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## Difference Between Algorithmic Processing and the Process of Lifeworld (Lebenswelt)

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# Difference between algorithmic processing and the process of Lifeworld (Lebenswelt)

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## Abstract

The following article compares the temporality of the life-world with the digital processing. The temporality of the life-world is determined to be stretched and spontaneous. The temporality of the digital is given by discrete step-by-step points of time. Most ethical issues can be traced back to a mismatch of these two ways of processing. This creates a foundation for the ethics of the digital processing. Methodologically, phenomenological considerations are merged with media-philosophical considerations in the article.

*Keywords: processing of human-computer interaction, process philosophical perspective, pragmatism, social philosophy, phenomenology*

Processes are the fundamental aspects in our daily life-world. They are part of our bodily movements. Thoughts and perceptions can be better described through processes and language in the form of a speech or an act of writing represents a process. All these processes of our cultural self-understanding are subject to different kinds of changes. These changes can be different. One way of change is given by the innate and pure social upheavals of society (Mead, 1938). Another way of changing is the modification of our behavior due to technical innovations (Montag, 2018). Ultimately, these two ways of changes are increasingly interconnected. A technical renewal is the digitization of our society, which is given by the increasing networking since the 1980s. In the following article I will compare the different kinds of processes: the pure social and bodily process of our daily routine and the process of digitized environment. With this juxtaposition, I do not want to claim that there is a strict separation between a normal life-world and a digitized world. In fact, it would be utterly misleading to claim that our current life-world is separate from a digital world. Nevertheless, on a fundamental ontological level there is a strict distinction between the digital processes and the other non-digital interaction patterns. This strict distinction is the source of most of the ethical issues associated with digitization. That leads me to my general thesis: Most ethical problems concerning digitization are rooted in change of different kind of process (process of life-world vs. digitized process algorithm and database).

Given this thesis my article seeks to lay the groundwork for the most ethical problem of modern society, as far as they are concerned with digitization. In doing so, I will concentrate on the progressive and existing types of digitization. First of all, these are (1) digitization in the literal sense, (2) datafication, (3) communication and (4) networking. A lot of discussion is heavily influenced by science fiction, such as fully autonomous cars or humanoid robots. Consequently, starting an ethical consideration

should start at the points, events, places that are real. Since most technical projects, such as humanoid robots and fully autonomous cars, are still research, I will concentrate on the mentioned areas of digitization (1-4).

## History of acceleration

With the beginning of modernity in the 18th century in human history, there are two crucial events that have led to an acceleration – or let's say change – of human-environment or human-human interaction. The first event is given by the whole process of industrialization which starts with machines and the steam engine and ends with the development of the assembly line. Certainly these are the main events, which are additionally accompanied by urbanization, electrification and an increased mobilization of our society. Looking at the change in the early 1990s human society has received an immense acceleration of its ways of acting and communicating. Therefore, the second phase is given by the computer technology and the Internet. Of course, before the development of the Internet, there was a preform of a networked society (Standage, 1998). But this preform was not accessible to all and was not given by an omnipresence, which is ensured by the mobile technology. For all further considerations, it must be taken into account that this second phase of digitization has not finished.

Therefore, I would like to start with a motivation, why it is also necessary to look at processes. This consideration consist of some examples, which, on the one hand, we can experience in our daily routine and has already changed our normal interaction with other humans, with our environment and with technical devices. On the other hand, I would like to look at a few examples concerning the upheavals of society as a whole.

### *Examples of an accelerated Life-World*

Firstly, Communication of small/medium-sized business and big companies (concerns) has speed up because of an increasing number of email transmission of every kind: customer questions, tickets for traveling or entertainment, organization with public institutions and so on. To give an idea of the change, some numbers are mentioned the rising amount of emails. The numbers are for Germany: in the year 2000, we have 32,2 Billion emails, in 2005 131,9 Billion, in 2010 317,6 Billion, in 2015 544,2 Billion, and in the last year 2018 848,1 Billion (Statista, 2019). It is an exponential growing of the amount of transmitted emails. The common communication like text messaging like SMS, WhatsApp etc. are not yet counted. It is self-evident that this last way of communicating is even more accelerating on our ways of life.

Secondly, the same as for ordinary email is true for social media: in all social communication, we have an increasing amount of connection to fellow human beings, friends, colleagues and family members. This way of communication does not only take place on personal computers, but is being carried out by *mobile phone* devices in public space. We can find a reduction in attention for the real environment, but an acceleration of text messaging in public communication. This way of communication is accompanied by a constant focus on the mobile phone. You can see them everywhere, *smobies* lost in their smartphones. In some cities like Amsterdam or Cologne the public traffic

administration has reacted to this new kind of behavior: They have built traffic lights in the ground at the pedestrian. It protects these unwary people not been killed from cars, because the gaze is directed downwards when operating the phone. This example shows that we have also in certain sense a slowing down of time consciousness, because the activity or arousal for the real environment is reduced. Nevertheless, we can find an accelerated way of communication due to digitized networking.

In the field of health through digital introspection, changes in health can be registered faster independently and individually. Speeding up a stimulus-response-mechanism between agents and their bodies is instanced and partly tracked by the healthcare industry: self-monitoring of health but also robots database (deep medicine) can speed up diagnosis of illness or bodily analysis. These kinds of analysis of health process are mainly given by digitized monitoring. It results in an accelerated body understanding, which can give you a permanent data feedback.

The fourth example deals with communication itself: We can find a language or linguistic change. On the one hand autocomplete or word completion speeds up human-computer interaction. Sometimes this can be really helpful, but it also changes the way how we speak and how we read. There are research about a reduced capability of reading and understanding complex text, which is associated with the fact, that text messages are more and more incomplete. Furthermore, text messaging consists of smaller pieces of text, so that smaller pieces are sent and read. Consequently, digitized messaging has an influence of the language as a process. Furthermore, there a power policy problem can be found: all text and word assistance are mainly in private hand of huge firms, like google. There is a shift of power regarding language.

Fifth example looks at social philosophical aspects of society as a whole process: With the digitization and mainly because of networking we have an immense change of the world of work: We find an increase in low paid jobs, where people have no contact at all with the manufacturing process of the products. Typically, deliveryman and -woman, Warehouse and logistics workers are completely taken out of the value chain of the manufacturing. It is true that this can not entirely trace back to the process of digitization. But the increased networking and the increased consumerism favor this development.

The sixth example looks at trading. Since the late 1980s beside normal trading, high frequency trading becomes more important at finance markets. The trading is done by computer programs in a range of milliseconds below the threshold of consciousness for human decision making. Normal human trades have no chance. There is a huge discussion, whether high frequency trading really helps to improve trading at all. Nevertheless, some financial crashes are produced by high frequency trading; for example a brief but dramatic stock market crash of May 6, 2010 was caused by high-frequency trading. The Dow Jones Industrial Average plunged to its largest intraday point loss, but not percentage loss, in history, only to recover much of those losses within minutes. Here we can see that with new digitized technology another type of dynamical risk occurs, which can influence or attack our normal life-world.

The seventh example reflects the increase in consumerism, which is responsible for all the negative effects on the environment and nature. In the 21st century's globalized economy, consumerism has become a noticeable part of our western culture. That is because of an incredible network and an immense data base in all sectors of

economics. Digitization helps to increase trading and in a certain sense welfare, but it also does not really help to reduce rubbish or CO2 reduction, since we start to buy stuff that we do not need to impress people we mostly not like. Here we find a really important ethical conflict which can best describe by change of processes. This last example also shows the connection between the transformation of digital processing (accelerated consumption due to digital cyberculture) and our behavior in society (increased consumption behavior). In all likelihood, most of the associated environmental and climate problems can only be resolved if we return to local and decentralized production and trade, which also takes into account the seasonal conditions. But this reversal would mean that we would have to negate and discard our self-evident way of digital consumerism.

#### *A process-philosophical foundation for ethical problems of digitization*

All of these leads me to my general thesis: Most ethical problems concerning digitization are rooted in change of different kind of process (process of life-world vs. digitized process algorithm and database)

## **Overview in process-philosophical thinking**

In this second part of my article I will give a short overview in process philosophical thinking. This overview provides a brief historical description of the main stage. It is selective and does not claim to be complete. However, what should be newly developed is the perspective on the processes of digital and technical devices. For the most part, it is only applied to cognitive or mental processes, perception, emotions or entactivistic models (human-environment or human-human interaction). Essentially, I would like to establish a connection between process-philosophical explanations of our way of being (Rescher, 2000) and a media-philosophical interpretation of our technical and digital devices (Simondon, 2012; Stiegler, 2018; Kittler, 1985; Winkler, 2015). Again, this can only be formulated as a rough idea and forms an aspect that is in the background of the main thesis formulated above.

#### *Some historical remarks on process philosophy – Greek philosophy*

In general, we can say that process philosophically thinking starts with the following idea or better say fundamental observation: instead of reducing reality to a permanent substance all reality is grounded as changes, variations, alterations, modifications, transformations: or to say it in one word: all is explainable by processes. This paradigm goes back to famous and well-known creek philosophically statements of time. It is from Heraclitus's concept of πάντα ῥεῖ:

All entities move and nothing remains still (Plato, 1998, p. 401d)

Everything changes and nothing remains still ... and ... you cannot step twice into the same stream (Plato, 1998, p. 402a)

You can find these quotations in Plato's *Cratylus*. Plato himself can not be seen as a full process philosopher, because he believes more in unchangeable ideas. The same is true for Aristotle, but we can find in the fourth book of his *Physics* (Φυσικὴ ἀκρόασις, *Phusike akroasis*) some analysis of time and change which is close to a concept of process and already gives us some problems. Two problems have to be highlighted here. First, processes always have something to do with the temporality of something. Second, time itself has something to do with changeability, and generally, a distinction is made between subjective time and objective time. Aristotle himself addresses these issues and notes the following inconsistency between time, movement and change. On the one hand we can read, that change and movement is not identical with time. Aristotle writes:

Again, ... change is always faster or slower, whereas time is not: for 'fast' and 'slow' are defined by time — 'fast' is what moves much in a short time, 'slow' what moves little in a long time; but time is not defined by time, by being either a certain amount or a certain kind of it. (Aristotle, 1987, p. 218b12- 219a3)

On the other hand, time needs something that change. Aristotle says:

But neither does time exist without change; for when the state of our own minds does not change at all, or we have not noticed its changing, we do not realize that time has elapsed, [...] (Aristotle, 1987, p. 218b12- 219a3)

The problem consists of the fact that change can not reduce to time, but it has something to do with time. In the following we have to keep this paradox in the background: There is an implicit connection between change and time, but it can not be used as an explicit definition of one for the other. To return to the common distinction between objective and subjective time, we will see that the very temporality of the digital has an influence on subjective temporality.

### *Some historical remarks on Process Philosophy – The Development since the Enlightenment*

It is clear that even in the Middle Ages a whole series of thinkers dealt with processes and temporality. Augustine's *Confessiones* in particular, with the ninth and eleventh books, represent an important contribution to temporality and memory (Augustine, 2013). But much of the results of the medieval ways of thinking remains in the protection and foundation of the essence of God. No independent reflections on the concepts of the process and temporality itself are made. Since the enlightenment we have some important philosophers and thinkers that all have a concept of processes which is a key term in their theories. Only in the Enlightenment, processing is worked out as an independent topos and operationally integrated into the thinking of philosophy.

With his theory of monades Leibniz develops a concept of a bunch of processes that define all substances (Leibniz, 1996). This concept results in the so called preestablished harmony of all entities. Clearly we can find in his works an understanding of dynamics, mutability and changeableness of all being, which is given by constantly unfolding potentialities. Schelling wrote a biophysical article, where he tries to establish a physical

foundation of all organism which goes back to the processes of life of organism: *Allgemeine Deduction des dynamischen Processes oder der Kategorien der Physik*, (Schelling, 1800). This article includes a recollection of the processes as a basic way to put categories in biology or biophysics.

In his book *The Birth of Tragedy from the Spirit of Music*, Nietzsche develops a concept of affirming the of passing by (*Bejahung des Vergehens*). This concept goes back to the fact that there is a *will to live* that is governed by a drive or better say impetus. Nietzsche also brings this idea to Bergson's *élan vital* (Bergson, 1907), which is often misunderstood as a force. Rather, both concepts aim at the constant re-creation of the living in every situation. Repetitions are not excluded, but both insist on a constant becoming of all situations as a creative and individual moment. We will see that this *concept of becoming* can not be reconciled with digital manipulation and processing.

Alfred North Whiteheads *Process and Reality* is seen as the first book which concentrate all central ideas of process philosophically thinking (Whitehead, 1929). It is cosmological approach: The whole nature is a process in total. It can be shown that Whitehead was inspired by Bergson's ideas, but he certainly expands the idea of the process by considering the inorganic world. In addition, he also takes into account the communication and use of symbols. As a result, he also looks at historical and communicative processes and thus expands the considerations of a philosophy of processes. Overall, Whitehead takes into account the cultural processes and also links them to the natural processes.

In modern philosophy the US-American philosopher Nicolas Rescher starts the philosophical movement. He published introduction into this way of philosophical thinking. Going back to Rescher, we can first give an etymological examination of the term process. Etymologically, the word process goes back to the Latin term: *procedere*. It means as much as "go forward", "a development", "progress", "trend" or "course of something", which takes time. Rather than tease other important philosophers of the processes, I would rather like to give a summary quote from Rescher's book *Process Philosophy – A Survey of Basic Issues*:

A process is an actual or possible occurrence that consists of an integrated series of connected development unfolding in programmatic coordination: an orchestrated series of occurrences that are systematically linked to one another either causally or functionally. Such a process need not necessarily be change in an individual thing or object but can simply relate to some aspect of the general "condition of things" – for example, a change in the temperature or in the purchasing power of money. (Rescher, 2000, p. 22)

In general, we can say that the classical Latin expression *operari sequitur esse* is reverse: the new paradigm of process-philosophical thinking is *esse sequitur operari* (Rescher, 2000, p. 10). As mentioned above, more thinkers could certainly be counted, but Rescher's work should not be repeated here. It is important to me to reproduce some concepts only in keywords and at the same time to add some philosophers who can not be found in Rescher's work. In addition, in the course of further consideration, I dwell on thinkers who can better complement the idea, that is developed in this article.

## The Life-World

Philosophical Definition of Life-World is given by Edmund Husserl and, in a nutshell, the life-world goes back to the everyday non-scientific perspective of our environment and surrounding. A strict distinction between a world of mere objects and a subjective mode of perception is rejected by Husserl. Rather, the life-world already exists in an *a priori* understanding of the correlative relationship between the objects and the modes of perception. This understanding is not only sociological but always historically grown. In the anthology *Husserliana XXXIX Die Lebenswelt* Husserl combines historical descriptions with everyday situated explanations. This exposition of meaning (Freilegung des Sinns) is provided by the phenomenological method. The general concept of life-world can be found in his famous later work: *The Crisis of European Sciences and Transcendental Phenomenology: An Introduction to Phenomenological Philosophy*. Husserl starts with a general critique of the so called sciences of facts (*Tatsachenwissenschaften*) do not look at the foundation of everyday life-world:

In unserer Lebensnot – so hören wir – hat diese Wissenschaft uns nichts zu sagen. Gerade die Fragen schließt sie prinzipiell aus, die für den in unseren unseligen Zeiten den schicksalsvollsten Umwälzungen preisgegebenen Menschen die brennenden sind: die Fragen nach Sinn oder Sinnlosigkeit dieses ganzen menschlichen Daseins.

In our misery of life – we hear – this science has nothing to say to us. It is precisely these questions which exclude them in principle, which are the burning ones for the people who in the most unfortunate of times have given themselves up to the most fateful upheavals: questions about the meaning or meaninglessness of this whole human existence.  
(Husserl IV, p. 4)

The life-world can be described as a normal style of looking at the world, which, first of all, is experience with the living body (*Leib, Leiblichkeit*). The living body creates an own system of corporeality and habitual activity, which represent a system of kinaesthetics (Husserl IV, p. 107-109, Husserl XXXIX, p. 47-52). Of course, this system of kinaesthetic movements is culturally shaped and determined. There is also a gradual change in the patterns of movement, which is precisely what happens in an interactionist sense through the use of technology. New technical innovations require new interaction patterns. New technical innovations require new patterns of interaction and this changes temporal structures of the life-world.

The second important aspect of life-world is the following one: the life-world is determined by life with others (Miteinander-leben) or better say living with the others: the others are active in the passive possession of the surrounding world, life-world in this respect is always situated and culturally framed (HuaVI, p. 110, HuaXXXIX, p. 145-170). A deeper and detailed analysis of the social aspect of living with can be found in Alfred Schütz's writings. He gives us a social-phenomenological approach which takes



into account that the life-world has a changeable but persistent background as dynamic horizon, in which we live and that live with us.

*Other thinkers of the life-world and the parallels to pragmatism*

Maurice Merleau-Ponty establish a body schematic foundation of being in the world, the living body is in its own relation part of the ordinary and everyday life-world, all objects are constituted by the interaction of the body. In this sense there is a body schematic (schéma corporel) foundation of the world, which is primordial. It goes back to proprioception. This is important because it defines the process of the individual behavior absolute in contact with world. It denies the classical distinction between body and world:

Notre but constant est de mettre en évidence la fonction primordiale par laquelle nous faisons exister pour nous, nous assumons l'espace, l'objet ou l'instrument, et de décrire le corps comme le lieu de cette appropriation. Or tant que nous adresses à l'espace ou à la chose perçue, il n'était pas facile de redécouvrir le rapport du sujet incarné et de son monde, parce qu'il se transforme de lui-même dans le pur commerce du sujet épistémologique et de l'objet. En effet, le monde naturel se donne comme existant en soi au delà de son existence pour moi, [...]  
(Merleau-Ponty, 1945, p. 180)

Our constant aim is to elucidate the primary function whereby we bring into existence, for ourselves, or take a hold upon, space, the object or the instrument, and to describe the body as the place where this appropriation occurs. Now so long as we considered space or the things perceived, it was not easy to rediscover the relationship between the embodied subject and its world, because it is transformed by its own activity into the intercourse between the epistemological subject and the object. Indeed the natural world presents itself as existing in itself over and above its existence for me; [...]  
(Merleau-Ponty, 1958, p. 178)

Obviously there are parallels to American pragmatism. Even pragmatists like Dewey and Mead anchor the processing in their ways of thinking. As good example the pragmatist and social-philosopher Mead has similar ideas. In the book *Mind, Self and Society* we can find a broader analysis of social human interactions. In particular, the development of the self is subject to the relational interaction mechanisms between the ego and the environment. The environment is not something static given, but is constantly renewed and modified by the interactions. In Mead's remarks, the environment is given primarily by the other people in the form of society. Their behaviors primarily determine the behavior of the individual. Nonetheless, Mead generally applies his ideas to nonspecific organisms, thereby formulating a broader thesis:

The organism, then, is in a sense responsible for its environment. And since organism and environment determine each other and are mutually dependent for

their existence, it follows that the life-process, to be adequately understood, must be considered in terms of their interrelations. (Mead, 2015, p. 130)

Mind arises in the social process only when that process as whole enters into, or is present in, experience of any one the given individuals involved in that process (Mead, 2015, p. 134)

In detail, Mead tries to communicate all aspects of human human or human environment relations in terms of processes. In a closer look at the communication, the significant symbols play a prominent role. Ultimately, they represent the mediation between people and can occur in a speech act, in writing or as a mere gesture and facial expressions. The language itself is also subject to a process that itself is subject to change. According to Mead, this change is initiated by the ego in the interplay with Me. The distinction between I and Me is only a conceptual distinction. On the one hand, the I sets the impulses and behaving creatively towards the attitudes and gestures of others. On the other hand, this is due to the attitudes, postures and gestures of society that have sedimented in the individual, what Mead calls the Me. Therefore, in Mead's reflections, one can recognize a network of processes that condition and produce each other. But they also run quite parallel and at the same time. By a close reading of his ideas we can summarize three import aspects, which takes the symbolic interaction as a process into account:

- 1) Symbolic interaction but also bodily interactions are given by human body as an integrated and situated organism. The interrelation defines all objects.
- 2) Since symbolic and bodily interactions are always processes all objects of the life-world are given in terms of processes.
- 3) Consciousness is constituted by the change of society.

#### *The Time Structure of the Life-world*

When we talk about life-world as a process of human – and it does not matter which area we address here: perception, bodily interactions with human or devices or symbolic interactions – we must consider time and in a certain sense time consciousness. All process of human interaction but also all sensory perception are not given by isolated points of time. All is given by *Gestalt* structures. We already have modes of formation that are organismic. Thus, the world is always conveyed through shapes and symbols anchored in our organic structure. But these structures have their own way of unfolding and establishing an organismic time. For perception, there are a number of examples that illustrate the difference to a purely physical time. By physical time we mean a pure meaningless sequence of now points (*Jetztpunkte*), which does not provide an inner structure and connection among these now points. Take for example hearing a melody, but it also works for hearing a talk: To understand the melody requires more than the mere sequence of disjointed sounds as nowpoints. In his phenomenology of inner time consciousness Husserl offers a doctrine of protention, retention and pro-impression or origin impression (*Urimpression*), which must be

accepted as conditions for the accomplishment of consciousness (Husserl, 1969, 2000). At the same time, protention and retention are a mere directionality of the consciousness, which anticipates or arrests modified or passed contents of consciousness in a modified way. In the narrower sense, the protention and retention lack the so-called *correlation-a-priori* (*Korrelations-a-priori*). The correlation a-priori consists in the double relatedness of *noema* and *noesis*. Normally, for every content of consciousness (noema), there is a structuring mode with regard to the manner of appearance and process-like unfolding (noesis). Since the intention of retention and retention is mere directionality, they lack the noema. In other words, retention and protention are part of the noetic structuring of consciousness. Shaun Gallagher has expanded these considerations with regard to physical considerations, and the body also has a protention and retention double structure in terms of body movements (Gallagher, 2006, p. 189-200):

- a) protentional → anticipatory force of sensomotor behavior
- b) retentional → continuous keeping of sensomotor behavior

We can thus formulate an important intermediate result: Time consciousness is always extended and is given by protentional and retentional structure of consciousness (Husserl) or the biological time of life in the form of duration or *durée* (Bergson, 1889) is a particular mode of temporalizing. We have to separate this way of temporal structuring from technical time structuring.

Husserl (Husserl, 1969, 2000) gives us a diagram of time consciousness (Figure 1) which describe the fact that in every now point we also have a retentional intentionality which is different from the ordinary remembrance or memory. The horizontal line represent the objective time line (AP) of now points and in vertical line we draw down a line which represent the retentional consciousness of passed point of time. For each nowpoint (E), therefore, there is a retention directionality (A', P', and A'P') that belongs to it.

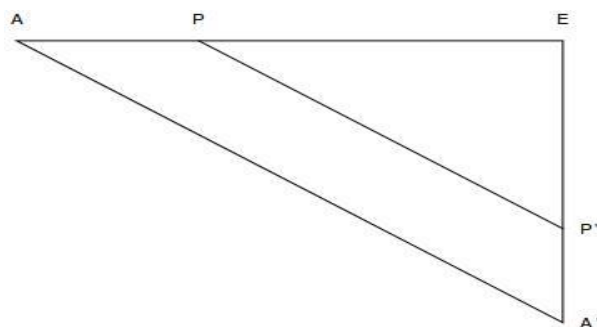


Figure 1

I would like to summarize the key messages of this section. Human time consciousness is an anticipatory power which is not just an image or likelihood, it is also felt according to the flow of Gestalt structures. This concept is also applied to bodily movement and interaction with technical devices or computer. Gallagher extends Husserl's ideas to all

kinds of everyday and kinesthetic movements. In addition, Mead develops a concept of social processes that are characterized by the use of significant symbols. Using these symbols is itself a process. The way the symbols are given to us is subject to a long-term change that has a historical and technical side. This long-term change can be identified with the cultural and civilizing development of our western society. This is itself an unstoppable process.

## Algorithms and Digitization

In the following section I would like to turn to the processing of the digitally given world. These are based on algorithms, as far as the computers are considered from a slightly higher level than the mere current flows in the processors and power lines of a computer. As we can show, there are also a whole series of interlocking processes in the field of the digital, but their nature is decidedly different from the above-described processes of organism and the living language of human beings. The whole area, which is developed here, must be assigned to a media-philosophical perspective. An ethic of the digital and the technique must turn to this area of philosophy in order to create a basis for ethics. If this is not done, ethics usually remains speculative and simply does not take into account the real possibilities which technology and, in the narrower sense, digital technology can implement.

### *Algorithms - A brief Overview*

Consequently, I would like to go further to find a general description of digital processing and algorithms are the basis of doing the digital and processing the digital, respectively.

In introduction books for computer science and algorithm we find: An algorithm is a self-contained step-by-step set of operations to be performed, this step-by-step definition is only related to an objective time flow and in general is determined by monocausality "if that then do that", and all steps are isolated from each other. Normally this is true for all kinds of programming language, it doesn't matter if you use higher language or assembler, in a certain sense it is also a result of semiconductor electronic and the whole p- and n-type dopants. If one actually goes back to the lowest levels of computer technology, that is, the current flows and the electrical engineering of semiconductor electronics, processing depends to a great extent on the technology of the hardware. However, this is itself given by a step-by-step at the level of "power on" and "power off". Of course, this must take into account the property of semiconductor electronics, which made the digital revolution possible. The special feature of semiconductor electronics consists in the fact that small electrical currents can control large currents.

To get back to the algorithms that work on the higher technical levels, I would like to give an illustrative example. It is a typical task for undergraduate students: Finding the largest number in a list of numbers:  $a_1, a_2, \dots, a_n$ . Algorithm are best described by sets of standard for flowcharts, which are defined by a so-called standard, i.e. ISO 5807 (Figure 2).

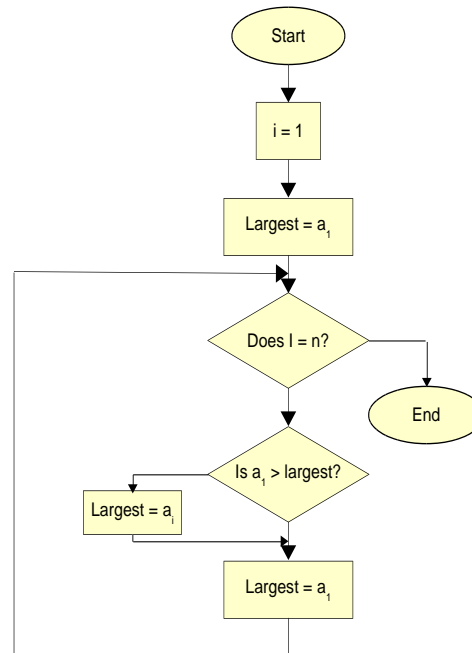


Figure 2

What can already be recognized by this simple example is the nature of digital processing. All steps are distinct and in the flow of execution there is no creative continuous influence of the individual steps among each other. The only influence is given by the regulation at the single steps itself. In media studies or media philosophy processes are one of three basic media functions. The three media features are the following (Winkler, 2015, p. 9):

- 1.) transmission (of analog/digitized information (Claude Shannon))
- 2.) saving/storing/recording
- 3.) processing

These three specific media functions go back to Friedrich Kittler (Kittler, 1985) and certainly have their own historical development. In addition, these three media functions represent a conceptual distinction. There are smooth transitions between them. Considering the processing of the computer or the digital, this processing is obviously determined by the computer and its architecture (soft- and hardware). Ultimately, this happens through a spatial-temporal shift of characters, which are brought into a new form of presentation. Winkler writes:

Computer prozessieren, indem sie Zeichen räumlich-zeitlich verschieben; [...]  
 Computer processes by moving characters spatial-temporally; [...]  
 (one translation, Winkler 2000, p. 13)

It is also about the generation of new information, which is not regulated *ad hoc* by a spontaneity of the technical but by a determination of the operation. All random number

generators, too, are based on mathematical formulas, which in the last analysis is based on the operation of fixed number spaces. A truly creative performance that goes beyond this framework is not expected in digital processing. In addition, a whole range of other candidates for processing the digital can also be used. Certainly, operating, generating, and using information generally go along with it. In terms of media philosophy, the concept of form plays a central role in outlining the concept of processing the digital. Therefore, with reference to Sybille Krämer (Krämer, 1989), Winkler highlights the transformation and transition of forms as a central moment of processing: *Processing is mostly technical change from one form to another* (Winkler, 2015, p. 22). This is also true for the pure current in all computer devices. For example, the form of storage by the technique of hysteresis is a mode of change of form. The technique of hysteresis is a fundamental way of storage. One can thus generate different states with memory, which are commonly referred to as zero and one or on and off. This is one of the sources of digital processing.

As I mentioned earlier, the origin of this definition of processing in media theory goes back to Krämer's theory of the operational (Krämer, 1989). Scripture and textualization of computer programs are technically independent and ultimately operate as a *techné*. This *techné* is nothing more than a bundling of practices, which addresses an aspect of the performative. (Winkler, 2015, p. 25; Krämer, 1989, p. 4; Hernes, 2014). Apart from the difference described above, there remains a general problem in processing the digital as in processing the organism. Here we come back to Aristotelian problem of identity and change: during processes something change and something persists. Inevitably, this leads to another conceptual distinction, which is discussed in the following section: Close and wide concept of processing.

### *Close and wide concept of processing*

In order to meet the Aristotelian problem of simultaneous change and persistence, case distinctions can be made. On the one hand, these case distinctions affect the levels that can actually be identified on a computer as an overall process. On the other hand, one should always also see *the computer's causa finalis* as a cultural object: In most cases, we use the computer to effect a secular, especially non-digital, purpose of the world around us. This leads to a media theoretically distinction between close and wide concept of processing. The close concept tracks the actual chain of each distinguishable level. These chains can themselves be represented in flow diagrams. At each level there are interfaces to a higher level and between these interfaces there is even a hard shift of the respective underlying forms of presentation:

#### 1. Close concept of processing:

digital intervention at different levels

1.1 electrical current → 1.2 processor → 1.3 bus system → 1.4 primary memory,  
1.5 operating system → 1.6 programming language (assembler or higher) → ... →  
1.X display representation → user

In this very simple example we find between each number the respective hard shifts of one formal representation to another. Nonetheless, these hard shifts are monocausal and define a clear distinction in the process of processing the digital. In this respect, the

differences to organismic processing become clear. The organism loses this way of distinct and monocausal temporalizing. In fact, it can be seen from the OSI model that in information technology, computer science and electrical engineering, this structuring of a narrow concept of processing is given. The Open System Interconnection model (OSI model) is multimodal and can be applied to completely different areas of computer technology, network technology and wireless technology, as it is initially only an abstract and nonspecific description of how layers and interfaces interact at all (Ernst, 2016, p. 263-300). The following table gives an overview of the 7 levels, which must be taken into account.

layer	Example	OSI-Modell
layer 7	Selection of information	Application Layer
layer 6	Reading, speaking, writing → encoding	Presentation Layer
layer 5	Support Identification	Session Layer
layer 4	datagram	Transport Layer
layer 3	Addressing, routing, traffic control	Network Layer
layer 2	Address space/family protocols	Data Link Layer
layer 1	Transmission/reception bit stream	Physical Layer

As already mentioned, the broad concept of processing must take into account a purpose that has an indication of something life-like. This broad concept implies, that media-philosophically at least one medium remains untouched during processing. A typical example is writing a message. In terms of our existing network culture, the message between transmitter and receiver remains unaffected. Classic models of information can be applied.

2. wide concept of processing:

In at least one respect Media remains unaffected:

Example sending an email: Sending is a process but with respect to the content the mail should be the same for transmitter and receiver.

Clearly, these examples show that there is a conceptual distinction. Ultimately, there are perspectives that are designed for the overall process. By all means, the example of sending an email can also be analyzed in terms of a close concept of processing. If one does this, then in this perspective the cultural aspect is lost. Sending the email is not considered a social media practice. In general there are process chains of these

different digital processes. Consequently, all processes can be connected and depend on each other, but they do not have to be.

## Interactions – Processes Life-World and digitized World

In the last section I would like to merge the two developed thoughts. On the one hand, we have a life-world, which is given in terms of its temporalization by spontaneity and a stretched time consciousness. The latter can best be explained by Husserl's doctrine of protention and retention. In the last section I would like to merge the two developed thoughts. On the one hand, we have a life-world, which is given in terms of its temporalizing by spontaneity and a stretched time consciousness. The latter can best be explained by Husserl's doctrine of retention and retention. Here there need not be monocausal connections between stages of time phases, but we can speak of an anticipatory power of consciousness. This anticipatory power can not be fully achieved through probabilities or neural networks. In terms of media philosophy, on the other hand, there is a world of the digital, interspersed with algorithms. Their timing is given by distinct step-by-step situations. There are monocausal structures with regard to temporal developments. These monocausal structures can be found on all levels down to the last level, the interaction between humans and computers. At least at this last point, but certainly also before, arise mismatches between the time of the life-world and the time of the digital world. Interestingly enough, life-time periods are needed to remedy these mismatches. At least at this last point, but certainly also before, arise mismatches between the time of the life-world and the time of the digital world. Interestingly enough, life-time periods are needed to remedy these mismatches. These life-world time periods of remedy can be very short but also very long. To clarify this, I would like to give a few examples. According to the concern of the article, I use examples to cover the areas, mentioned above, that already determine our daily life in dealing with the digital. To put it briefly, I refer to the following areas: (1) digitization in the literal sense, (2) datafication, (3) communication and (4) networking. In overview, the examples are given in the following table:

Life-World	Digitized world	Problems in Interaction
- communication is enriched with affects, emotion and non-designativ elements (e.g. intonation, some micro gestures)	- all levels (from electrical layer (hardware), host layers, media layers) → only clear designation and clear semantic	idiomatic, metaphorical and emotional understanding for AI is usually not possible → partial communicative dissonance
- human-environment interaction is always flexible within the flow of interaction → anticipatory and felt, manly without representation, ethically enriched, → for most	- computer-environment interaction strongly depend on algorithm, data base based = a representation is needed, inflexible since data and relations are given: computer are fast	→ huge problems can arise in computer-dependent decisions: high-frequency trading → decisions are made in milliseconds → problems are made in human life-world



interaction: humans a slow

- human have consciousness /awareness of Gestalt in the flow of experience →anticipatory ability for hole scene, all of this is culturally framed	- only algorithm: step-by- step: (even neuronal network) → ability of finding patterns of basal contour → no ability for the whole scene	→ conflict human-computer interaction: if the situated cognition is important for whole process of understanding: mismatch between computer and humans
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As you can see from the examples, most of the digital handling problems that arise in our network culture can be traced back to the temporal mismatches. It's because of the time-digital inhibitions that we can not track our intended flow from the human side. In addition, the process-philosophical approach shows the possibility of describing a multitude of examples.

## Conclusion and Outlook

I would like to summarize the core ideas of the article. Human behavioral processes are increasingly determined by digital timing. This goes from simple examples, such as preselection of words by text messaging, to areas of high frequency trading. Time horizons of human consciousness is mostly Gestalt oriented and is always more than a monocausal meaning structure. Fundamentally, this is given in time experience and can not be simulated by computer programs since they are typically based on a step-by-step algorithm which only reflect an objective and physical time structure. Conflicts result from a mismatch between these types of time horizons. These conflicts in the various temporalizations are the source of most ethical issues. Therefore, a process-philosophical perspective provides a foundation for ethical problems of digitization. Certainly, an open problem is given by the different time dimensions: long-term phenomena and short-term phenomena. How should one capture the transformations of the long-term phenomena by means of short-term phenomena? Ultimately, this goes back to Mead's entire problematic: How to describe the change of the whole society? In essence, Mead's thoughts need to be broadened by considerations of digital processing.

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