, has to be uncovered as a self-delusive illusion insofar as cybernetics only calculates and can only calculate with beings productively, for it is important vis-à-vis value as a mode of being which is unfathomably incalculable and beyond any cybernetic control, but is nonetheless a historical way of world-disclosure for a *plurality* of human beings at mutually estimating play with one another. The dimension of value in its economic sense is never a subject in Heidegger's writings, and we have to learn this in an 'unsettling' re-reading of Marxian texts inspired by Heidegger: *Inherent in the interplay promising gain is an essential limitation to productive technology in general, and cybernetic technology in particular, for technology is essentially not able to steer and control the augmentation of value* for which there is no sure-fire, calculable, winning strategy.

It is noteworthy that in the above quote, Heidegger speaks of "der Mensch", which is here translated naturally as "humans". What is singular in German translates

naturally into plural in English. This is because the phenomenon of value of its nature involves a plurality of commodities and of exchangers of commodities. Whereas use-value always signifies a usefulness for a human user, the second-order exchange-value always signifies a usefulness for *another* human user. Now there are at least *two* free starting-points demanding ontological consideration. Something useful has to be offered by a seller, and someone else has to bid for what is offered, and only in this ongoing *interplay* of offers and bids does the exchange-value come about, or eventuate, as an abstract, quantitative exchange proportion (since anything at all can be exchanged for one another, all quality is abstracted from in generalized exchange). Exchange-value is therefore essentially *quantitative* (ποσόν) and *relational*, πρὸς τι, and not a substance, an οὐσία. Contra Marx, whose thinking was still held fast by the Cartesian casting, there is no "value-substance" (Wertsubstanz, MEW23:49). The human world is characterized by a *plurality* of human beings engaged with each other in *exchanges* and *interplays* of all kinds. Economic interchange is only one kind of human interplay.¹⁸

All human interplay, however, is fathomless because each human starting-point in the interplay among at least two is *free*, i.e. essentially abyssal, fathomless, groundless. It is this essential groundlessness in the plurality of human interplay that vitiates any dream (or Heideggerian/Orwellian nightmare) of total cybernetic control through digital technology, even though the possibilities of *surveillance* and *welfare* from 'above' of human beings and their intertwined movements opened up by automated digital technology conforms entirely to the state's caring will to political power. In itself, the economic game of striving for gain is a groundless, incalculable interplay subject only to the simple principle or rule of play that it turn out to be gainful rather than value-diminishing.

6.

Global Communication?

6.1. What is communication in a global network?

Human being finds itself always already *attuned* with the world in one mood/mode or another and, equally primordially, it *understands* the world. As a *plurality* of human beings we are open to a world in *sharing* an understanding of it. We are in the clearing of the disclosure of beings as such *together*. *Communication* is the *sharing in common* (L. communis) of an understanding of world by *articulating* it in speech, spoken or written. Human being's openness to the world is always already broken down or articulated into a logos that can be shared with others, thus also sharing in language an understanding of the world. At first and for the most part, communication is concerned with sharing the ever-changing facticity of the world in its continual movement, that is, with *news* of all kinds. Most of the world's

happenings we do not experience at first hand, but at second hand through a communication of news which we make sense of against the foil of our own world-experience. Written correspondence concerns mainly sharing the understanding of happenings in the world (news) and practical affairs in (business or personal) life. The movement of messages (communications) from one individual to the other is motivated by the practical movement of dealing with life itself and by keeping abreast of the movement of factual life.

The digitization of the logos is a special case of the digitization of beings in general, and is most natural because the logos itself is already a discrete articulation that can be easily broken down further into binary code or bits. Therefore letter correspondence and the postal system are quickly digitized as e-mail correspondence on the internet. But the spoken logos, too, and images of the world's happenings can also be digitized and made vehicles of communication with the aim of sharing an understanding of what is constantly going on in the world.

Written communication does not have to be one-to-one. It can be a *general, public sharing* of the world's moving facticity first enabled historically by the printing press and the newspaper which employed paper as the medium for the articulated signifiers of a language. Digitization leads to an explosion of news because now factual world happenings can be shared worldwide in writing, voice and image easily and at near-zero cost. What has happened (historical fact) can also be shared in the same way. Digitized media are global as a matter of course because the worldwide circulation of messages in the electromagnetic medium knows no technical bounds geographically nor with regard to the type of message. All the various media (news'papers', photo journals, radio, television, video) are now one digital medium distinguished only by the source of dissemination. Hence, no doubt, we are suddenly living in a world of global digital communication.

These communications of news of the world's factual movements, however, are shared by countless individuals, each with a different perspective on the world, with a different basic world-understanding against which news events are assessed, evaluated. The basis evaluation is whether the news is good or bad, i.e. whether the factual movement of the world is deemed to be for the good of or to the detriment of humankind in general or particular (a particular country, region, industry, etc.). Insofar news is always political, always controversial and conflictual concerning as it does the differing particular interests and more universal views of different groups of people. The divides in how news is understood do not depend on the news itself, but on the underlying understanding of the world, and ultimately and crucially, on the individual understanding of the deepest concepts of human being itself such as *freedom* and *justice*. The controversy over such issues *as such* is not a matter of the

communication of news, and it is shared and fought out only by relatively few. Otherwise, the controversies continually raging over issues of freedom and justice take place only between divergent positions representing particular configurations within a deeper-lying problematic concerning the question of human being itself. In other words, these controversial issues lead us back ultimately to philosophy, whose movement in time is slowest of all and does not depend on the instantaneous ease with which messages today can be globally communicated.

Political controversies and conflicts of all kinds are waged between differing positions (parties, organizations, segments of the population, etc.) that depend on the dissemination of news messages. Hence there is a continual *power struggle* to get one's message disseminated and placed favourably, and most news messages have some political import, so that control of the disseminating media becomes a decisive and divisive political factor, for it is important to occupy the news audience's minds with the 'right' messages for the sake of legitimating a particular political constellation, especially a government's rule, or a particular political tendency or struggle. The understanding of world news events is only in part a matter of fact, and more deeply a matter of deeper conceptions of human being itself, which is always also a conception of the world, of how it shapes up for understanding in the ontological 'scaffolding' of fundamental categories and concepts.

On both a deeper and a more superficial level, therefore, there is always an ongoing struggle to disseminate one's message and to get it across. The truth of the world at all levels is a power struggle. Getting a more superficial message across depends on the audience's preconceptions and prejudices, on what it is inclined to take in, on what it can understand easily, on what is pleasing or even flattering to it. The dissemination of an average message is therefore a *rhetorical power struggle* employing all the available techniques of rhetorical persuasion to flatter and thus win over the senses, hearts and minds of recipients. The power struggle over deeper messages is more difficult insofar as such messages are neither news nor views and are therefore not comprehensible in general, but demand for their reception a smaller audience's developed ability to comprehend. Such deeper-lying, but nonetheless crucial questions are therefore pushed into niches or pushed aside altogether in the global communication of messages.

The ease and cheapness with which messages can be communicated through the global network itself causes a problem of the *superfluity* of messages, of information of all kinds which materially are simply an in-formed electromagnetic medium. We become over-informed without necessarily improving our understanding one whit, for the latter can only take place outside of cyberspace in quiet study. Digital messages can become a kind of plague. We are flooded with messages to the point of *over-saturation* and of being *overtaxed* by endless reports

on factual goings-on in the world, to say nothing of advertising messages we would rather do without.

6.2. Communication among digital beings themselves

Communication proper is a human affair, but the term has long since been transferred also to physical beings in general and, in particular, to digital beings themselves for the ‘communication’ among digital devices of all kinds that are controlled by executable binary code. They are fed with digital data to process and also receive control commands from elsewhere through the electromagnetic network. Such communication constitutes an automated cybernetic network, a kind of web-robot that spans the globe. The worldwide digital electromagnetic medium is the consummate *element* for cybernetic control because all the digital beings inhabiting cyberspace are calculable and can be calculably addressed (and traced) by the appropriate binary command code. This provokes the question whether the global digital network is truly for the sake of human communication, as it certainly seems to be on one level, or, less apparently and unbeknowns to us, for the sake of machine communication, i.e. of total cybernetic control as a covert realization of the will to (productive) power.

6.3. The intermeshing of the movement of digital beings in the global network and the movement of value as capital

The efficiency of the cybernetic digital network is welcome to the movement of capital because, as we have seen in the preceding chapter, both productivity increases and the acceleration of turnover time boost the self-augmentation of value by enhancing the chances of coming out on top in the competitive struggle for gain. Capital therefore slips into the global digital network like a hand into a glove. The speed with which messages can be communicated accelerates the circulation labour and shortens the circulation phase of capital. Moreover, the near-zero reproduction costs of digital code lead to dissemination throughout the global network and massive cost reductions for many productive and circulation functions of capital. A banal example: invoices can be communicated, i.e. billed, by sending a digital being (a digital-electronic invoice-file) through the network both *quickly* and at *zero cost*. Both tendencies lend themselves to maximizing the value-augmentation-formula for capital’s gainful movement: $dM/dt = (M' - M)/(t' - t)$ (cf. 5.4. Time in a capitalist economy).

Consumers too, who are just as much enticed by and caught up in the gainful game as capital itself, benefit from the near-zero cost of all sorts of digital ‘messages’ in the global electromagnetic network, where such messages comprise written texts of all kinds, music, photo, film, etc. Although the original ‘production’ costs for a digital being may be considerable (programming, writing, recording, photographing, filming, etc.), the reproduction and distribution costs are next to zero, requiring

only the cost factor of the electromagnetic medium itself. This provokes the question whether the deeper-lying telos of the global digital network is for the sake of sustaining, expanding and accelerating the movement of value as capital and, more generally, whether it is bouyed by the striving of *all* economic players for gain, which can take the form simply of saving money. Is the global digital network the consummate medium for the gainful power-play?

The will to power in the guise of total digital cybernetics therefore dovetails neatly with the striving for gain, especially with capital’s incessant striving to bloat value with surplus value through the course of its circular movement. It is therefore justified to speak of an *inversion of human purposes behind our backs*, for what seems to be simply a desire for ease of communication globally and for cheaper, more convenient products and services, turns out to further something unintended, but perhaps inkled, viz. the will to (cybernetic, pro-ductive) power over all movement and the incessant acceleration of the rivalrous power play of all kinds of powers (labour powers, personal skills and abilities, productive powers of means of production, the power of money as capital, the power of land and sea as factors of production) for the sake of monetary gain.

6.4. An alternative message from outer cyberspace

When human beings communicate with each other, this by no means implies necessarily that they come to an understanding. Rather, humans communicate with each other only within the common-sensical horizon of always already having understood, so that any differences in views that arise are only endless and sometimes subtle differences of configuration within an unquestioned, presupposed world-understanding that is taken to be ‘naturally’ self-evident and unquestionable. The ever-widening possibilities of communication opened up by digital technology lead only all the more to a global levelling into an average understanding of how the world *is* (factually), *including* the never-ending conflicts over matters of fact, that is reflected in and presupposed by media reports and discussion on the factual state of the world. The invariable compass in the bit-torrents of information is common-sense, that is, if orientation is not lost altogether in constant cross-currents of inane chatter and drivel. The as-yet unbroken, holiest taboo of global communication, that excludes precisely through its ‘democratic’ all-inclusiveness, is to address the intellectual pain and harm it inflicts on the mind. Within the bounds of sound common-sense, it is tacitly assumed that truth is a matter of factual correctness, which is then supplemented by differing personal ‘subjective’ ‘values’, ‘belief systems’ or even ‘philosophies’. A deeper-lying telos of the global communication network could then be lurking in the levelling of understanding to a kind a global common-sense and hence in the suppression of any kind of thinking that puts common-sense pragma-

tism and the hegemonic mathematico-scientific truth of the world into question.

The discourses of the media communicate, and must communicate, in terms of people's average understanding and cater to their tastes and what they want to hear. Average understanding is broken down into many different segments, some of which are inconsistent with one another, or downright contradictory, whilst nevertheless co-existing, each catered to by a segment of the media. But underlying them all as the 'natural' foundation of average understanding is the unquestioned, hegemonic mathematico-scientific worldview, if only because it is immensely *effective* in shaping our world on all levels. Furthermore, scientific method consists in a theoretical modelling of 'the facts' which, again, as mathematically souped-up common-sense, appeals to it. Truth is measured by undeniable effectivity and factual correctness measured according to 'objective' scientific method. The esoteric discourse of mathematical physics, especially in connection with deeper questions concerning the cosmos, is unquestionably given credibility in the media because of its experimental basis in 'the facts' (measurable) and the incontestable effectiveness of such discourse in life-shaping phenomena such as cars, aeroplanes, power plants, atomic weapons, etc., etc., whereas the esoteric discourse of philosophical thinking is regarded as speculation in the pejorative sense or as a matter of personal taste and values. Even an apparently critical questioning of science in media discourse is unable to unearth anything like the simple ontological presuppositions of the modern casting of world, because such an unearthing requires a kind of questioning alien to any segment of people's average understanding, including especially the complacent, know-all world-views of the highly educated and scientifically trained in our age. The highest law of media communication is to stay within the bounds of average, common-sense understanding.

An historical world shapes up only in an interplay, strife and conflict between hiddenness and disclosure in which the foundational categories of a world are forged and recast. This is philosophical struggle. Only insofar as we belong to this strifeful interplay can we take cognizance not only of what the case is, or adopt a political stance toward the state of the world and its unending injustices, but also engage in questioning the ontological 'scaffolding'-categories enabling, in the first place and from out of the abyss, the world to be understood *as* a world. Taking cognizance of beings in their respective modes of *being* is our destiny as human *beings*. Mostly we understand beings in their being implicitly, and without such an implicit understanding, we would not understand the world at all. Information as news is one way in which human being takes cognizance of the factual states of affairs in the world and their movements within an implicit, tacit categorial understanding. Taking explicit cognizance is philosophy.

Notes:

1. Jacob Klein *Greek Mathematical Thought and the Origin of Algebra* transl. Eva Brann, Dover Publications, New York 1992, first published by M.I.T. Press, Cambridge Mass., 1968 p. 193.
2. M. Heidegger *Platon: Sophistes* Marburger Vorlesung WS 1924/25 *Gesamtausgabe Band 19* ed. Ingeborg Schüßler 1992 S. 225 = GA19:225; italic emphases by Heidegger himself. References to M. Heidegger *Sein und Zeit* (Being and Time) Niemeyer, Tübingen 1984 are given in the form SZ:151.
3. Hans-Georg Gadamer *Wahrheit und Methode* Tübingen 1975, 4. Aufl. S. 450, 451.
4. Jacob Klein *op. cit.*
5. R. Descartes *Regulae ad Directionem Ingenii* Philosophische Schriften Meiner, Hamburg, 1996.
6. Cf. the article "space-time." *Encyclopaedia Britannica 2008 Ultimate Reference Suite* Chicago: Encyclopaedia Britannica, 2008.
7. Cf. the article by Gary William Gibbons, "relativistic mechanics" *Encyclopaedia Britannica 2008 Ultimate Reference Suite*. Chicago: Encyclopaedia Britannica, 2008.
8. Cf. on this entire section M. Heidegger *Grundbegriffe der aristotelischen Philosophie* Marburger Vorlesung SS 1924 *Gesamtausgabe Band 18*, ed. Mark Michalski 2002 § 26. Bewegung als ἐντελέχεια τοῦ δυνάμει ὄντος (Phys. G 1) et seq. Cf. also M. Heidegger 'Zeit und Sein' in *Zur Sache des Denkens* Niemeyer, Tübingen 11969 21976 SD:1-25.
9. Traditional commentators on Aristotle have not made the connection, or rather misconnection, between the ontological concepts Aristotle develops in order to grasp the phenomenon of movement and his investigation of time. Not even Heidegger, in his thorough-going interpretations of the *Physics* on movement and time in *Gesamtausgabe Band 18* and *Band 24 (Die Grundprobleme der Phänomenologie)* Marburger Vorlesung SS 1927 ed. F-W. v. Herrmann 1975 § 19 a) b) Auslegung des Aristotelischen Zeitbegriffs GA24:336ff), makes the link between the triad of concepts fashioned to capture movement and the triad of temporal dimensions into which time stretches.
10. In his detailed interpretation of Aristotle's ontology of time in GA24, Heidegger himself does not question the quantitative nature of Aristotelean time.
11. Cf. G.W.F. Hegel *Enzyklopädie I §99 Werke* Bd. 8 Suhrkamp, Frankfurt/M. 1970.
12. Cf. Heidegger GA 19:276, 274, 391.
13. Cf. M. Eldred *Critique of Competitive Freedom and the Bourgeois-Democratic State: Outline of a Form-Analytic Extension of Marx's Uncompleted System* with an Appendix *A Value-Form Analytic Reconstruction of 'Capital'* co-authored with M. Hanlon, L. Kleiber & M. Roth, Kurasje, Copenhagen 1984 and *Capital and Technology: Marx and Heidegger*, available at <http://www.artefact.org/capiteen.html> and on paper in *Left Curve* No. 24, May 2000 (also in German and Chinese). Cf. also, more recently, M. Eldred *Social Ontology: Recasting Political Philosophy Through a Phenomenology of Wboness* ontos verlag, Frankfurt/M. 2008 xiv+688 pp.. esp. Chaps. 4 v), 5 iv), 9 vi)
14. G.W.F. Hegel *Werke* Frankfurt/M. 1970 Bd. 18:39, Bd. 8:85, 8: 79.
15. Cf. M. Eldred 2000 *op. cit.* and M. Eldred 2008 *op. cit.* Chapter 9 vi) for more details.
16. Cf. e.g. 'Das Ge-Stell' in *Gesamtausgabe Band 79 Einblicke in das was ist*.
17. M. Heidegger *Nietzsche II* Neske, Pfullingen 1961 S. 378.
18. Cf. my *Social Ontology 2008 op. cit.* Chap. 5 vi) Exchange as core phenomenon of social intercourse: Interchange and interplay.