

From Metaphor to Hypertext: an Interplay of Organic and Mechanical Metaphorics in the Context of New Media Discovering

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Abstract. Hypertextual linking of information is one of the basic principles of digital media. We suppose this principle to be discovered in metaphorical thinking with the help of the so-called absolute metaphors. We derive the notion of an absolute metaphor from Hans Blumenberg's metaphorology, and we interpret metaphors according to Max Black's interaction theory. Our aim is to interpret these absolute metaphors as being open to new implications, just as they are open to a pragmatically determined dialectical interaction of organic and mechanical metaphors. We follow the direction of interactions within these metaphors in a philosophical attempt to explain the nature of mechanical and organic systems. In particular we will analyse the metaphors 'association is trail' (Bush), 'computer is a clerk' (Engelbart) and 'hypertext is a Xanadu' (Nelson). All these metaphors are both organic and mechanical. That is why we can say that hypertext is both an organic and mechanical system.

'It is reality that awakens possibilities, and nothing would be more perverse than to deny it. Even so, it will always be the same possibilities, in sum or on the average, that go on repeating themselves until a man comes along who does not value the, actuality above the idea. It is he who first gives the new possibilities their meaning: their direction, and he awakens them. But such a man is far from being a simple proposition. Since his ideas, to the extent that they are not idle fantasies, are nothing but realities as yet unborn, he, too, naturally has a sense of reality; but it is a sense of possible reality, and arrives at its goal much more slowly than most people's sense of their real possibilities.'

Robert Musil, *The Man Without Qualities*, ([1], p. 12)

1 INTRODUCTION

It has been convincingly argued (e.g., [2,3,4]) that a metaphor appears often at an outset of scientific discoveries. We can illustrate this statement in the case of the discovery of hypertext. As a nonlinear text with links containing references to other pieces of information, hypertext presents a new form of media, formed through the remediation of a prior, analogue medium of a text. We present how is the outset of this discovery articulated in a figurative way of metaphor and model.

Etymologically speaking, metaphor means a transfer. According to Arendt [5], we need to use a metaphor, when we need to transcend the borders of the real (given) world and then lead

into speculation, (in our case speculation about the as yet non-existing hypertext, which we have no words for yet). A metaphor means, in this sense, a transfer from something imagined into something existing, thus into a material, functional medium. This is possible with the help of so called predicative metaphors based on analogies. We thus interpret the process of the invention of hypertext as a metaphor in the sense of transfer, which bridges the gap between a possible and an existing reality, as suggested in our epigraph from Musil.

We want to show why that figurative thinking is constructive and worthwhile in the discovery of hypertext and its explanation, and for which roles metaphors and models play in the scientific conceptualising of hypertext.

We will suggest that all inventors of hypertext concepts, mentioned in this paper, make up their concepts of hypertext by employing so-called absolute metaphors. This term, from Blumenberg ([6], pp. 62–69), means a background metaphorical complex, or some leading idea, that systematically informs the thinking of individuals and entire epochs by reference to an implicit model, such as a mechanism or an organism.

We will present the concepts of hypertext as systems based on metaphors, which connect organic and mechanical metaphors together. We will show this in detail with the help of the analysis of the following predicative metaphors, which we suppose to be absolute:

- 'association is trail' (Vannevar Bush, 1945) [7],
- 'computer is a clerk' (Douglas Carl Engelbart, 1962) [8],
- 'hypertext is a Xanadu' (Theodor Holm Nelson 1974) [9].

We want to show that above mentioned metaphors of hypertext are not mutually independent. They have evolved from the first one to the third one, as we will show below.

Vannevar Bush (1890–1974) is our first prototype of Musil's man with a sense for a possible reality. Bush started the transfer between a real (unsatisfactory) and a possible (better) feature of a new form of text. We will interpret his memex as a theoretical model developed from the 'association is a trail' metaphor. Bush wanted to improve the way how scientists deal with information. His memex (imagined as a mechanical machine) would archive all the data that a scientist has collected. The memex would link all this information by means of metadata indexing. Bush 'mobilized' his idea by the means of scientific communication. He described himself as a man of the mechanical age [10] and who wanted to address the scientists of the digital age and to encourage them to transfer his theoretical model onto a functional medium.

The Engelbart and Nelson concepts of hypertext are built upon Bush's metaphor.

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We can start with a presentation of this organic and mechanical interplay of metaphors from a methodological and historical viewpoint.

2 METHODOLOGY

We draw on Hans Blumenberg's metaphorology [6], combined with Max Black's interaction theory of metaphor [11], and his view of how metaphors and models are used in scientific discoveries [2]. Why have we chosen these authors? Black's semantic theory has now been superseded by pragmatic accounts, which rightly accentuate the pragmatic dimension of the metaphor. But we do not need to focus on the actual speech situation. In this paper we focus on metaphors and their implications mentioned in the scientific texts about hypertext.

Blumenberg's metaphorology resembles Lakoff's and Johnson's theory of the conceptual metaphor [12] which has received much more attention in the past few years. But Blumenberg's account is arguably more complex in its historical point of view, which is also our main focus.

Metaphorology is not just another theory of metaphor in our modern sense, i.e. an analysis of the concept of metaphor, but it is an investigation into some prominent instances of this concept. The first aim of metaphorology is to substantiate the existence of the so-called *absolute metaphor* which, hypothetically for the time being, can be considered as a foundational element of philosophical language. According to Blumenberg, absolute metaphors cannot be translated into unambiguous literal language,² they are, so to speak, 'resistant' ([6], pp. 3–5). Blumenberg does not however explain why this or that metaphor is absolute. In his historical perspective, a metaphor is absolute if it has resisted being fully translated thus far. This does not exclude the fact that such a metaphor could be fully translated in the future. We suppose that, in a nutshell, a metaphor is absolute (for a given period), if every attempt at its explanation results in another metaphor or analogy.

The fact that an absolute metaphor cannot be translated into literal language – and this is the second step in Blumenberg's project – does not prevent it from replacing or correcting another absolute metaphor. Such transformations take place in history and they are important subjects of metaphorology ([6], p. 3).

For instance, there are a lot of metaphors about the world: 'the world (order) is (like) a machine' (*machina mundi*) or 'the world is clockwork'.

These two metaphors are not mutually independent, as the latter is a certain specification of the former. In numerous quotations from philosophers and scientists, Blumenberg tried to show how the *machina mundi* metaphor has been transformed into the clockwork-metaphor with the dawning of the Enlightenment ([6], pp. 62–69).

In this paper we will focus on two particular metaphors or rather metaphorical themes (which we call 'metaphorics') – on mechanical and organic metaphors, their dialectical interplay and blending when explaining the nature of associative memory, text and hypertext. In order to do so, we follow Blumenberg's need to examine the *consequences* of this or that particular metaphor by various thinkers. A set of non-contradictory consequences of

a metaphor is what we call, following Black's interactions theory [11], its *interpretation*.

Max Black provides a complex method of interpreting vital, predicative metaphors of the form 'A is B'. The basic idea is that if such an utterance is intended or/and recognized as a metaphor then the literal meaning of 'A' *interacts* with the literal meaning of 'B' resulting into a *metaphorical* meaning 'B' which is hereby being predicated of 'A'. The core of this method consists of explaining how these two meanings interact. They do indirectly through so-called implication-complexes or associated implications. An implication-complex is a set of implications predicable to a term. An implication complex A is a set of implications in the form of 'A implies A_i' and an implication-complex B is a set of implications in the form 'B implies B_i'. These implications do not need to be true; they only have to be considered to be true in a given context. The very interaction consists of pairing members of these complexes $f[A_i, B_i]$. The meaning B_i is transformed by f so that it is predicable of A instead of A_i. The function f may stand for an '(a) identity, (b) extension, typically ad hoc, (c) similarity, (d) analogy, or (e) what might be called a metaphorical coupling', (where, as often happens, the original metaphor implicates subordinated metaphors). ([11], p. 31) Black does not further explicate these terms. For our purposes, we will take *identity*, *extension*, *similarity* to be nonfigurative transfers based on a surface similarity. *Analogy* based on a structural similarity and *metaphorical coupling*, based on a subordinated metaphor are, on the other hand, figurative connections of two implications. They are nested metaphors.

Let us illustrate this method with an example of Thomas Hobbes' mechanical metaphor 'Consequence is a train of thoughts'.³ The implication-complexes, which depend on the context of utterance or reception, might be:

Thomas Hobbes: Consequence is train of thoughts			
Primary subject: consequence	Secondary subject: train of thoughts		
Implications	Implications	Pairing	Way of pairing
consequence is a succession	train implies movement	[succession, movement]	extension
consequence is a link connecting thoughts	train is a link connecting parts	[link, link]	identity
consequence is a causal connection	train connection is mechanic	[causal, mechanic]	extension
consequence is difficult to avoid	train is difficult to stop	[difficult to avoid, difficult to stop]	analogy
Additional implications			
consequence follow logical laws	trains follow timetables	[follows logical laws, follows timetable]	metaphorical coupling

³ 'BY "consequence," or "train," of thoughts I understand that succession of one thought to another which is called, to distinguish it from discourse in words, "mental discourse."

When a man thinketh on anything whatever, his next thought after is not altogether so casual as it seems to be. Not every thought to every thought succeeds indifferently.' ([13], Ch. III, p. 11.) Hobbes' emphasis on a causal connection between thoughts gives us the reason for taking this metaphor to be mechanical.

² By 'literal language' we mean the unambiguous language of modern science.

Table 1. Interpretation of Thomas Hobbes' mechanical metaphor 'Consequence is a train of thoughts'

The first pair is a case of an extension. The concept of a train's movement is extended so that it covers a succession of thoughts. The second pair is a plain identity. The third pair may be a case of an extension as well. The mechanical way of a train's moving is extended to a broadly causal way of our logical thinking functions (or at least, that is what Hobbes believed). The fourth pair seems to involve an analogy, where the difficulty of bringing a train to standstill is analogous with the difficulty of avoiding a derivation of a consequence. The last pair is a case of an analogy, or a metaphorical coupling. Logical laws are analogous to timetables.⁴ However, in which respects? They both express regularities – in a train's movement and in our thinking. Or they both have a normative force, i.e. they both prescribe how things ought to be. There are many aspects in which logical laws are like timetables. Here it is a case of a nested metaphor whose interpretation is open-ended. If this is so, then the interpretation of the original metaphor 'Consequence is a train of thoughts' is open-ended as well.

This example shows that (interpretations of) some metaphors are open-ended or unbounded. This means that such metaphors cannot be easily captured by literal paraphrases. They are absolute metaphors in Blumenberg's sense. Black's interaction theory is, thus, rich enough to be used for analysing absolute metaphors. Black's terminology enables us to recursively qualify metaphors as absolute. A metaphor is absolute if its implication-complexes are connected by analogy or a nested metaphor that is absolute too, because organic and mechanical metaphors interact here.⁵

Black sees every implication-complex supported by a metaphor's secondary subject as a model of the ascription imputed to the primary subject ([11], p. 31) He develops this theory into the so-called theoretical model. (We describe the memex in terms of a theoretical model in Section 4.) Theoretical models resemble the use of metaphors in requiring analogical transfer of a vocabulary. Metaphor and model creating reveal new relationships. But a metaphor operates largely with *commonplace* implications, says Black, but the author of a scientific model must have prior control of a well-knit scientific theory. Systematic complexity of the source of the model and a capacity for analogical development are essential qualities of models. Black cites another philosopher of science, Stephen Toulmin:

'It is in fact a great virtue of a good model that it does suggest further questions, taking us beyond the phenomena from which we began, and tempts us to formulate hypotheses which turn out to be experimentally fertile... Certainly it is this suggestiveness, and systematic deployability, that makes a good model something more than a simple metaphor.' ([14], pp. 38–39)

⁴ To be sure, Hobbes couldn't have had in mind trains as we have today. But wooden railways were common in England in the 17th century. They were used for transporting coal from mines. The fifth implication most probably wasn't intended by Hobbes. However, this need not stop us interpreting the metaphor beyond its author's intention.

⁵ There can be other reasons of unparaphrasability as the impossibility to spell out all the implications in practice (because they are too subtle, or there are infinitely many implications, or the metaphorical theme is too abstract). These reasons are not our concern.

A successful model must be isomorphic with its domain of application. In stretching the language, by which the model is described in such a way as to fit the new domain, we pin our hopes upon the existence of a common structure in both fields. If the hope is fulfilled, there will have been established objective ground for the analogical transfer. We can determine the validity of a given model by checking the extent of its isomorphism with its intended application. In appraising models as good or bad, we can, in principle at least, determine the 'goodness' of their 'fit'.

In the next section we move to some deeper characterizations of mechanical and organic metaphors from a historical perspective. We introduce the dialectical relationship between these two metaphors on examples from Plato's, Kant's and Alberti's absolute metaphors.

3 MECHANICAL AND ORGANIC METAPHORICS FROM A HISTORICAL POINT OF VIEW

The mechanical, as well as the organic metaphors has a long history. Mechanical metaphors are usually expressed in terms like 'mechanism', 'mechanics', 'machine', but also by 'construction'. Organic metaphors are connected with 'organism', 'life', 'vitality', 'generative' and its cognates. Mechanical metaphors mean often-detached elements, atoms, driven by abstract forces that exhibit certain regularities or laws. Mechanisms are constructed or discovered by a *bottom-up* approach where pieces, elements, atoms are *composed* together to give rise to a complex system. Elements are prior to the whole. Organic metaphors, on the other hand, highlight the priority of the whole over its parts or the priority of a principle over its instantiations. Parts are here only because of the whole, which is more than a composition of its parts. Organic systems are recognized by a *top-down* approach where the whole is *decomposed* into its functional sub-systems.

The main idea, which drives our investigation, is that of a dialectical relationship between organic and mechanical metaphors. They are interconnected or even entangled into each other. A mechanical explanation is usually insufficient at a certain point or to a certain extent – an absolute metaphor cannot be fully explained. This gap can be filled by an organic explanation. And this is true also the other way around.

Kant sought in his first *Critique* that nature can be explained by mechanical laws which are derived from the forms of our understanding. This explanation turned out to be insufficient in explaining actions of humans as free beings, but even in explaining some objects occurring in nature like living organisms. They have to be explained teleologically by their inner purposiveness. We can better understand a living organism by asking what its purpose is in nature, not by tracing back its mechanism, which defies any mechanical explanation. Teleological (organic) explanations, however, have for Kant only a heuristic, so to say provisional, role by showing us the directions where to look for mechanical explanations.

The opposite direction is also conceivable. Machines are imitations of organic bodies. This is the traditional Aristotelian view of technology as mimesis. Machines are, in some respect, enhanced bodies (e.g. they are stronger or less prone to malfunctioning), they are, in some other respect, deficient (e.g. they lack

intelligence or they are single-purpose). Here is an illustrative passage from Leon Battista Alberti ([15], p. 175):

‘Here we need only consider the machine as a form of extremely strong animal with hands, an animal that can move weights in almost the same way as we do ourselves. These machines must therefore have the same extensions of member and muscle that we use when pressing, pushing, pulling, and carrying.’⁶

Machines are conceived here as extensions of human powers, which is something that will be important in the theories of hypertext. Only (human) organisms as opposed to machines can initiate causal claims.

It is typical that mechanical metaphors aim to explain organic systems and *vice versa*. To use Black’s terms, mechanical metaphors are nested in the implication-complexes of organic metaphors. We can, thus, use a mechanic explanation within an overall organic system (and *vice versa*). The decision whether one takes or prefers an organic or mechanical vocabulary depends on the communicative intentions of particular authors. Blumenberg calls this a ‘pragmatics function of absolute metaphors.’

In the following three sections we will focus on mechanical and organic metaphors, their dialectical interplay and blending when explaining the nature of memory, text and hypertext. In order to do so, we, following Blumenberg, need to examine the *consequences* of this or that particular metaphor by hypertext thinkers.

4 MEMEX: MECHANISATION OF ORGANIC MEMORY

We begin this section with an analysis and interpretation of the metaphor ‘association is a trail’, abstracted from Bush’s text. We have chosen it because it helps us to understand as the basic metaphor of hypertext. Engelbart and Nelson (subsequent hypertext investigators) further developed their hypertextual systems from the ‘association is a trail’ metaphor by developing its open implications. From a theoretical point of view, the ‘association is a trail’ metaphor fulfils our criteria of an absolute metaphor born from an organic and mechanical background metaphors. In accordance with Bush, we consider an association as organic, connoted with complexity, unpredictability and intricacy. A trail seems to be more mechanical, systematic, better marked, and easier to follow – at least in Bush’s overall aim to mechanize human memory.

Let us follow the directions in a dialectical interaction of organic and mechanic metaphors in the ‘association is a trail’ metaphor. Bush describes the methods of mechanical, artificial indexing, which he finds inappropriate at first.

‘[...] significant attainments become lost in the mass of the inconsequential [...] Our ineptitude in getting at the record is largely caused by the artificiality of systems of indexing. When data of any sort are placed in storage, they are filed alphabetically or numerically, and information is found (when it is) by tracing it down from subclass to subclass. It can be in only one place, unless duplicates are used; one has to have rules as to

which path will locate it, and the rules are cumbersome. Having found one item, moreover, one has to emerge from the system and re-enter on a new path.’ ([7] p. 1)

The mechanical way of linking content is insufficient. Therefore Bush finds a solution in the organic quality of an association:

‘The human mind does not work that way. It operates by association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in accordance with some intricate web of trails carried by the cells of the brain. It has other characteristics, of course; trails that are not frequently followed are prone to fade. Items are not fully permanent and memory is transitory. Yet the speed of action, the intricacy of trails, the detail of mental pictures, is awe-inspiring beyond all else in nature.’ ([7], p. 6)

Bush sees the mechanical, ‘artificial indexing’ as more organic, more in line with human associative memory. Bush does not want to explain an ‘association’ in terms of a ‘trail’, his aim is to transfer the organic and the mechanical characteristics of associations and trails from metaphor into a mechanical device. So he moves back to a mechanical idea (or the idea of mechanization, more precisely said):

‘Selection by association, rather than indexing, may yet be mechanised. One cannot hope thus to equal the speed and flexibility with which the mind follows an associative trail, but it should be possible to beat the mind decisively in regard to the permanence and clarity of the items resurrected from storage.’ ([7], p. 6)

Bush finds machine-transferable qualities in associations. The organic is extended by the mechanism of marking (indexing) associations as marked trails to prevent them fading.

Applying Black’s method of interpreting predicative metaphors, we are able to find similar directions of the meaning interaction:

Vannevar Bush: Association is trail			
Primary subject: association	Secondary subject: trail		
Implications	Implications	Pairing	Way of pairing
association is a connection of thoughts	trail is connection of places	[connection of thoughts, connection of places]	analogy
association is called into mind by symbols, which are given by some convention	trail is equipped with marks	[association’s symbol, trail marking]	metaphorical coupling
it is hard to remember associated items without remembering the convention, i. e. by mnemonic devices	it is hard to follow a trail without maps and marks	[mnemonic devices, maps and marks]	metaphorical coupling
a not followed association is prone to fade	a not used trail fades	[association’s fading, trail’s fading]	analogy

Table 2. Interpretation of Vannevar Bush’s mechanic metaphor ‘Association is trail’

⁶ Quoted from Blumenberg [6], p. 67.

The first pair of implications is an example of an analogy. The implication ‘trail is a connection of places’ is analogous to ‘an association is a connection of thoughts’. The primary, organic subject is seen in light of the secondary, mechanical subject. The better-known concept of the trail is extended so that it covers an association. The second pair is an example of metaphorical coupling. Trails are usually provided with marks. Such marks are metaphors for symbols by which associations are called into mind. The third pair may be a case of a metaphorical coupling again. We use marks, or more generally maps, in order to follow trails. In our metaphor we use mnemonic devices in order to follow our association, or to remember associated items. The fourth pair seems to be the case of a metaphorical coupling too: Disused trails fade. This is analogous to a not followed association. They are prone to fade.

Black says, the literal meaning of ‘an association’ interacts with the literal meaning of a ‘trail’ resulting in a metaphorical meaning of a ‘trail’ which is hereby being predicated by an ‘association’. The very same metaphor says something about the secondary subject: Bush sees a ‘trail’ in the light of an ‘association’.

‘An association is a trail’ is a case of absolute metaphors in Blumenberg’s sense. It is the unifying representation, which help us to orient in the evolving concept of hypertext. In this stage of discovering hypertext, it is not possible to translate its idea into unambiguous, scientific language. There is no existing technology allowing us to run the memex. There is no scientific terminology yet and it would not be fruitful to establish it. The inventor is only able to show the first orientation of his ideas. In the next step he develops his metaphor into a theoretical model of the hypertextual linking of information, a memex. Nevertheless, a detailed analysis of the memex is a theme for a more detailed investigation. We can only confirm the memex as a fruitful theoretical model in this paper due to the following reasons: The memex resembles the use of metaphors in requiring an analogical transfer of vocabulary. Bush wants to mechanise an organic association trail in his memex. His aim is to improve an organic, transitory memory by means of a mechanical, permanent trail of an association. Bush speaks about the mechanical memex using the terminology of an organic, associative memory. In stretching the language by which the associative memory is described, in such a way, as to fit the new domain (memex), Bush pins his hopes upon the existence of a common structure in both fields. His hope is fulfilled, so there is objective ground for the analogical transfer.

We can describe the memex in the terms of Black’s model as a ‘system of imaginaries’ ([2], p. 234). Bush concentrates on the principle of indexing associative trails. The memex allows the establishing, marking and following of associative trails to be permanent. The memex is supposed to add the organic factors of speed and convenience to the ordinary mechanical filing-system processes. Bush is aware that it cannot work at the same speed as an organic, human memory. But he believes it will be possible in the future, that new technologies will allow future machines to work at the same speed as humans can think. This example shows that Bush was not limited by considering only the real means that were available to him. He built a model, a system of the possible, system of imaginaries. We can consider such a system, pragmatically built as an equilibrium to be consisting of both the organic and mechanical qualities of a human and a machine.

According to Black ([2]), we appreciate the memex as a very vital model. The memex is based on implications rich enough to suggest novel hypotheses and speculations in the primary field of investigation. It suggests further questions, it takes us beyond the phenomena from which we began, and it tempts us to formulate hypotheses which turn out to be experimentally fertile in the future of hypertext development. Bush supposes that clever usage of an associative trail manipulation can augment human associative memory. As we will show in the next section, his concept of associative linking content was inspirational in the questions of human intellect augmentation, by means of a technological extension.

In this section we have analysed Bush’s metaphorical thinking in detail. Seen in the broader context of hypertext inventing, the mechanisation of organic qualities of a human mind is essential for contemplating hypertext. In the following section, we will show how the direction of interaction changes. The new direction will lead us to the following question: how can a system of mechanised associations become more organic by means of human machine interaction and cooperation? Will this be fruitful to think about mechanical devices in terms of a text?

5 NLS: INTERACTION BETWEEN HUMAN AND MACHINE

We tried to find some innovative metaphors about content linking for our analysis of Engelbart’s text. Nevertheless, Engelbart uses Bush’s metaphor mentioned above. In this section we analyse and interpret the metaphor ‘a computer is a clerk’⁷, abstracted from Engelbart’s text *Augmenting Human Intellect: a Conceptual Framework* [8]. We believe that it is helpful in our understanding of the next metaphors turn and also in the context of hypertext development. We will complete our analysis with an interpretation of Engelbart’s NLS system. As will become evident, Engelbart speaks about this machine in the same way as a text, which is an essential direction for hypertext development.

The ‘a computer is a clerk’ metaphor fulfils our criteria of an absolute metaphor, because it is created as an analogy of an organic and mechanical subject. Allegedly, a computer seems to connote mechanic qualities whereas a clerk is organic, connoted with human qualities. Based on the analysis following Black’s interaction theory, we argue that Engelbart turns to see a machine being more organic: as a human being and, in the case of the NLS system, as a text.

Engelbart begins his paper with the task of augmenting the human capability to solve problems:

‘By “augmenting human intellect” we mean increasing the capability of a man to approach a complex problem situation, to gain comprehension to suit his particular needs, and to derive solutions to problems.’ ([8], p. 1)

Engelbart’s main aim is to invent a means that would make the individuals, intellectually more effective, by means of a human-computer interaction:

⁷ ‘Let us consider an augmented architect at work. He sits at a working station [...]; this is his working surface, and it is controlled by a computer (his “clerk”) with which he can communicate by means of a small keyboard and various other devices.’ ([8], p. 70)

‘We see the quickest gains emerging from (1) giving the human minute-by-minute services of a digital computer [...], and (2) developing new methods of thinking and working that allow the human to capitalize upon the computer’s help. By this same strategy, we recommend that an initial research effort develop a prototype system of this sort aimed at increasing human effectiveness in the task of computer programming.’ ([8], p. 3)

Engelbart uses the analogy of a computer as a clerk, as a ‘fast and agile helper’⁸.

Douglas Engelbart: Computer is clerk			
Implications	Implications	Pairing	Way of pairing
Primary subject: computer	Secondary subject: clerk		
computers have users	clerks have supervisors	[user, supervisor]	analogy
computer is a fast and agile helper	clerk is an agile helper	[helper, helper]	metaphorical coupling
computer is programmed	clerk have to follow rules and laws	[following programs, following rules]	analogy
computers work mechanically	clerks do a lot of mechanical routines	[mechanic work, mechanic routines]	analogy
computers are without emotions and errors	clerks have to avoid emotions and errors	[mechanic, suppressing organic qualities]	analogy

Table 3. Interpretation of Douglas Engelbart’s organic metaphor ‘Computer is a clerk’

The first pair of implications suggests that computer users are analogous to clerks’ supervisors. Engelbart imagines the computer of the future in terms of human collaboration, as a mechanic helper, which needs to be programmed and led by his organic supervisor. The idea of programming is essential in the concept of interaction. The second pair of implications shows that, for Engelbart, a computer is a fast and an agile helper. A clerk is also seen usually as an agile helper. Something mechanical (computer) is analogous to something organic the (clerk). Only mechanical features of clerks are transferred according to this metaphor. We select only the mechanical features of an organic secondary subject. This is going to be explicit in our third implication: Computers work mechanically whereas clerks perform a lot of mechanical routines. The direction of interaction (from ‘A to B’ or ‘B to A’) is evident in the last implication. Clerks should be free of emotions in order to avoid errors. They have to suppress their organic qualities and work mechanically. Their mechanised, programmed way of working is now transferred into computers.

Seen from a metaphorological perspective, Engelbart follows his contemporary influential thinkers. Licklider [16] speaks of ‘man-computer symbiosis’ and Ulam [17] uses the term ‘synergesis’. Most comprehensive is Ramo’s [18] term ‘synnoetics’, applicable generally to a cooperative interaction of people, mechanisms and automata into a system whose mental power is greater than that of its components. We find these organic and

mechanical metaphors to be leading at the beginning of the digital age. Engelbart’s text reflects the difficulties with describing his images about the future and possible reality, in the way of literal and scientific terms, Reading between the lines here, he creates his vision in the figurative way of imaginations and he supposes this way to be more comprehensible to his readers.

‘The picture of how one can view the possibilities for a systematic approach to increasing human intellectual effectiveness, as put forth in Section II in the sober and general terms of an initial basic analysis, does not seem to convey all of the richness and promise that was stimulated by the development of that picture. Consequently, Section III is intended to present some definite images that illustrate meaningful possibilities derivable from the conceptual framework presented in Section II. The style of Section III seems to make for easier reading. [...] Section III will provide a context within which the reader can go back and finish Section II with less effort.’ ([8], p. 3)

However, let us return to the pragmatic reasons for hypertext discoveries. We have to mention Engelbart’s account of linking. In the third section of his *Augmentation*, Engelbart comments on Bush’s main ideas about a hypertextual content linking, derived from the ‘association is a trail’ metaphor. From a technical point of view, Engelbart continues in Bush’s effort to mechanise linking information by indexing. He broadens this task, because he thinks about links and connections as about interactions. The literal meaning of interactions stresses the meaning of a two-way connection and communication, just like the meaning of feedback. Engelbart with his team was capable of creating a functional, collaborative knowledge environment system called the NLS (for oNLine System). (It was first demonstrated in 1968.) Engelbart’s lab used NLS for all its own knowledge work, drafting, publishing, shared screen collaborative viewing and editing, document cataloguing, project management including a shared address book – all of these in an integrated hyper groupware environment. It was possible to edit the structure as well as the text.

While Bush saw the memex as a tangible, a mechanised, a personal library, Engelbart considered the NLS to be an editable text with rewritable links. He saw it as a sort of self-organizing retrieval system, which dealt with the symbolic structures by means of programming.

How does the direction of the organic and mechanical metaphors interaction change with Engelbart? Engelbart sees mechanical devices in the light of organic, human qualities, interacting by means of symbolic communication. He tries to put the mechanic implications nested in organic terms (i.e. systematization, logic, routines) into machines and augment them. He suppresses (for his pragmatically determined aim) any undesirable organic characteristics in his machine, (i.e. a high error rate, forgetfulness, tiredness etc.). In the next step Engelbart tries to improve mechanical devices by means of suitable organic qualities (i.e. the ability of symbolic communication, ability of feedback, speed of associative processes etc.). In contrast to prior historical eras, he started to explain organic qualities as nested in mechanical metaphors. Or we can say, the metaphors of the mechanical is replaced by the metaphors of programming.

With these thinkers considering pursuing this direction, the metaphor of the mechanical is now becoming corrected (or furthermore developed) by the metaphors of the algorithmisation. In the next section, we will follow how the text becomes

⁸ ‘Such a fast and agile helper as a computer can run around between a number of masters and seldom keep any of them waiting [...]’ ([8], p. 70)

hypertextual in Nelson's thinking, and the figurative conceptualising of the new information media.

6 XANADU: ORGANIC MACHINE AS MORTAL MACHINE

In this section we analyse and interpret the metaphor 'a hypertext is a Xanadu', abstracted from Nelson's hypertextual project [20]. Nelson coined the term 'hypertext' and defines its properties in 1965 ([21], p. 96). In *Literary Machines* ([9], p. 30) he describes his most famous hypertext project Xanadu as a 'magic place of literary memory'. His hypertext concept is supposed to be analogical to Coleridge's Xanadu [22]. We will concentrate on Nelson's implications from this metaphor.

Nelson wants to transcend the possibilities of textual form, determined by the qualities of mechanical printing machines. The metaphor, which he chooses, answers this purpose. We can see the connection with Engelbart's approach. Nelson and he sees a machine as a text. While Engelbart only notices this analogy, Nelson is able to develop it in a very detailed way with the help of figurative language, but also in unambiguous, scientific definitions of hypertext qualities. The word 'hypertext' we can consider as specific type of metaphor, catachresis, which, according to Black, fulfils the gap in the existing vocabulary. As with Musil's man from the epigraph, with a sense for the possible, he abstracts from the given (mechanical) reality which is insufficient for him:

'The sense of "hyper-" connotes extension and generality; [...] The criterion for this prefix is the inability of these objects to be comprised sensibly into linear media [...]. ' ([21], p. 98)

Hypertext is the presentation of information as a linked network of nodes which readers are free to navigate in a non-linear (organic, associative, creative) fashion. Nelson does not want to mechanise the organic, as Bush did. Most of all, he wants to create a new, more organic, more human media. Which organic qualities does he transfer into his literary machine, i.e. hypertext? He wants to teach machines human skills such as writing and reading. The Xanadu user is the reader and the writer of the text at first. And he is a programmer too. As Fuller and Goffey [23] show, programming is a new use of a language and the language has a very organic, human quality.

Ted Nelson: Hypertext is Xanadu			
Primary subject: hypertext	Secondary subject: Xanadu		
Implications	Implications	Pairing	Way of pairing
hypertext concept is rich	Xanadu offers a lot	[rich, offers a lot]	analogy
hypertext is a text with a new dimension	Xanadu is a magic place	[new dimension, magic place]	metaphorical coupling
hypertext is a text with references to other texts	Xanadu is a place of literary memory	[web of texts, literary memory]	analogy

Table 4. Interpretation of Ted Nelson's organic metaphor 'Hypertext is a Xanadu'

Nelson explains his hypertext as a Xanadu. The first pair of implications suggests that the concept of hypertext is as rich as a Xanadu. The second pair of implication-complexes is a case of

metaphorical coupling: a Xanadu is a magic place in Coleridge's poem, while Nelson's hypertextual Xanadu adds a new dimension to the text. Coleridge's Xanadu transcends the materiality of our world, hypertext remediates materiality of 'paper' with its qualities. The third pair of implications defines Xanadu as a place of literary memory. This is analogous to hypertext being a text with references to other texts. Coleridge's Xanadu is a metaphor for the never-ending finding of a magical place. It is dedicated to active and creative users. It functions, after forty years of development in a limited version. It will stay in a dream as in Coleridge's Xanadu. It is too difficult to be the main principle of the contemporary leading hypertextual system, the more mechanical WWW. As Nelson says:

'Today's popular software simulates paper. The World Wide Web (another imitation of paper) trivializes our original hypertext model with one-way ever-breaking links and no management of version or contents.' ([20])

The reason is pragmatic: for general purposes we need an easier solution. In this aspect, the historical dialectical interplay of metaphors, at the turn of the twentieth and the twenty-first century, shows us that a more mechanical medium is more vital than an organic one. But Xanadu has a chance to inspire a specialised, professional system for scientists and people who have to think in a more complex way. Or, we can change the direction of metaphors, and go along with Rushkoff, to suit people, who do not want to be programmed, but want to programme [24].

7 CONCLUSIONS & FUTURE WORK

The common pattern of the analysed metaphors in Black's interactive view is that the interaction of the meanings in them goes in two ways. The implications of the mechanical and the organic metaphors are nested one in the other and therefore these metaphors are absolute in the Blumenberg sense. The interpretations of our metaphors are open-ended and fruitful for new concepts of hypertext. We applied this idea in models and concepts of hypertext: All of our hypertext thinkers speak about the human-machine interaction in terms of finding the best equilibrium of the possible and the real, of organic and mechanical qualities. The direction of their investigations leads from the need of a mechanical machine, based on organic principle to a new medium, based on the transfer of many human organic qualities and skills into an interactive medium.

Bush mechanised the way of human, organic associative indexing and makes mechanical ways of indexing more organic, more in line with human thinking. On the other hand, he contemplates the mechanisation of associations.

Engelbart's hypertextual equilibrium stresses the interaction of human (organic) and mechanical (computerized) elements. He speaks mostly in terms of mechanic qualities nested in organic, human elements. He stresses the idea of seeing a machine as an (organic) text, as a medium.

Nelson builds upon his predecessors' idea, that the medium is more organic. He wants to transcend the possibilities of the textual form determined by the qualities of mechanical printing machines. He speaks about hypertext in more organic terms. His concept is very organic and therefore mortal, as we have shown.

In the period in question, the history of the concept of hypertext started with an organic metaphor of association. It continued through the idea of mechanisation and furthermore through the

idea of organic-mechanical interaction and was complemented by the organic metaphors of reading, writing and programming. In the context of hypertext discovering, a mechanical solution became insufficient. This insufficiency is supposed to be filled by an organic solution. The next step consists in the mechanization of organic qualities, and the following one in their algorithmisation in the era of digital media.

Absolute metaphors, as metaphors in general, fulfil the function of stressing some aspect of the source domain. This function is pragmatically determined. In our case the pragmatic reasons are the following:

- (1) to augment human intellect by mechanical means,
- (2) to enable other people to understand such difficult thoughts, as Musil's 'unawakened realities', which are not translatable into the literal language of science. ([1], p. 12)

The history of media is the history of attempts at understanding human, organic qualities and to use them as extensions by transferring them into machines. After a successful transfer, the direction of this interaction then changes. Now we start to use media as a translation, as a metaphor for explaining human, organic qualities. It seems that in the era of algorithmisation⁹, the metaphors of mechanical machines have lost its importance. It has been corrected by the metaphors of the digital media, just as the metaphors of linear (mechanical) text has been corrected by the metaphors of (organic) hypertext.

In our future work we will continue pursuing the history of this metaphors in relation to the WWW. We expect to interpret it as a mechanised organic medium of Nelsonian hypertext. We see the importance in investigating more unique hypertexts such as scientific ontologies.

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⁹ According to Fuller and Goffey, it is a process of a reality that occurs in the conversion of process, which we know from the physical world into sequence of writable and readable algorithms that drive our human-media interaction. ([23], p. 80)