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"The Internet – A New Communicational Infrastructure":

THE INTERNET – A NEW COMMUNICATIONAL INFRASTRUCTURE:

Introduction.

In the following I will present an approach to the Internet which aims at characterising some of its general properties at a relative distance to–or even in ignorance of–actual, specific present-day uses, and will try to relate the model to the general history of media and of modernity.

First, I will present and discuss a model of the history of media, covering nothing less than the history of mankind.

Second, I will go into some aspects of present-day media transitions in which I see the Internet as the backbone of a new communicational infra-structure or–a new matrix of media.

And third, I will present some reflections on how this may relate to notions of modernity and of processes of modernisation.[1] {This section is not in the present version of this paper}.

1. The Five Main Types of Information Societies - according to the media matrix.

Information, of course, is crucial for the existence of any society. A society cannot exist in which the production and exchange of information are of only minor significance. For this reason one cannot compare industrial societies to information societies in any consistent way. Industrial societies are necessarily also information societies, and information societies may also be industrial societies.

On the other hand, different societies differ in respect to the ways in which information is treated. Consequently, information societies can be compared to information societies, and–as I shall argue–a main criterion for distinguishing between different types of information societies can be found in the matrix of the available media. If we categorize societies according to the various sets of media available for the production and circulation of meaning and information, we can identify the following five main types of information societies.

1) Oral cultures based mainly on speech.

The origin of oral cultures is not known. They are often assumed to predate literate cultures, but since oral culture leaves no trace of oral practice, there is still room left for speculation.

Possible visual communication: images (found in caves), smoke signals, etc. Possible auditive communication: voice, hand, speech, rhythmic expressions, drums, whistling, humming etc.

2) Literate cultures: speech + writing (primary alphabets and number systems).

Given a writing system, there is a still a huge variety of different societies – they may differ in the kinds and spread of writing systems, as well as of literacy; societies may also differ in the purposes of use (for government, administration, control, religious purposes, business, private affairs, literature, philosophy) as well as in respect to other criteria.

Literate cultures emerge in various places between 5000 and 3000 BC. In Meso-potamia/ Egypt, in (pre-Columbian) Mesoamerica, in China, and possibly in the Indus Valley). According to Lock & Peters (1996: 793), the earliest evidence of writing (cuneiform) dates back to c. 3500 BC in Mesopotamia. Writing in China is assumed to originate independently around 3000 BC. A third independent origin of (hieroglyphic) writing occurs in the mesoamerican Maya culture. The mayan calendar dates the origin of historical time to an equivalent of the year 3113 BC, Willis (2000). The question of whether the Indus script culture developed independently of the Mesopotamian (now Iraq) is not yet settled. According to Denise Schmandt-Besserat (1996), counting devices can be traced back to 8000 BC, and imprinting of numerical marks on tokens (as a means of abstract counting) also predates the Mesopotamian cuneiform script, which she considers to be derived from this abstract counting/marking system. (»The token was the first code to record economic data, providing the immediate background for the invention of writing« p. xii). Recent discoveries in China have been interpreted as evidence for the existence of a Chinese writing system predating those formerly known (Politiken, ?, 2001).

3) Print cultures: speech + written texts + print.

Movable type is decisive for economic reasons, but the effects go far bey-ond this in Europe (while there are no significant effects in China/Korea).

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[1] The approach to this is presented in Finnemann (1997).

Print cultures emerge in Asia. Block printing in China around 600 AD, and moveable type was »widespread in China« before 980 AD (Lock og Peters 1996: 810); According to Mokyr, (1990: 218), the first known block print (xylografi) is dated 868 AD, and moveable type made of porcelain was invented in China by Pi Sheng, 1045 AD. Mokyr admits a few pages later that movable type first appeared in Korea, i.e., before the porcelain type in China (Mokyr: 221, n 9). Metal moveable type was used in Korea around 1240 (Mokyr, ibid.) and (maybe invented independently, maybe not), around 1450 in Europe (Mokyr: 49: 1453). »In Korea a phonetic alphabet was invented which could have made printing [with movable type] far easier« in the 15th century, but it was not used, while in Europe »In the 50 years following the invention [of Gutenberg] more books were produced than in the preceding thousand years«. Mokyr:49.

4) Mass-media cultures: speech + written texts + print + analogue electric media.

The matrix includes media for a secondary orality: telephone, radio.

Analogue electric media emerge in Europe with the electric telegraph from 1843 AD (van Dijk, (1999: 6): 1847), followed by an huge and ever-increasing number of media based on the use of electricity/energy processes for symbolic purposes. Most significantly the phone 1877, (van Dijk, p. 6), gramophone, radar, tape recorder, radio, television, video, electric typewriters (but also significant non-electrical devices such as the typewriter), calculators and fax-machines – not to mention an even larger number of electrified measuring instruments). (Sources: Beniger (1986), van Dijk (1999), Mokyr (1990)).

5) Second-order alphabetic cultures: speech + written texts + print + analogue electric media + digital media.

The binary alphabet is an alphabet of second order. It is used to handle primary alphabets, and other symbols and symbolsystems. The matrix includes media for a tertiary orality: digitised speech, synthetic speech, voice response systems, speech recognition systems etc.

Digital media emerge with the invention of the principle of the universal computer (Alan Turing, 1936 AD) as a first, significant though theoretical breakthrough. (Among the earliest versions of modern computers are Konrad Zuse's machines (Z1, 1936-1937, Z 2 1938-1939 ff), Colossus I (1943) and II, Eniac, (1945), the Manchester machine (1948). The Internet emerges in the late 60s, in the widest sense as a publicly accessible open network in the 90s. The PC arrives in the late 70s and the fusion of these elements on a global scale in the early 1990s. (Source, Michal R. Williams, *A History of Computing Technology*, Prentice Hall, London 1985 and others). The spread of digital technologies into civil society on a large scale is always based on the appearance of graphical user interfaces (MacOS, Windows, Netscape, Internet Explorer etc.) which allow non-professionals to control the application/use of the technology.

2. General remarks on the interpretation of the 5 matrices of media.

Each of the 5 types can be conceived of as characteristic for a class of societies which share the same matrix, though they may differ in respect to many other criteria.

Secondly, they may also differ in respect to the character and properties of, say, the specific writing system employed (whether cuneiform, various pictorial writing systems [e.g. in China and Egypt], alphabetic systems with and without vowel signs).

Thirdly, they may also differ in respect to the social uses/purposes of media (for instance whether writing is used for religious rituals, state bureaucracy, commerce, industrial control, literature, philosophy, private communication etc.), as well as in respect to the forms and wider diffusion of appropriate media literacy in society.

In this respect, the scheme only indicates that the arrival of an additional medium implies a change of the communicational platform or matrix - a change allowing a number of new communicational practices not previously possible.

The scheme also represents a staging of history into epochs. Each new matrix can be considered as epoch-making in a number of different - and it is claimed - significant ways, not least in respect to social and cultural paradigms, to communicative genres, and to dominating paradigms of knowledge.

Before I go into the specific transition from the 4th to the 5th info-society, I will make a few general remarks, with some reservations.

• *I don't see or interpret the scheme as representing any sort of deterministic point of view.*

The most important reason for this is that all new technologies are human inventions. Technologies are a product of ingenious creativity, even if forced by ecological, social, or cultural pressures, such as capitalist systems' economic pressure to increase productivity (Marx), or by political and military pressures such as warfare, or ecological and demographic threats to a given society.

A second reason is that a technology does not prescribe how it is used, nor for what purposes. The telephone was invented without any idea of the future purposes for which it would be used. The computer was invented to solve a very specific class of mathematical and logical problems and "number-crunching", while many later functions - for instance as a typewriter, as a design tool, as a multi-medium, or as the basis for the Internet - were unforeseen. Deterministic effects exist only in the sense that if a given technology is used in a certain way, we might be able to detect and maybe predict some of these effects, or to say something about the kinds of possible effects.

The five matrices represent only a set of necessary conditions for the information processing and communicational practices possible within the society in question. As we know: even though we are able to say many important things about the cultural impact of the printing press, we cannot predict the content of the books to be printed next year.

The same also goes on the macro-level. Together, orality + writing form a common platform for societies as different as the Hellenistic urban states, The Roman empire, The Chinese empires, and the principalities of The European Middle ages, in which Scholasticism formed a common ideological platform for the medieval type of information society, (cf. Southern, 1995f). Similarly, the effects of moveable type in Europe differed radically from the effects in Korea and China, because they were used in different ways in different cultural settings.

There is no causality involved in the cultural impact of any medium.

• The scheme is meant as *heuristic*, and to be used as a »machine« to generate hypotheses, which in their turn are to be tested. There is *no way to undo the need for evidence* for each claim. As a heuristic scheme, it can be utilised both on the *diachronic, historical axis,* and on *the synchronic, systematic axis.* Later, in the chapter on the Internet, I shall focus on both these axes.

• The scheme is *focussed on language*, spoken and written, as the main axis – and mostly on writing.

As regards speech media, there are only three epochs: face to face, analogue media (secondary orality, W. Ong), digital media, which in continuation of Ong could be defined as media for a tertiary orality, including, e.g., speech recognition systems, speech synthesis, voice response systems etc.. But the social function of speech is also changed by the emergence of other media.

Other means of visual and auditive representation could also be taken into account and eventually lead to various revisions and complications of the general model. However, so far I believe the model to be resistant, meaning that, for instance, other media of visual representation than writing could be incorporated without violating the overall scheme.[2]

The development of other means of expression seems to follow the general scheme–or to be in accordance with it, meaning that they cannot undo the weight of the 5 major matrices, even if a history of, say, visual communication might lead to supplementary distinctions. This is probably so because the basic structure of speech/writing also influences the organisation and utilization of other means of representation.

• In general, the cultural significance of the model is claimed to be rather high because of *the role and character of media as mediating between things and signs*. On the one hand, media are artefacts, the products of technical capacities in the instrumentation of our relation to surrounding nature as well as to our own nature. As such, the media always represent the technological competences and capacities of the society in question. On the other hand, media mediate symbols and meaning. As such, they are always intimately connected with the cultural values, ideas, philosophy and knowledge of the society in which they are used. Thus media mediate between the material and spiritual/symbolic life.

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[2] E.g. the co-evolution of perspective and movable type in the 3rd matrix. Of photography and new paradigms of art, changing the role of perspective (impressionism, expressionism, cubism, abstract modernism etc) in the 4th matrix, and the co-evolution of digital computers and various sorts of digital

Hence, the history of media may lead you to any place of significance in the history of mankind.

• The scheme depicts a history of evolution in the sense *that the matrices relate on a scale of increasing complexity.* This is in accordance with the general Darwinist scheme of biological evolution, from lower to higher and more complex organs and organisms (if organs: exaptation[3], and if organisms: evolution). This is a severe limitation of our capacity to predict future developments, since we are not able to tell anything about the character and properties of future–not–yet–thought–of–media; or perhaps more precisely framed: we are not in a position to exclude the invention of new means of communication transcending any hitherto known concept, device, and capacity. The history of media will be open-ended and indefinite as long as communication is still taking place.

> Within the AI camp, it has been claimed that the computer is intelligent and develops as a competitor to humans, and that it will survive, while humans will not. Even if we are not in a position to deny such predictions, we are in the position to say that they are as unfoundable as are their negations. We are also in the position to say that an intelligent machine capable of competing with human intelligence should be able to establish its own expressional system. Hence it has to be based on principles different from those known from any existing computer as well as from the principles of the universal computer as specified by Alan Turing 1936. Both these actual machines, as well as the universal machine, are only capable of performing on the basis of a system of representation (in the binary alphabet or any equivalent alphabet consisting of a finite set of letters), which is defined and implemented from the outside of the system. There does not exist a machine or mechanical device capable to specify and produce its own representational system. Humam beings are capbale to do so.

• On the other hand, the scheme also represents *a scheme of decreasing complexity,* in that oral societies may develop in very different ways, since they often develop in isolation from other societies. The development of new means

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art (VR, movable 3D-representations, morphing etc.) in the 5th matrix. On digital images as textualised images, see Finnemann, 2000.

[3] »In evolutionary biology, the process whereby forms or structures that evolved to serve one function are co-opted to serve other functions. The human use of the tongue for speech is a good example.« Penguin Dictionary of Psychology. 1996. Edited by Arthur S. Reber

of communication in general implies a tremendous increase in cultural inter-action – and hence homogenisation - between previously less connected and hence more divergent cultures.

Since communication can only take place if a common platform emerges and develops, communication across borders will always imply a kind of bridge-building, resulting in the development of shared codes and means of communication. Even warfare (which is also a kind of communication) is always accompanied by intensified cultural exchange, aggregation and assi-milation on many levels.

To be sure, African societies are still very different from, say, European societies, but they are not as different today as they once were. They are now more integrated and closer to us, and hence they play a more important role in the Western mind. In this respect, one could say that the decreasing cultural complexity at the same time manifests itself as the opposite: as an increase in the complexity of our world-view. We need to relate more consciously to different, and hence more complex, cultural relations than we have previously done.

• The interpretation of the scheme as representing an evolutionary process *does not imply the assumption of any sort of linearity in history*. On each level there are a number of very different developmental stories, some of which may lead to extinction. Others not.

Still, cultural extinction is not necessarily a result of the communicational system employed; it could also be a result of many other causes, e.g. natural catastrophes or warfare.

• However, even if there is not linearity, there is a tendency towards a *conver-gence in history* so far. Today most societies are in transition from the 4th to the 5th media matrix, while some societies have not yet been industrialised. Others may not yet have arrived in the 3rd info-society, or even in the 19th-20th century

Euro-American industrial society–and maybe they don't need to before entering the 5th info-society.

But, independently of from where different cultures enter the 5th information society, there is–in a certain, important sense–only one type of society in this category, meaning that societies belonging to the category are all connected to each other via one and the same new, globally distributed, electronically integrated, communicational infrastructure emerging around the Internet.

In the information society type 5, there is one common infrastructure, but since the same infrastructure is used by many different, independently existing communicational networks, it is not like a global village. Nor will it ever be, since we do not have the capacity to develop the kind of close, intimate relations to the whole population indicated by the village metaphor.

Most of the groups and networks using the net will never communicate with each other, or even know the existence of most other groups on the net. As claimed, for instance by Manuel Castells (I-III: 1996-1998), one should also be aware that some groups might be able to exploit the net in much more fa-vourable ways than others–and as a means of exercising their power. But even so, the Internet structure itself allows any individual or social group to connect themselves with other individuals and social groups connected to the net.

In the 5th information society, therefore, there is what one might consider a common communicational platform and a shared memory of mankind. There is one integrated, commonly accessible archive, but many independently existing –mutually unconnected–communicational villages or networks.

• It was claimed in the above that our knowledge of media leads us to acknowledge the existence of profound limitations in our capacity to predict the future. We can only observe and communicate with the help of existing media, and we cannot predict the capacities of future media. This, however, does not mean that we cannot learn from history, only that our erudition cannot be as pleasing as we might like, meaning that history should hand us the

solutions or give us our values. What history grants is mainly preconditions, an understanding of our point of departure.

History offers hubris and nemesis as well, but also an understanding of relations and intimate connections between our cultural practices, our technologies, and ourselves. What history can give is the capacity to put into perspective.

3. Transitions from one media matrix into another.

In the present context, I will focus only on a few aspects which I see as significant for the understanding of transitions from one media matrix into another, and later I will focus on the new media matrix which is emerging around the Internet.

The most significant single sign in the above scheme is the *plus sign,* which in this context is both *a plus* and *a plus something more*.

First, there is a plus for each new medium added to the previous matrix, indicating that *the arrival of a new medium does not mean that older media disappear*. This is a very fundamental rule in the history of media. True, there are lots of media which are not in use any more, but the main rule is that older media continue to exist and to be used. Media only disappear insofar as their qualities and functions are completely taken over by a new medium.

So, the invention and spread of new media does not imply that existing media disappear. If they do, there are specific reasons.

Instead, new media are added to the matrix, and a restructuring of the whole media matrix follows as a part of this process, while the function of each medium may change. We can state the general principles in the transition from one matrix to another as follows. The emergence of a new medium is accompanied by:

   a) a restructuring of the whole matrix implying

   b) a refunctionalisation of older media

   c) which often results in the development of new functions, eventually
      utilising hitherto un-used or even unknown qualities and functions of old
      media, – functions which may be as important as the new medium itself.

E.g., the telegraph and innovation of print media. The telegraph allowed the transmission of news across a much wider space in a much shorter time, thereby also creating a platform for the development of a new print medium: printed *new*spapers.

d) Finally we can also observe that new media often emerge because of information overload in older media.

Information overload is not– as one might believe–a new phenomenon. On the contrary, it is actually a very old story, maybe the oldest story on media in the history of mankind.

   According to the American anthropologist Denise Schmandt-Besserat (1996), for instance, information overload was actually claimed to be a main reason for the invention of written language, and the overload thesis was postulated in our very first source interpreting the invention at all, namely a Sumerian myth told in an epic poem which dates back to the 27th century BC.

The story is as follows: the Sumerian King Emmerkar, the lord of Kulaba, would, quoting Schmandt Besserat »send his emissary to the lord of Arratta soliciting timber, gold, silver,…and precious stones to rebuild the residence of the goddess Inana. Back and forth the messenger delivered word for word the pleas, threats and challenges between the two lords, *until the day* Emmerkars instructions were too difficult for the emissary to memorize« and then–quoting directly from the English translation of the poem:

> - *The emissary, his mouth being heavy was not able to repeat (it)*
> - *Because the emissary, his mouth being heavy was not able to repeat (it),*
> - *The Lord of Kulaba patted clay and wrote the message like (on a present day) tablet.*

And to be sure that you really get the point, the poet continues:

Formerly the writing of messages in clay was not established.

Well, the story is not true. It is a myth. At the time of King Emmerkar, writing had been practiced for at least 500 years. *The writing of messages in clay* was very well established. But at any rate, the poet had a thesis, an idea of information overload as the reason why writing was invented.

As a result of this kind of logic (the emergence of new media to solve information overload), older media are also relieved of some their former functions, and therefore one should also expect that old media are refunctionalised when relieved. Whenever a new medium takes over some of the functions of older media, the old media are open to new kinds of use. And indeed, we often find that new communicational patterns develop around the older media.

Take as an example a short story of the printed text: as we know, the social uses of the printing technique (moveable type) gradually generated a need to make people literate. To educate the population. So, e.g., in early 19th century Denmark, it was decided that everybody had to go to school to learn how to read, compute, and write. The development of print technology was followed by an immense increase in the use of handwriting. This had not happened on this scale in the preceding 5000 years of the history of writing; but it did happen a few centuries after the invention of the printing press, which led to an incredible (and completely unpredicted) increase in the production and distribution of both printed and written texts. (Cf. Mokyr, op.cit.).

The printing press itself became a platform for the development of a number of new genres (religious texts, printed picture books, calendars, literature for »the learned republic«, philosophy, poems and novels etc. cf. Eisenstein, 1979, Horstbøll, 1999). But the role of printed text was changed again in the 4th info-society because of–among other things–the electric telegraph, which, as already mentioned, created a platform for the circulation of printed news on a radically expanded scale of space as well as in a dramatically shortened scale of time, thus allowing the modern newspaper to appear on the historical scene. This was a breakthrough which again allowed the origin and development of new textual genres (such as the interview, chronicles, reportages, commentaries etc).

In the type 4 information society, printed text survived not just as text printed in the newspapers. The printing of other sorts of text, including traditional books and magazines, also grew to a new, higher level. This was not only the case in the pre-television age, but even more so in the television age. There

have never been printed and read so many texts in so many different places as has been the case since WWII.

What then will happen with the printed text now that we are entering the 5th information society? Will the printed text, as often claimed, be replaced by electronic text? – and are we actually leaving the Gutenberg galaxy of print culture while entering a new digitised Turing-galaxy?

Well, let's start by observing the process so far. What we have seen in the last 20 years – after the arrival of the personal computer – is basically an immense spreading of *both* electronic text and printed text. In the 80s, many prophets predicted a complete transition from print to electronic text within a few years. No more paper in the offices, it was proclaimed loudly. What actually happened was the opposite, and it could be better described not as the end of print, but as *the end of out of print.*

Just look around; if you see a computer, you can be almost sure that you can also find a cable leading to a printer.

Printed text has survived, and the use of printed text has spread on an even greater scale than ever before. The number of printed books, the number of printed reports and the number of printed texts of many other sorts has grown even more after the advent of the PC than before. Nowadays, printed texts are everywhere.

In modern society, and all the more so in the 5th information society, a decision can hardly be taken without the presence of a number of bulky reports and printed texts on the table. The importance of printed text in contemporary culture is even more significant, since texts are now also spread beyond »their own« media.

Today we find texts on the houses, the streets, the busses and the cars; on our refrigerators, on the machines in the factory, and on the containers in the harbour; reflected, even in the eyes of the blue-collar worker; in the farmer's barn and in his office as well; on the fishermen's boats; accompanying any

kind of machinery and almost any kind of work-process. In short: every-where—even on our clothes, and possibly on our bodies.

Literary fiction may not be as important as it was to the cultural elite prior to the advent of movies, and yet printed texts are more important today than ever before, because they have become a necessary means of the modern division of labour and large scale operations, both in the private sector and in public institutions, both in blue- and white-collar work.

A lesson from this is: The importance/function of older media is not minimised, but rather changed and reinforced by new media. This is also true for the relation of old media to the computer. And this is the case in spite of the fact that old media actually can be simulated and integrated in the computer.

Some media will probably disappear, such as the traditional typewriter, for instance, for the simple reason that the typewriter can only produce discrete effects, which can be completely simulated in a computer. The only advantage left to (old style) typewriters is that they are not dependent on a supply of electricity or access to batteries. Nevertheless, one can still imagine some unpleasant situations that would make this an asset.

An even more important lesson is that it is not possible to understand the impact of a new medium or of a medium at all if it is not seen in its interrelationships with other media. To understand the function and use of any single medium, you must always take the whole matrix into account. The proper object for an analysis of media is the whole matrix of media into which each medium is interwoven.

Reciprocal reinforcement is a basic mechanism in the relationship between media, and it is a mechanism by which the cultural effects of new media are also reinforced and spread throughout society with the help of the older media.

Again we can take the relationship between printed and electronic texts as an illuminating example.

As formerly stated: printed texts did not disappear because of the emergence of electronic text; on the contrary, nowadays printed texts are produced on a larger scale, and they are produced by means of electronically stored texts.

However, *the function* of printed texts has changed in the same process in which the electronically stored text on our worldwide interconnected hard disks and servers became the new storage medium. Printed texts are now often produced for more specific (here–and–now) purposes, and they are no longer the sole or main storage medium.

We have not only come to *the end of out of print*,

we have also arrived at

print-just-in-time (or only a little too late),

in an appropriate place

in *an appropriate number* and last but not least

in *an appropriate physical form*.

Since printed texts nowadays are produced by means of electronic texts, we are also able to choose the physical format and to generate single copies in their own individual physical format according to specific needs.

In this process, printed text has been relieved of its former function as the fundamental storage medium, as the main medium for our collective memory. The electronic text is now also becoming the basic means for *the production* of texts as well as for the building of archives of text, while the printed text in the same process has been assigned a set of unpredicted new functions. Texts to be used in a specific situation, just in time, space, number, and in an appropriate physical format.

The media themselves do not prescribe the social organisation of the matrix, and a given medium may also be subject to further changes and modifications, and be brought into a number of different social organisations. Knowledge of the moveable type printing technique, for instance, does not prescribe the use of the texts which later evolved in Europe. But the technique was (as were the watch, the compass and the gunpowder) a very fundamental precondition for the process of modernisation and the development of modern science and political institutions.

So, what we have in the present day history of texts is a prototype of the digital revolution. It sneaks up on us behind our backs as the long-term effects of a huge number of small individually made–but parallel–choices and small steps. Today we produce printed copies by means of electronic orginals. Printed texts are still here because each of us still prefers to use printed texts.

There is no opposition between the printed and the electronic text; there is a reciprocal reinforcement.

If you should want to fight the transition, you are forced–as has always been the case with new media–to do so by using the new techniques, since texts, books, and even speeches are now or will soon be produced and circulated by digital, electronic means.

Let me now turn to the role of the digital matrix which is emerging around the Internet–to the media matrix of the fifth information society.

4. How to define the Internet.

In the following, the notion »internet« refers to a globally distributed, electronically integrated and open network of connected computers. The notion does not refer to a specific communicational protocol such as TCP/IP or http, because any such specific protocol could be replaced with new ones without further implications for the function of the net. The same whole cultural and social system could exist on a variety of different protocols, the protocols themselves being the only difference. Furthermore, any such protocol could also form a basis for a number of distinct, but mutually unconnected, closed networks.

Nor does it refer to a specific kind of application software such as browsers like Netscape or applications such as Telnet or Gopher, since the definition should include all the various kinds of software applications, whether e-mails, chat-forums, websites, Usenet groups, bulletin boards and possible new applications (including a number of applications not yet even thought of).

So far, the Internet is simply the globally distributed, electronically integrated network, which we access by browsers, mail programmes, Usenet groups, websites, bulletin boards and the like.

It is also possible to define the Internet according to the basic social functions of the node-and network-structure. The node-structure refers to the storage function implying the existence of some sort of stored content (information, knowledge, archive, library, encyclopaedia, information system, etc.) and the network structure refers to the function as a means of communication.

There is far-reaching news in both of these two aspects, net and node, but their integration into the same platform is *the* revolution. The value of the net is given by the connected nodes, and the value of the nodes is given by the net connections. What we have is a connection in which the storage capacity of printed media is integrated with the transmission speed of electronic media, i.e. a globally distributed, electronically integrated means of communication and archive, containing information and knowledge. [4]

The Internet defined as system.
In a more systematic way the Internet could be defined as a system based on a set of common protocols, a set of applications and a number of distributed access points. Such a system can be considered as a complex system based on at least three individually variable, but interconnected axes:
• An axis of protocols which forms a standardised, shared platform for communication
• An axis of various applications to access the net - there will be a set of different kinds of applications, whether built into one or more software packages
• An axis of access points allowing more or less unrestricted public access.

Altogether, these axes form a system in which any sort of restriction or rule on any axis may be changed, while the system as a whole stays stable. Such systems are not necessarily established as rule-based systems or as based on invariant structures, but on the use of various sorts of redundancy – this, however, goes far beyond the scope of this presentation. See Finnemann, 1995 on rule-generating systems and axes of variation based on the use of redundancy as a means of stabilisation.

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[4] The Internet can be considered a system in which all constituent parts are variables. Variations on one axis may sometimes take place without affecting the whole system, while at other times the whole system is changed. However, it is not an autopoietic system, since it cannot generate and organise its own constituent parts nor control the processes of variation. Cf Bøgh Andersen (1999) though he suggests a definition of the web as a quasi autopoietic system.

The basis of this, of course, is the properties of the digital computer. To understand the Internet, we therefore need to take a look at the symbolic properties of the computer. I will not go into detail, but simply specify a number of the most general, important, unprecedented, first-ever-features of the computer.[5]

First-ever features.

- an alphabet - the binary alphabet - in which any other alphabet can be represented and processed, and in which we are able to represent knowledge expressed in any of the formats used in the prior history of modern societies;

- an alphabet for textualised—serial—representation of any sort of visual expressions (images, photo-realistic or not, video, TV, audio media);

- a still-evolving set of mechanical search-, sorting- and indexing engines which in principle allow any representable pattern (any sequence of bits) to be used as criterion;

- a functional architecture manifested in the same format as the content – programmes can only function as programmes if processed as data on a par with other data–everything must be represented and processed in precisely the same binary alphabet.

- unrestricted interactivity with regard to both system architecture and content based on the representation of all procedures in the binary alphabet which can be edited on the level of single bits.

- a globally distributed, electronically integrated archive of knowledge represented in any of the hitherto known formats, and including a whole

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[5] For an analysis of the the binary alphabet and the symbolic properties of the computer see Finnemann, 1999a; for an overview see Finnemann, 2000.

range of handling functions (both for production, reproduction and distri-
bution of texts which are permanently editable.);

- random access to any part of an electronically integrated, globally
distributed archive of knowledge, enabling, among other things, the
generation of an indefinite amount of different linkages/hypertexts (new
sequential constraints can always be substituted for previous sequential
constraints);

5. Internet and other media - the new matrix.

The future role of the Internet is not yet stabilised, and in many respects it is far
from predictable; the same goes for relations between the Internet and other
media.

Anyway, because of the many different functions which are already perfor-
med via the net, it is reasonable to assume that the Internet will develop as the
backbone of a new media matrix. The Internet itself is can be considered as a
communicational medium as well as a new globally distributed, electronically
integrated archive of human knowledge. It is both a means of high speed
communication and a storage medium.

The relation to other media is complex, involving at least five different sorts
of relationships:

1. *It is a medium with its own specific capacities – a medium alongside other
media*
To this category belong functions such as e-mail, chat forums, web sites,
web-based virtual reality systems, hypertextual linking and other, known as
well as not yet known, functions which have no direct equivalent in previous
media history.

2. *The computer/internet is a medium in which all older media can be simulated and hence integrated*

To this category belong electronic text, (e.g. integrating the book, the newspaper, the library) and the telephone and radio, (and eventually video and digital television) fax machines, and other media.

Television on the Internet will probably differ from both traditional television and from the well known individualised and interactive kinds of internet use. There will still be different kinds of use. We may have technological convergence, but not functional convergence.

3. *The computer/internet is a medium in which older media are absorbed*

This means that functions previously related to different media can now be deliberately blended in the computer according to our wishes (e.g. blendings/mixtures of digitised photos, drawings, graphics and other sorts of images. Digitised sequences (photorealism) in films or e-mail as a blending of writing, printing and nearly real-time distance communication (as formerly known only from the phone). To this category belongs the blend of all sorts of mediated functions, since they can all be digitised and deliberately combined.

4. *Refunctionalisation of older media.*

We also need to take into consideration the question of whether old media disappear when integrated, or whether they are refunctionalised, as has been the case with print media so far. The same goes for handwriting and other means of expression.

5. Finally, both the computer and the internet can be used *»in the background«* of other media, built into them without changing the external relations, as in cars, washing machines, i.e. pervasive computing–in such cases the interactive use is reduced or resticted into simple signalling for the benefit of automation.

The complex character is also manifested when it comes to the wider analysis of the functions of the Internet /the new matrix:

6. Approaches to the Internet

Three levels/kinds of analysis, each of which can be the subject of various disciplines, can be distinguished

A: as a whole,

- as a technological and institutional system (cables, standards, protocols, servers, economy, legal affairs etc.), ICANN, and others.
- as a conceptual phenomenon, whether conceived of as a separate cyberspace, space of flows (Castells), info-highway (Gore), city of bits (Mitchell) or as a medium for a control revolution (Beniger), quasi-autopoietic system (Bøgh Andersen) or as globally distributed, electronically integrated social memory and medium of communication (as suggested in this paper) etc.

B: as medium for a variety of old and new narrative and discursive genres

The question as to whether the internet or the web-part constitutes a narrative space is discussed below. A main complication here is that there are genres on many levels:

- *as software genres,* constituted on the level of applications (as different sorts of software: chat, mail, Usenet, web-pages, audio players etc.)
- *as design genres,* constituted on the level of the interface–as different designs of the »same« software (formal, iconographic, virtual reality, auditive), or as different sorts of interfaces, (e.g. web-interfaces: personal web-pages, institutional web-pages etc.), or as genres in the use of interactivity, (e.g. chat) hypertextuality (e.g. links) etc., partly overlapping content genres (narrative e-modes).
- *functional genres,* which are constituted on the level of communicative/ social function - the same function can be performed by different sorts of

software and in different designs (or by means of analogue media) and vice versa. For instance: news pages on the net, e-commerce-pages, personal web-pages, portals, text-archive, library, archive, as a museum/exhibition, game-space or as a functional equivalent to older media (radio, video, fax-machine, phone, camera, typewriter, calculator).

- *content genres* - genres constituted on the level of purpose, content/ meaning. Narrative e-modes, e.g. faction/fiction, textual & pictorial means of expression used, textual genres (traditional genres such as novels, poems, non-literary prose genres, reports, interviews, and new genres, including new forms of multi-semiotic expression and multimedia applications based on the mixture of text, image and sound etc.)

To these different levels of genres also is added a fifth level, a meta-level, constituted by (new) genres emerging as new mixtures/blends of functional features from the various levels.

This is the narrative or discursive space based on the integration of both texts, images and sounds, and it is a subject for media studies, among others

Here one could also add that we will see–more–different sorts of author-ships; old and new forms: personal authorship (various forms), network-authorship (Cf. Poster), »machine-«authorship (Cf. Aarseth). Nevertheless, the notion of an author is still needed for several reasons (as it will be argued in a later version of this paper).

C) X and the Internet

A third type of approach can be described as the Internet in the context of X; X being one kind or another of social/cultural practice.

As an example one could mention *the Internet as a news medium*, when a newspaper goes on the net, it competes both with older media and with other sources of news. Everyone can be a news-source on the net (you should always have a news-section on your site).

Maybe the economical and institutional structure of printed newspapers will fade away since you can now choose news from a variety of sources, foreign news from one source, local news from another, news about books, films etc. from others, professional news, etc. You are also free to choose the best quality in specific areas.

News on the net is part of what media studies should be concerned with, while many other X'es, old as well as new, can be left to other disciplines, including multidisciplinary studies and interdisciplinary studies.

Examples of X:

X = as a news medium (any institution on the net can produce a news service – competing with older news media and other net media)

X = as a new sort of public sphere (new trans-regional and national borderlines), in which different individuals may select different fora according to individual priorities and/or cultural background (multi-ethnic cultures).

X = as a marketplace (e-business)

X = as playground (games, chat,)

Indeed, the Internet itself is spreading everywhere in modern societies, and is undoubtedly part of a far-reaching cultural transition; but that is only a part of the process; there are a number of different other processes which we should be aware of, even if they are not in the focus of our own analytical concerns.

7. The narrative and discursive space of the Internet

While most media scholars would probably agree that it is meaningful to speak of older media - such as the various media of texts, of film, radio, television

etc. - as the basis for a specific discursive and narrative space, defined by the properties of the medium itself - it is more complicated when it comes to the new medium of computers, and this is not least the case because we are capable of integrating the various narrative and discursive spaces of older media in one and the same new digitised medium.

Considering the diversity of possible computer applications and the variety of uses, one may doubt that it is possible, not to say meaningful, to utilize the notion of the Internet as a discursive, narrative space - speaking as if it can be described as a coherent space with a specific set of properties allowing us both to distinguish this space from other spaces and to say something interesting about this specific space.

Considering, also, the fact that the computer itself is both a medium in its own right with a specific set of properties, and at the same time a medium in which any other known medium can be incorporated, integrated and/or absorbed, you will soon be aware of the intricate conceptual complications.

If the typewriter is a medium, the word-processor–which is the digital equivalent–is a genre within another medium, and the same goes for photography, radio, video and other analogue media: when they are digitised and integrated into the digital computer, they are converted to genres within a new medium.

Most of us, I believe, have been confronted with one aspect or another of this very disturbing conceptual problem, for instance, in the form of whether we describe the computer as a medium, or whether we speak of a constellation of specific settings of hardware/software as a medium (e.g., in the notion of multimedia, which is normally not used of film and television, though in these media there are both spoken and written texts, images (still, as well as moving), music, and other sounds).

The distinction between medium and genre is of importance because the conversion of older media into digital form also implies that the various editorial features, which were provided as a whole in the old medium, can now not only be integrated as a whole, they can also be separated and recombined

with other features in ways in which the »wholeness« of the former medium disappears. A very illustrative example is the mixing of digital photographs with digitised drawings and paintings, which can be done in arbitrary combinations down to the scale of single pixels on the screen (or on the print-out).

In this way digital photography both continues as the digitised equivalent to older photographic techniques - a photo-realistic expression which is integrated or absorbed in the new medium, both as a functional feature (»photorealism«) in various sorts of software for image processing, and as a compositional element which can be blended with other graphical elements.

So, we have integration into the new medium, implying conversion into a genre, and absorption into - or blending with - other expressional functions.

How, then can we talk about a narrative and discursive space in any coherent way?

8. The notion of a writing Space

According to Jay Bolter there is a new distinctive writing space which he defines on the basis of present day PC technology . »The space is the video screen where text is displayed as well as the electronic memory in which it is stored«

isually complex,

By »writing space« I mean first of all the physical and visual field defined by a particular technology of writing. All forms of writing are spatial, for we can only see and understand written signs as extended in a space of at least two dimensions. Each technology gives us a different space […] For electronic writing, the space is the video screen where text is displayed as well as electronic memory in which the text is stored. The computer's writing space is animated, visually complex, and to a surprising extent malleable in the hands of both writer and reader.

Jay D Bolter, *Writing Space - The Computer, Hypertext and the History of Writing.* 1991: 11.

Gunter Kress has also stressed the there is a change of space, describing it as »a move from narrative to display« as he stresses »the screen is the new space of

representation.« but also asking »How it will be organised - as a largely visual entity or as largely linguistic entity?‹ (Kress p. 71).

If in agreement so far, we still have to ask whether we can give a more specified description of this space or whether the rest is a matter of emerging new genres.

Here, I argue for the first option: Since all digital media (and all sorts of computer processes) depend on a common set of basic symbolic properties, it is possible to identify a set of general properties which are also constituting the discursive and narrative space of the Internet.

As I have shown elsewhere these general properties can be summarised as the following three:

- The lower level of physical manifestation of «letters« (in the binary alphabet).
- The intermediate level(s) of formal syntax. (Actually, there is a hierarchy of formal levels).
- The upper level of the »interface«.

On this basis it is possible to qualify Bolter's definition of electronic writing space in the following way:

While the linguistic text is defined by double articulation: the articulation of meanings (words) by means of a system of empty letters on a lower level, the computational text (whether text or image) can be *defined as a system based on triple articulation*.

These three levels of articulation are common preconditions to all sorts of computational processes. They are the invariants, but while the first is truly invariant–there must be a sequence of the exact same two bits–the two latter are only necessary in a more abstract sense. There need to be a formal syntax and there need to be an interface, but there is no specific syntax nor any specific interface which is a necessary part of any given computational process.

As a result, we can conclude that both the syntax and the interface may be subjected to variation, which means that different genres may emerge on these levels.

And, indeed, this is why we actually do have different genres both in respect to programming languages (general logical programmes as Algol, Prolog, procedural programmes as LIST, high level programmes as Pascal or C++, object-oriented programming languages), and applications (word-processing, image-processing, spreadsheet, email, databases).

So, the discursive and narrative space of computers and the Internet is con-stituted in the textualised form of representation in the binary alphabet. This space is–as are all textual forms–constituted as a space to be processed or traversed in time, i.e. in a process which, at the level of physical manifestation of the passage, can be described as sequential or linear.

As an implication, it follows that Kress' identification of the new space with the screen alone is not sufficient. Firstly, in the computer there is a text behind all images on the screen; secondly, there are also mechanisms to over-code or rearrange images to produce new textually coded images, schemes, and models of various sorts, including icons, diagrams, and graphs; and thirdly, the underlying, invisible textual form of all digital images implies, that an editable time component is always available. Digital images allow for a much wider and more faceted array of potentials for cognitive (over-)coding.

Against Kress' expectation that the images will win, I would argue that what we see on the web is primarily text and secondarily images over-coded with textualised messages, and the reason is that text is still a most economical and precise means of articulation if not of everything.

Here are some of the most important and basic features of the narrative and discursive space constituted on this basis:

1)   The principle of random access which means that the next step is never determined of previous steps by any necessity which cannot be suspended,

conditioned, modified or overcoded. Since this can be done to any previous procedure, we also have the principle of permanent editability. In the computer, there is no rule which cannot be overruled. Random access is also the basis for interactivity and hypertextuality.

2)   The principle of nesting and multiple layering of formalisms into hierarchies. This principle allows overcoding and the incorporation of lower level formalisms as empty means of expression of higher level meanings, making a lower level formalism into a function on a higher level. E.g. a word processor allows us to control the formalims of the ASCII code with the help of the informal semantics of ordinary language.

3)   The incorporation of both formal languages, ordinary language (both written and spoken), images, and various pictorial codes (diagrams, graphs, graphical user interfaces, iconographies).

4)   The principle of overcoding of any sequence (whether a text, an image, a sound) by ascribing new functions/meanings.

At the bottom of this is the principle of random access, which means that the next step can be taken independently of previous steps and according to new specified criteria–possibly specified by the user.

   This is actually the principle of the basic addressing system used on hard disks and servers to store and retrieve information, and also of the switching between programmes and applications and of the switching between various specific functions in a programme or an application, between run mode and programming mode. It is exactly this principle which is the core mechanism in the concept of hypertext.

The narrative and discursive space of the Internet can be characterised by the following components:

- On the invisible, but performative level: the space is textualised with random access to any sequence stored, and open for the input of new sequences–possibly specified by the user.
- On the visual level of the interface from where interactivity takes place: the space is open to multi-semiotic and multimedia articulation.
- Multi-semantic control of the processes is possible, allowing the optional use of textual, pictorial and/or auditive expressions on the level of the interface and above, and in the control of the lower level formal processes.
- Hypertextual linking on all levels and between levels up-down in hierarchies
- Modal switches between different semantics, between levels and between modes (reading–browsing–editing as described later in this article).

9. Web space.

The web constitutes a very specific, characteristic of digital media, mixture of communicative and archival functions. As you sit in front of an on-line machine, the net can be considered your extended hard disk.

The communicative functions manifest themselves in various ways, not least in the composition of the front page, the main entrance to the site. While the design of other pages on a site may vary more, according to specific purposes and content, the front page need to fill an important role as an entrance or interface.

The front page is a text which explains to the visitor where he has arrived, what he can find here, and possibly where to go next. The character of this entrance can be compared to what the French textual theorist and historian, Gerard Genette, has described as the "paratext", which means the

devices and conventions, both within and outside the book, that form part of the complex mediation between book, author, publisher, and reader: titles, forewords, epigraphs, and publishers' jacket copy. (Genette, 1997)

However, as a paratext or a collection of paratexts, the front page differs from those described by Genette, in that the front page is composed as a whole - though it is composed by combining very different elements and functions.

The front page is a kind of interface, but as such, it is different from other types of interfaces known from the computer world. The main difference is that traditional interfaces are only defined in a relationship between a system and a user.

The front page on a website is also an interface towards the user (though in this case he is better seen as a visitor) but at the same time, the interface is also defined towards the whole rest of the site, as well as towards the company or institution which owns the site, and towards the relationship between this site and the rest of the web. So, there are four significant aspects of the web-interface. It is:

- The interface to the whole site - and to various selections

- The interface to the institution/company - the site owner

- The interface to the rest of the web

- The interface to the visitor

In this way the Internet brings new dimensions to the interface, since it is not solely defined in the interrelationship between individual human and computer interaction; it is also defined as a communicative relationship with other sites/nodes on the network as well as with the owners og the nodes.

Only a tiny part of a website is visible and since sites are also dynamic, you can never be sure that a visitor have an overview either of the content or of structure of a given site. The front page can be considered as the interface to presenting a version of the whole site and eventually also to (selected parts of) past versions.

Though there is always a front page, a site can be accessed at any specific sub-page. As a consequence, all web pages should include information which allows users to inform themselves about the structure and content of the site, either explicitly on each page or by means of a link reference to a front page or overview page.

The front page is also the interface to the site-owner, whether a company or an institution, and it should provide the visitor easy access to all relevant departments.

It also seems that there is a web culture, forcing site owners to provide links to other relevant sites–to web relatives. On the net, the question where to go next is always on the agenda.

Since sites are public, they are designed according to a set of standards which fits the ordinary expectations within the target group both with respect to hardware, software, principles of navigation on the site and with respect to the expected competencies of the users within the domain in question. However, there is also a need to provide a kind of »unique« design, presenting the identity of the site-owner.

The interfaces to the site structure, to the owner-company structure, and to web relatives are mainly based on the link facilities provided, as are the more interactive parts of the visitor-oriented user interface.

So, there are a number of different features which are executed by links:

- Reflecting the site structure
- Reflecting the relationship to other websites
- Links generated by the visitor (via find-functions/ search machines, interactive art-sites and other sorts of interactivity)
- Links to allow communication with the site owner (mail, order formulas, etc.)
- Links reflecting the owner-institution's structure (e.g. departments)
- Content-oriented links within a site or within a »textual« unit on a site

• Links provided as presumed attractors

In all these cases links are supplied as preselected, specified features, which are meant to help the visitor reach his goal and/or to help the owner reach his.

Finally, we also need to take in to account hypertextual forms manifested as search machines and as open search fields, including the input field for URL addresses, which represent the unrestricted free choice of the user, either within the site or on the net or some parts of it.

Hypertext used as a paratextual device–the navigational structure reflecting the site structure.

Site-navigation and site-representation.

The navigational structure is one of the most essential parts of a website and very difficult to design. A number of types of coherence is required:

1) The navigation system normally needs to be easily recognisable by any visitor, which means that it follows standard conventions (colour, marking).

2) Since the navigational features are integrated into the whole site they are also designed to fit the general design of the site (eg. the brand manifested in corporate or institutional design standards).

3) Navigational links are also named and marked to reflect the inner structure and content of the site, and do so in a way which is easily understandable for the visitor.

4) Navigational links are marked in a way which allow any visitor to identify the available links (possible choices) on any given page.

As a standard, the overall navigation system reflects the main categories of materials available. Navigation is basically of hypertextual character, but as an overall link structure, representing the hierarchy and categories of the archived materials on the site, *it is far from the associative and non-hierarchic prin-*

ciples which are often ascribed to the hypertextual organisation. The overall navigational structure, however, represents only one level of the link structures offered on a typical page.

In most cases you will also offer links to specific materials, be it latest news of some sort, or materials of especially high significance etc. You may also find navigational links manifesting an *alternative classification.* In the last few years there has been a tendency to offer both content-oriented (»Information about«) and target group-oriented navigation (»Information for«) as seen on Aarhus University's front page (22.5 2001). Similar principles are used at many other sites, which might indicate that this feature is recommended by some web guru or another, or is taught as user-friendly in web design courses.
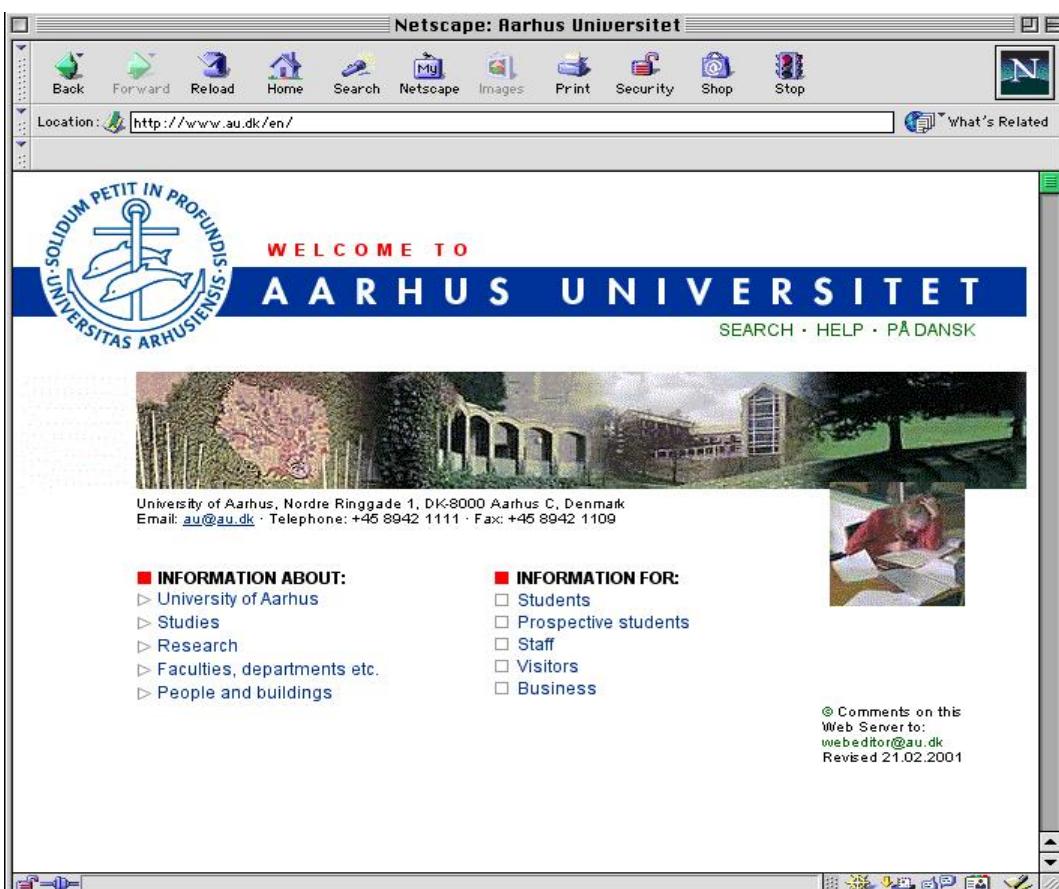
I shall not go to into detail, such as the question why there are exactly five target groups, how they are defined, and why the chosen ones have been chosen, but solely reflect upon the specific question of how the user is to understand the relationship between the two navigational entrances offered.

However, maybe one should not deliberate too much in this situation, because the result will be confusion, as illustrated by the following five different interpretations or models of possible relations between the two navigational entrances.

• First, the two different sets of categories can be seen as if each of them covers the whole site, classifying the same, complete set of materials, according to the two different principles.

• Second, they can be seen as two asymmetric representations, the (left) one being a general classification covering the whole site, and the (right) one being a selective representation, assumed to be of the highest relevance to most /certain groups of visitors.

• Third, they can be seen as two asymmetric classifications, covering two different sets of materials, possibly overlapping, but neither being complete.

• Fourth, they can be seen as two asymmetric classifications, covering complementary fractions, not overlapping, but complete when taken together.

• Fifth, they can be seen as two asymmetric classifications, the left one covering a general, complete classification, and the right one covering a small fraction (one class) in depth, e.g. the subcategories of one of the main categories.

The design does not tell us much about this. We cannot know whether the parallelism of the two columns, the use of identical fonts, colours etc. means that they are covering the same material in two different ways, or whether the asymmetrical positioning on the page signifies anything in this context. The

main problem is, of course, how to provide information about the principles of link structures offered.

10. Hypertext as theoretical concept of the narrative web space.

So far we have seen that hypertext plays a significant role as a paratextual device, both in the form of free search and as a specified interface to relevant web sites (web relatives) on the net, and as an intertextual device.

Therefore it seems reasonable to consider whether the general notion of hypertext might provide an adequate theoretical framework for understanding the narrative and discursive space of the web.

As a point of departure for this one could take a look at some of the most widespread definitions of hypertext as for instance Jay Bolter's definition from the above-mentioned book:

- *A hypertext is a network of textual elements and connections […] A hypertext has no canonical order. In place of hierarchy, we have a writing that is not only topical: we may also call it »topographic«.*
  (Jay Bolter, *Writing Space*, p. 23, 25)

Another definition from the same period is Jakob Nielsen's:
- *The simplest way to define hypertext is to contrast it with traditional text like {a} book. All traditional text, whether in printed form or in computer files, is sequential, meaning that there is a single linear sequence defining the order in which the text is to be read […] Hypertext is nonsequential, there is no single order that determines the sequence in which the text is to be read.*
  (Jakob Nielsen, *Hypertext and Hypermedia,* p. 9, 1991.)

And finally we have a very brief definition:

• *As a structure of blocks of text connected by electronic links, which offers different pathways to users.*

 (Ilana Snyder, *Hypertext, The Electronic Labyrinth*, 1996 p. IX).

Among the catchwords in these definitions are »no canonical order«, »no hierarchy«, »topographical writing«, »non-sequentiality of reading«, »blocks of text linked together offering different pathways to the user«.

As argued in Finnemann (1999b), one of the weaknesses of these early definitions of hypertext is that they seem to identify the notion of *text* with hierarchy, linearity, sequentiality; and *hypertext* with associative, flat structures, multiple paths etc., without taking into consideration the difference between the text itself, the writing process and the reading process.

Since the order of writing is completely in the hands of the writer/author, it goes without saying that you can write a hypertext in exactly the same way as you can write a text, and since writing (unlike speech) can be read independently of the order of production, there is always a multiplicity of ways to read any text.

When it comes to web pages, the notion of hypertext as non-hierarchical or non-canonical also fails completely. Websites are highly hierarchical; there is always a front page, i.e., a canonical order for entrance, access, and overview of the whole site. If there is no hierarchy there is probably only a single page.

However, if applied to the web, we also see that the front pages fit well to Bolter's idea of topographic composition as a hypertextual principle.

Among such topographic elements on front pages are (in most cases)
 • the site-holder's name, etc.
 • the general navigational system of the site, eventually also representing an overview
 • various additional functions (e.g. search, find)
 • textual information referring to the content of the site
 • possibly news or other attractors, etc.

Taken together, these elements represent a set of options offered to the visitor. The hierarchical structure is often manifested in a decrease of topographical elements on the lower (and more content oriented) levels of system in question.

At the same time, it also becomes clear that hypertext need not have much to do with the existence of multiple pathways through a site. When it comes to websites, we are not necessarily interested in multiple pathways; we may just as well be even more interested in finding only one pathway to materials of interest, namely the shortest one.

The options in the navigational system, for instance, point in completely different directions, or they point at different positions in a hierarchy. They are not different pathways to the same goal or purpose; on the contrary, the number of different pathways (the number of suggestions of the next step offered) is as much related to the possible differences in purpose of use.

In fact, hypertextual websites are normally much more hierarchically organised than are textual representations, whether printed or electronic.

Again: hypertext is not - as is often assumed - opposed to hierarchy, on the contrary, hypertext allows the construction of, and navigation in, even more hierarchical systems, first of all because it provides new navigational mechanisms *which are not opposed to texts but on the contrary, are added as new features which can be built into or between texts, and/or elements of texts, and made to navigate up and down in hierarchies.*

It is also said that the hypertext frees the user from the usual serial tree-structure (allowing only the choice either/or) by allowing multiple pathways. But no one can escape from seriality. The visitor will always have to choose one specific step in stead of any other–whether one or many are offered,–and at the end of the day, he has passed through the system in exactly the same serialised way–step by step–as if he had read a book.. This said, one might assume that the notion of hypertext is not too well suited as a relevant theoretical concept for understanding the narrative and discursive space of the Internet.

But it is. This is the case because the notion of hypertext can be better conceived of as additional to text rather than oppositional.

What hypertext adds to text is primarily that it provides a set of navigational mechanisms which can be used in a variety of ways in our navigation between textual elements within and between texts.

There are two aspects of this, one relating to the textual corpus as it exists, independent of any specific reading. Here, hypertext comes in as the built–in links produced by the author/editor as possible, interesting, or relevant options offered to any visitor.

But since any text can be read from a multiplicity of perspectives by a multiplicity of readers, hypertext is also of relevance as a feature which can be controlled by the reader, as we know from the various sorts of search and find functions allowing the reader to specify the anchor point for the next link to be followed. In this perspective it is more interesting to look upon the variety of reading modes which can be supported by building hypertext-devices into electronic texts.

First of all, we should probably note that electronic text cannot be overviewed or browsed as easily or in the same ways as printed text. Consequently there is a need to compensate for this loss, implied in the transition from printed to electronic text. Hypertextual devices can be used to do this to a certain extent, but hypertextual devices which add something more than compensation are, of course, more interesting.

Basically we can speak of three modes, or three sorts of possible »reading«-approaches to an electronic text:

- Reading »as usual« (including skimming etc.)
- Navigating and browsing
- Editing (interactive behaviour changing the future behaviour/content of the system)

Hypertextual devices refers to the last two of these modes, while the former is more or less unaffected (though the marking of words in a text as possible links to be followed actually does affect ordinary reading, as does the use of footnotes and references in printed texts).

Since the distinction between navigating and browsing is a distinction between different ways of using hypertextual devices, they can be seen as subcategories within the hypertextual dimension, leaving us with three basic modes which constitutes a hypertext system: the reading-mode, the link-mode, and the editing mode.

If you want to use hypertextual devices you are forced to perform a modal switch between ordinary reading (node mode) and linkmode or editing mode. For this reason, I prefer to include the logical distinction between the node-mode and the link-mode in the explicit definition of a hypertext system as different from a system of texts as well as from other genres of digital media. The editing mode can also be included, but it is not a constituent part of a hypertextual relation.

According to this, hypertext can be defined as a notion for a genre of systems which exploits and facilitates modal switches between the reading modes and the browsing/navigating modes, and possibly also into an editing mode allowing usergenerated pages and other sorts of interactive processes to be generated.

A system belongs to the genre of hypertext systems if the modal node-link switches are integrated into the normal use of an application, whether on the net or not.[6]

So while the reading (or node) modes to a certain extent can be described as the performance of a continuous process, the modal switch represents a discon-tinuous process, included as a part of the reading process. Any reader can always perform a modal switch when reading, but in hypertext systems there is no way to continue without doing so; you are forced to do so. Consequently, it

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[6] »Integrated into the normal use« is meant to exclude the use of modal switch between programming mode and run mode and between use of an application and editing the settings of the application.

is more appropriate to characterise hypertext systems as restricting the readers freedom of choice compared to traditional printed text. A hypertext offers only a limited selection of suggestions to future steps, but at the same time, this restriction (to a set of predetermined possible next steps) allow the links offered to be qualified and augmented. For this reason it is also relevant to look at various ways in which you can facilitate the modal shift.. (to be continued in a later version)

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