

MEDIUM THEORY AND SOCIAL SYSTEMS¹

ABSTRACT

The paper first gives a tentative theoretical explanation of the concept of media, based on the dichotomies of actual/potential (meaning), form/medium (appearance), and substratum/material content (extension in time and space). This theoretical explanation presents the possibility for observation both of a social micro and a social macro level from a medium perspective. In the next section the paper frames the macro level by a tentative synthesis of the medium theory and the sociological systems theory briefly describing a socio-evolutionary process where new media alter the societal capacity to handle complexity in time and space. In this section it becomes probable that by means of different media, social systems give different possibilities for actual social performance. In a way, social systems themselves can be seen as medium for formation. Finally the paper takes the micro level perspective by applying the theory to newsgroups, interpreting them as self-organizing interactive systems giving a differentiated and diversified scope for social inclusion.

The Concept of Media

The concept of media is used in nearly every scientific field in these years as a concept for the transmission of signals or even information between a sender and a receiver. Especially after Herrold Innis, the medium theory has been building on the concept of media. Marshall McLuhan (1967) made the medium theory well known with the statement: "The medium is the message." More cautiously, we could say that media create communicative spaces. According to Meyrowitz (1994: 51) media questions are relevant on at least two social levels: the micro (individual-situation level) and the macro (cultural level). The medium theorists have been rewriting world history as relative to different media, e.g. Walter Ong (1982) on writing, Elizabeth Eisenstein (1983) on the printing press, Joshua Meyrowitz (1985) on electronic media. This literature is full of empirical findings and interesting assumptions about the correlation between new media and social phenomena. But although Meyrowitz (1993) is aware of a concept of media as a form of environment that leads us to ask: "*What are the characteristics of each medium (...) that make it physically, psychologically, and socially different from other media and from live interaction, regardless of content and grammar choices.*" (Ibid: 61) this concept is rather latent in his great opus "No sense of Space" where "*the term media of communication refers to all channels and means through which information is transmitted among people except direct, face-to-face modes of communication*" (Meyrowitz 1985: 331). At least two things are wrong here, first also face-to-face interaction must be seen as mediated; second the word *transmitted* signals a reduced understanding of communication. Meyrowitz, who is the most solidly grounded theoretician in the sociology of the media theorists, mostly built on Goffman. Goffman is a very important sociologist on the interaction level, but lacks a corresponding theory of society on the more structural macro level, which results in a missing explanation of the dynamics between the micro and the macro level. This is also a problem when it comes to a synthesis between the theory of media and the field of sociology.

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Medium Theory and Social Systems

All in all, medium theory has taken important steps in the right direction to explain the social in relation to media. What is missing is the ability to demonstrate that social structure itself has mediating possibilities. An actual demonstration would show different forms of social reproduction in relation to shifting technologies that underlie communication. The systems theory of Niklas Luhmann offers a sociological theory both explaining the micro level and the macro level including both social evolution and reproduction. The systems theory includes three different kinds of media seen as evolutionary developed answers to improbabilities. Starting from a zero point of evolution: It is “*improbable that ego understands what alter means - given that their bodies and minds are separate and individual. (...) It is improbable for a communication to reach more persons than are present (...) Even if communication is understood by the person it reaches, this does not guarantee that it is also accepted and followed*” (Luhmann 1995: 158). Through *media's* evolutionary achievements, the improbabilities, according to Luhmann, transform into probabilities. The medium, *language*, increases the understandability of communication. Through language, the improbability of reaching people outside the present physical sphere is overcome by *the media of dissemination*; namely, writing, printing and electronic broadcasting. *Symbolically Generalised Communication Media* (SGCM) answer the question of the improbability of the acceptance of the premises of communication, i.e. describe how communication has effect in a more complex and differentiated society (Luhmann 1995, p. 161). To do this SGCM has to solve problems with combining selection and motivation by employing a semantic matrix intimately connected with reality, e.g. truth, money, power, love, etc. (1986: 19). In this way Luhmann offers an understanding where language, artifacts for dissemination, and social, semantic structures can be seen as different kinds of media influencing the social. When we look at the interplay between communication technology and social structures, Luhmann, although he often writes “after the invention of the printing press”, hesitates, and does not point at a direct connection between new communication technology and new social structures. Even though Luhmann did not work out such correlations, the best hint we find in this connection still comes from him: “*if media and techniques of communication change, if the facilities and sensitivities of expression change, if codes change from oral to written communication, and, above all, if the capacities of reproduction and storage increase, new structures become possible, and eventually necessary, to cope with new complexities.*” (1990: 100).

The concept of media not only can, but also must be used in both a sociological and a technical sense at the same time. The technical dimension cannot be understood as a social system in itself, but as a perturbation, disturbing and attracting the iterations of social systems (Baecker 2000). And social systems, as the quotation of Luhmann (1990: 100) hints, and all that the medium theory is about, are strongly influenced by the contemporary media matrix. McLuhan (1967) had the idea that communication technology is like an extension of our sense organs, but in his theory this idea was tied to other more problematic ideas (see Meyrowitz 1985: 21, Finnemann 1997: 4). Intuitively we could see media as a kind of extension of human possibilities for externalization. Following this idea we need an abstracted medium concept, enabling us to explain social systems on the one hand and the technological tools for communication in time and space on the other. All theorizing is a communicative activity and is therefore a social activity; there is nothing communicating outside the social (Luhmann 1995), no Cartesian privileged point from where the social can be directed or explained. That means that the concept of media must be conceptualized as self-referential as a form of communication helping to explain what communication is. New technologies and techniques for communication emerge and influence communication, i.e. they

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can be seen as new perturbators. The social is an ongoing process and new media influence the societal capacity for handling complexity in time and space. Media is not the message but alters the environment of communication. The introduction of new media itself is a social process. Therefore this article has a paradoxical purpose: to use communication on communication and still find differences that can explain the ongoing social process. The epistemological consequence of this paradox is to build the theory on a matching paradox; that is, a theory with no starting point (an ongoing process) produces differences by referring to itself and to its own construction of an external world. To work out the meaning and the function of the concept of media in this way, and to use it as a thinking tool to understand new media and the social systems emerging in communicative spaces, both at a micro and a macro level. It is necessary to leave the conception of a *transmission* of messages and replace it with the distinction between form and medium.

Perceptual Appearance

Fritz Heider (1959) offers a theory of mediation that is compatible with our purpose. According to him we can say that a medium is a loose coupling of elements, e.g. light or sound that in them are invisible. When light waves run through the air, the rays are relatively unaffected by this substratum. But when a solid object reflects them, e.g. a stone, they are coordinated with the object in a special way: you see the stone and not the light. The object can be said to print itself into the medium as a *rigid coupling*, which is perceptible as a figure on a ground. Heider makes a distinction between a medium plan and a thing plan; so the things are perceptible at a distance only through media, i.e. you can see them, smell them, and hear them. Already at this point of theorizing we have left the idea of transmitting and started on the theory of differentiating. You must differentiate between what is ground and what is figure. Inspired by Maturana and Varela (1980) we can say that perception is not an adequate reflection of the surrounding world but system internal construction, i.e. there is no transmitting of data but an ability to differentiate figure from ground on the basis of different media. Luhmann abstracts the difference between medium and thing by replacing the concept of *thing* with George Spencer Brown's concept of *form*. This distinction makes it possible to use the theory for analysing what *system internal construction* is, and to include the different media as a variable in the social reproduction.

Form

Brown (1969) defines *form* as the distinction between indication and distinction. Construction is to *draw a distinction*; only by drawing a distinction can one be able to indicate something. A distinction contains everything: the indication that the distinction makes, the non-indicated rest of the world (which the indicated is distinguished from) and the distinction itself, separating the states indicated from the states non-indicated (Baecker 1999).² The distinction also contains its own motive because the two sides are asymmetric, the indicated side is marked and the other side is un-marked. This asymmetry is the observer, the third value (the first value is the indicated and the second is the non-indicated), who draws the distinction. Now we come closer to what construction is; it is always a result of the process of drawing distinctions. After drawing a distinction you can either iterate it or look at the un-marked side of the form by making a new distinction (look at the axioms below). We have no starting point; there are no presuppositions necessary for drawing a distinction except the fact of already being involved in the process of drawing distinctions. To

² Brown gives an example of drawing a distinction by drawing a circle in a plane space: In the operation of drawing the circle appears as an inside (the indicated, the circle), an outside (the non-indicated, the rest of the world) and the unity between the two sides (the difference).

fully understand the form-calculus one has to consider another of Brown's concepts, namely *re-entry*. Re-entry means that the form can re-enter itself; the operation of the form cannot begin as long as the distinction between distinction and indication is not copied into the distinction. The observer can not only choose between two sides but also observe the form that makes such a choice possible, e.g. the distinction (unity) that constructs another observer's indication of the one side and not the other (Luhmann 1999: 19). The re-entry is the solution of a paradox underlying the form-calculus, namely that the distinction has to be distinguished from the distinction itself to observe the form of the form. In other words we could not observe that we observe by this form if it haven't been for the re-entry. An analogy Luhmann (1999: 21) offers on this tautology is that the world history only can be told in the world history. It becomes a paradox when what is the same is copied into itself to make a difference. Now is it the same or is it not? Spencer Brown dissolves this paradox with the help of the distinction of observable/un-observable: The world seems to be suited for self-observation and the physicists have to distinguish themselves as observers distinct from what they observe. "*We may take it that the world undoubtedly is itself (i.e. is indistinct from itself), but, in any attempt to see itself as an object, it must, equally undoubtedly, act so as to make itself distinct from, and therefore false to, itself. In this condition it will always partially elude itself.*" (Brown 1969: 105). Luhmann (1999: 20) points at a factual, a temporal and a social way to dissolve the paradox of form and adds that: "*the paradox of form only comes about because an observer attempts to observe at once both the unity and the distinguished sides of a distinction.*" If we follow Brown and pragmatically draw a distinction we only see the indicated side of the form; later if we make a cross and indicate the other side, we have the temporal way to dissolve a paradox.

Brown's form of notation presents: $F = M \overline{\quad} UM$: "F" as form, "M" as marked and "UM" as unmarked and the distinction as " $\overline{\quad}$ ". In the calculus of form there are two axioms: the first is *the form of condensation*: $\overline{\overline{\quad}} = \overline{\quad}$. It means that the value of calling the same distinction again is the same as the value of the first call. Broch (2000: 111) remarks that it is not the same in a sociological sense as in a logic sense, so repetitions are not just absorbed but confirm values and hereby create identity, familiarity and life-world. The second axiom, *the form of cancellation*, says that: "*The value of a crossing made again is not the value of the crossing*" (Brown 1969: 2). With Broch's example if we leave a room that we have been walking into we have cancelled our stay in the room. In a sociological sense it is not the same as in pure logic because the use of a distinction results in memory that is not cancelled with the cross (the use of another distinction).

Meaning

According to Luhmann (1995: 74) meaning is the difference of actual and potential – this he adopted from Husserl – but for Luhmann it is not only the conscious level of system formation that produces meaning, but also the social level of systems formation. This means that in every moment of time something is in focus for the consciousness and/or for the communication in opposition to what is not, but could have been – as a figure on a ground. More abstractly, we can say that meaning is a form that consists of something marked (for example how much money you have left for the rest of the month) differentiated from what is unmarked (that you are living in a market economy, that you must have food, buy presents etc.) as a simultaneous representation. Therefore we can say that $Meaning = Actual \overline{\quad} Potential$. "*The phenomenon of meaning appears as a surplus of references to other possibilities of experience and action. Something stands in the*

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focal point, at the center of intention, and all else is indicated marginally as the horizon of an “and so forth” of experience and action” (Ibid: 60).

In the sociological perspective what is said must be differentiated from what is not said but could have been said – and in this way gets meaning from this simultaneous representation of the actual and the potential. For example if I mark a student a “7” she will understand this “7” because it is not “9” or “03”. Language is not meaning but has the function to generalize meaning with the help of symbols (Ibid: 94) as a medium for formation.

Meaning equips an actual experience or action with redundant possibilities so the uncertainty of the selection is offset once again. One can return to the starting point and choose another part (Ibid: 60). Also meaning is self-referential and includes itself as one among many possibilities of further experience and action. It can only gain actual reality by referring to other meaning, which in case of tautologies becomes unproductive. With Luhmann’s example it is possible to think: “*This rose is a rose is a rose.*” (Ibid: 61). This use of a recursive path is productive only if it makes itself dependent on specific conditions. These conditions emerge as a result of the systems history where selections already have been made resulting in a border of meaning influenced by the differentiation structure of society. As we shall see, this differentiation is dependent on the communication-media situation giving the scope for understanding, memory, handling of complexity etc., making the social structure a medium for the actualization of different social forms. Luhmann (1995: 75) distinguishes meaning into three dimensions: a factual (this | something else), a temporal (before | after) and a social (consensus | disagreement). For example, the dimension of sociability consists of loose couplings of consensus | disagreement as two horizons; they are social because they always imply somebody to agree or disagree with. To disagree with somebody only makes sense if you agree in other matters, e.g. that you disagree. When we orient towards one of the horizons, the other is simultaneously constituted on the unmarked side of the sociability form. “*Specifying our agreement is simultaneous to implicit specifying our disagreement and vice versa*” (Paulsen 2001: 54).

Materiality spaces and subtracts

Luhmann abstracts the difference between "medium" and "thing" by replacing the concept of *thing* with the concept of *form* (form | medium). A form always demands a medium. A way to understand this is presented by Paulsen (2001), according to whom a form always consists of an actual coupling of actual and potential. The media always consists of potential couplings of actual and potential. Here I take a step further and say that what is a form in one medium can itself be a medium for further formation. An analogy offered by Lars Qvortrup (1998) sees plastic as the medium of the form Lego and Lego as the medium for the form Lego-house. We can continue and say that Lego-houses are the medium of the Form City. A meaning-system can make almost everything into a medium; it just has to loosely-couple its elements. For example, we can signal by blinking with an eye, which represents coding in a meaningful way, conditioned by social system. Loosely-coupling it from its mechanical constraints can only do this.

So a medium is *something* which elements can be loosely coupled in a way so forms can be printed into them. This at the same time describes the emergence of another “perception level” because the media themselves in this process becomes invisible when focusing only at the form. As the Danish phenomenologist K. E. Løgstrup (1976: 14) has said: “ The sound disappears in the

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speech, the speech disappears in meaning.” If we look upon a medium as form, it is visible, for example as a book but while reading and, paying attention to the content, it is invisible, only mediating the content. To take the ongoing social process as an example, it is only mediated through social structure (social conventions) that we can alter the structure itself.

Everything that comes into being must have some kind of extension in time and space; this goes also for the media. To elaborate this we introduce another distinction, presented by Brügger (2002: 51), between *stratum* and *material content*. “*The stratum is part of the medium on, or in, which the material content is placed*”. An example is the book in which the paper is the stratum and what is put on the paper, for instance black or colored ink, is the material content. Brügger gives two comments: first material content must not be confused with content (the meanings that might emerge through knowledge about the coding system). In this sense the material content is meaningless. Second, the stratum must not be confused with the medium as such. The stratum is part of the medium but only one part, the other being the material content (Ibid.). The media must also be divided into three areas - production, distribution and consumption. According to Brügger to characterize, for instance, the area of production of media, one must answer the following threefold question: what is the stratum of the medium, how does it make the production of material content possible, and what is this material content? And the same goes for the two other areas (Ibid.). With this concern Brügger joins the media theorists like Innis (1951) and his concept of a media having either a time or a space bias.

To give a kind of ontological order of the different media levels we shall briefly look upon the concept of space. According to Plato space is: “*the Receptacle – as it were, the nurse – of all becoming*” (Plato 1977: 49 (p.177)). The Greek term “DEXAMENE” that is translated to *Receptacle* derives from a verb meaning, “receive” or “absorption” so space to Plato could be expressed as a receiver. According to Plato space is not directly perceptible but only “*apprehended (...) by a sort of bastard reasoning*.” (Plato 1977 52B(p. 192)) but by reasoning it becomes acceptable that everything must be in something. For Kant (1970: 68) “*Space is a necessary a priori representation, which underlies all outer intuitions*”. In this meaning space is a form of intuition through which experience becomes perceptible. We give space to the world to perceive it, Kant had a problem about *representation* by pointing to Newton’s absolute space as something that is compatible to our form of intuition and in the same time denies that we can perceive the thing in its self. If we go to the phenomenologist of the twentieth-century, we perceive space as not mathematical or geometric but immediate and direct, and you could say that it is more than ready-to-hand (Tække 2002). In the perspective of this article space is a medium for the media of perception and only a form in reasoning and language. In the space-medium the perception media as different kinds of forms have been loosely coupled through the biological evolution from energy and particles as a result of the selection process.

Media of reproduction

We follow Luhmann (1995) in his distinction between three different levels of system formation: a biological, a psychic, and a social. They are *autopoietic*; which means that their elements are incorporated in a network integrated in such a way that they all the time by their organization produce and maintain the network through which they themselves are created. This goes through a process of selection by the difference of system and environment where the elements of the

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different levels do not get mixed with each other and where there is also scope for a differentiation process within the singular system formation (re-entry).

At the biological level we differentiate between phenotype and population where the pressure of selection is the environment (the temperature, the chemical conditions etc.). The environment could also be called the perturbator of the autopoietic function. The systems are not directed from the outside, but are only structurally coupled to the environment in which they have a scope corresponding to the possibilities to adapt to it, or loosely-couple it, to find ways to stay alive. It is the accidental combinatory experiments of nature that give the form to the phenotypes that either live and reproduce the population or die taking their genes out of evolution.³ It is the genes that give the complexity in the ongoing phylogenesis. The medium of reproduction is life; it is life that is maintained at various ways at this level of system formation. Every form (phenotype) alters the population seen as a medium giving new conditions for new genetic combinations dealing with the selection pressure. The reproduction medium of the psychic systems is consciousness and of the social it is communication. We'll come back to these latter two types of systems in the next section when we look at the influence of new media on social reproduction.

To sum up, there are three fundamental kinds of objects that we can apply our concept of media to: 1) the autopoietic media of reproduction (life, consciousness and communication), 2) the space-media of perception (light, sound, smell and substance, loosely-coupled matter on a biological basis), and 3) the technical media for communication (from oral language to digital media, consisting of matter, loosely coupled by meaning systems in the co-evolution of social and psychic systems).

New Media and the socio-evolutionary process

Orality as medium

Before oral communication with language the hominids could not accumulate enough knowledge to overcome the barrier of biologically stored ways of possible behavior, which means that accumulated experience was lost with death of the individual. Therefore the possibilities to select action and understanding were limited to instincts stored through nucleic acid. In the co-evolution of the three different levels of system formation, language emerges and makes possible the storing of knowledge (Weisskopf 1964). With language humans began emancipation from biologically determined social behavior and started to structure co-operation dependent on meaning in oral communication and the social system emerges as a meta-system that handled more and more of the co-operation in society. Before oral language the social also consisted in meaning, but the complexity of society was very limited (complexity is when there are more possibilities than the system can actualize at one moment in time). To give an example, G.H. Mead (1936) says that the two dogs in a dogfight have the same meaning in it. In my perspective – if one of the dogs puts his tail between the legs it is the actual that gets its meaning by not being something else (the potential). Like the dogs our pre-oral ancestors had an

³ Maturana who coined the term “Autopoiesis”, dose not take the genetic approach, e.g. he dose not pay attention to DNA.

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extremely simple background of alternatives or we can say that their society had an extremely simple complexity.

Every known human language is double articulated (Jensen 1996) which gives an enormous combinatory potential for representing and producing complexity. Meaning can print itself into the medium of spoken language that in itself consists of three differentiations: phoneme | sound, morpheme | phoneme and sentence | morpheme. That means that in every known language there are about 23 distinct sounds, and that you can make thousands of meaningful words out of them, and that you can make infinite numbers of meanings with full sentences of the thousands of words (Esposito 1999, Paulsen 2001). With language we introduce an infinite number of distinctions between the actual and the potential, so oral based societies have a much larger capacity for handling complexity than the former kind of society.

According to Luhmann (1995) communication is the unit of three selections. First, *information* defined by Bateson as a difference that makes a difference, meaning that it is a reference to knowledge, e.g. “7” is not “9” or “03”, therefore information is a co-communication of one out of an already existing repertoire of possibilities (a coupling of actual and potential). Second, *uttering* is the use of a medium to let others observe your information. The behavior that contains the information must be interpreted as a contribution of communication and therefore, information is gleaned from behavior. If you, for example, are waving, the addressee must interpret that your movement is coded communication by making a distinction between information and behavior (and see that it is a form in a medium). Third, *understanding* is up to the addressee and cannot be determined; it is also a selection in a spectrum of possibilities. This means that the social cannot be directed by a single human but is self-referential. Also the understanding of an uttering is not invented for the occasion but lies in the possibilities of the society as condensed.

With language the society is loosely coupled from total biological control and communication can start to develop new ways of dealing with the scope of the structural coupling to life. From this moment of time, co-evolution excludes the biological level of system formation only including the social and the psychic levels of system formation. The human as a species started to learn in another way than the animals. We can see the contrast if we look at society as the medium and look at what is said as the form, because the medium with language-based communication can increase its complexity, from generation to generation. Every time a new form is printed into the medium it is altered; all information is a message about difference and will see parts of the societal knowledge in a new light.

Oral complexity problems

Oral language is tied down to time and space: “*Sound exists only when it is going out of existence*” (Ong 1982: 32), and it does not reach people out of earshot. In an oral culture, knowledge, once acquired, has to be constantly repeated or it will be lost (Ibid: 24). These cultures had a problem with complexity because they had to use a lot of their energy on reproducing fixed formulas which also produced a highly traditionalist or conservative set of mind that inhibited intellectual experimentation (Ibid: 41). Although such a society could store only little knowledge, the problem of complexity was made worse because the society could not be separated from interaction, i.e. every interaction was a reproduction of society. The

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individuals had a rigid-coupling to the society, saying anything new or alternative meant a threat to all society, therefore punishment by social exclusion meant death or exile. To deal with the problem of complexity (information overload) the society differentiates into segments, i.e. into equal subsystems (Luhmann, 1977: 33). Somebody left and made a new system equal to the one they had left. Segmented societies extend over very long periods but have a very limited extension in geographical space. The subsystems (e.g. tribes) could be spread over large territories with the same culture, but they were not a society in the modern sense because they had no central structures and no idea of all the subsystems as one unit different from other cultures. According to Luhmann (1995: 26) only complexity can reduce complexity so even though the oral culture could build a much bigger internal complexity to match the one of the surrounding world, compared to the pre-oral cultures, their medium did not, even with double articulated language, succeeded in building internal complexity when talking storing of knowledge or extending communication in space in comparison to modern society. The oral medium has air as its substratum, waves in it as the material content, and language as the form in this medium. Following Innis (1951: 33) a media has a bias either to disseminate knowledge over time or over space. The oral medium that has such a non-durable material content in such a diffuse substratum has - even though it sounds strange - a bias towards time (stable over long periods). The reason is that society has no capacity to handle complexity in form of alternatives because of the high demand for reproduction, and as we have seen only inclusion was possible because the society could not distinguish itself from interaction.

Writing and stratified differentiation of society

There are various steps in the first techniques of writing, from stone carving with hieroglyphs (giving a time bias) to alphabet writing on paper (giving a space bias). The phonetic alphabet works in accordance with the double articulated language so you can express everything that you can say orally in a meaningful way and keep the combinatory possibilities of the acoustic medium in the optical medium. Also the code is very easy to learn in comparison to over 40,000 Chinese signs taking around 20 years to learn just so many that you can write and read fairly well. Nobody ever learns them all or learns to write all that they can say (Ong 1982: 87). With optical medium of writing it was possible to differentiate between interaction and society and alternatives could be presented, but still society was very static in comparison to the modern society. Anyway, through developments of the medium (both in relation to substratum and material content), and notation code, for the form of language, the complexity of the society did grow to be much more complex than the former kinds of society. The storage capacity increased and the social units enlarged too, because the society started to handle complexity not by differentiating society into equal subsystems but into unequal ones with one central unit of management. This is stratified differentiation of society in the sense of a hierarchical system that, every time it cannot handle its complexity, separates out a new stratum to deal with the problem (Luhmann 1977), e.g. soldier for fighting. Still the society only accepts inclusion, and non-conformists were excluded, meaning for example witch burning or a life as an outlaw. Even though the social system has many more possibilities as a medium for actual performance, the individual was still in a rigid coupling to the society. Everything referred to God and you were born into your God-given position. Marriages were not between the strata but only in the strata where equality still ruled, and it was not what was said but who said it that gave the effect. This condition meant that the societal learning was crippled; no matter how bright an idea you had, if it was in opposition to someone more powerful (higher in the hierarchy) or to the tradition it

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could cost you your life. Power, law, science and economy were not separated but all referred to God through the king. For example, the scientific communication system could not gain the degree of freedom needed for the emergence of self-organization as long as the reflexivity was not communicated in terms of uncertainties but given normatively, e.g. by religion (Leydesdorff 1993: 4). This can be seen as a complexity problem because writing even with the alphabet on paper with ink did not mean that everybody got the same information. Copying texts by handwriting was expensive and corrupted them, therefore the best way to secure important knowledge was to lock the text in a safe place (Eisenstein 1983: 199). For centuries people traveled long distances to read a special book, learning it by heart and making a copy by hand, even though the “original” itself probably was copied for centuries and full of mistakes. The medium of handwriting (the chirographic medium) blocked the different function systems from gaining self-reference, because it meant missing feedback, which again means that the social as a medium only gave a reduced scope of possibilities for building up complexity. Imagine for instance the problem of finding a common understanding of Aristotle when everybody had different copies of his works.

“As an agent of change, printing altered methods of data collection, storage and retrieval systems, and communication networks used by learned communities throughout Europe.”(Eisenstein 1983: xiv).

Print and the functional differentiation of society

Print was the answer to this problem of handling complexity, altering not at first the content but the production, distribution and consumption of the optic medium (Eisenstein 1983: 113). Now thousands of equal copies could be produced and the printers made good money. Quickly nets of distribution were established all over Europe. The consumption situation was alert because many single readers now had the same copies and their feedback from now on strongly affected the following revised editions. A good example is mapping. There are more than 600 maps and sketches made between 300 and 1300 that have survived ravages of time, and it is impossible to find in them a developmental process, a progression of thought or accuracy. What provides accurate maps is the feedback process between those who make them and those who use them, which was not possible before the printing press (Ibid: 197). Only after the printing press emerged it was possible to compare one’s own observations with the knowledge already stored; nobody knew what others had found out before. Before the printed book knowledge was found in traditions; after the printed book it was found partly by comparisons of texts and partly by observations of nature, finding faults, inconsistencies or supplements in relation to the texts.

The printing press meant two important loose couplings that together gave scope for society as a center-less structure of social possibilities. Because of printing, the old hierarchy started to fall apart as the different functions were loose coupled as self-referencing systems ending with the functional differentiated society. This form of society handles complexity by separating out new function systems that are not equivalent to each other functionary but dependent on each other’s different functions. For example, the political system could not handle its job if the court-system *disintegrated* and the modern society would not at all function without money. So this loose coupling is the end of stratified society and the beginning of a society consisting in structural-coupled function-systems. At the same time, this is the end of the individual's rigid coupling to society, now the individuals by them self must make inclusion or exclusion in relation to different kinds of function systems. Inclusion is made possible by communicating through a

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special semantic code referencing to a special function system. Luhmann (1995) refers to this code as a *Symbolically Generalised Communication Media* (SGCM), that gives possibilities inside the border of a function system. For example the SGCM of the political system is position | opposition (= power + | -); notice that this code is self-referential because there can be a re-entry on both sides, i.e. the position has its own internal opposition (p | op | op) and the opposition its own position. In every situation this code can be used; from a family situation to governmental situation, but the maintenance of a family system in a functional differentiated society has its own SGCM; love + | -. In our society we do not get married to secure our family but because of love. Although the medium of the printing press was the answer to former kinds of complexity problems, it created new problems: first nobody in the functional differentiated society can observe all of society - you can only observe it through one code at the time, either through love, economy or power.⁴ Next the medium of printing has a bias towards separating people in different information systems according to writing and reading skills. The skills needed to read and write affect access to print in two ways: First communication through writing and books automatically is restricted to those with knowledge of the required code. Second regardless of having knowledge of the basic code, messages can still be directed at different groups by varying the complexity of the coded message (Meyrowitz 1985: 75). In chirographic culture it was only an elite in special centers that could read and write and their primary means for *storing* knowledge was oral (Eisenstein 1983: 7). Even the medieval monk was an exceptionally slow reader who read aloud and haltingly (Meyrowitz 1985: 261) and as Eisenstein (1983: 34) notes "*Learning to read is different, moreover, from learning by reading.*" All groups did not acquire the reading skills right after the invention of the printing press, but was almost only a privilege of grown men. This meant that in the beginning women, children and the lower class did not have the possibility of sharing knowledge in society. This meant for example that women lost privileges that they have had in the chirographic culture, that childhood was invented, and that human life divided into many steps referring to the writing skills, e.g. all the steps from the first year in school to scholar. Also different educational backgrounds separated people, even the well educated, often, because location restricted access to a variety of information (Meyrowitz 1985).

Electronic media

Electronic media is a new loose coupling of the matter in space, reducing space as distance when communicating. They represent a new substratum, e.g. a television set, with illuminated dots of light and sound as the material content. Also electronic media follows a new form of production, distribution and consumption. The production of electronic media is extremely easy; every child who can speak can code a message in radio or in television. As to distribution we can say that when you bring a television set into your home, you receive the material content for years, creating still new meaning; as opposed to books where you must go and buy or borrow every time you want to see something new. The consumption is like the production so easy as if there was no code at all except from the code of language itself. Electronic media gives the ability to be in a parallel space. The sender can reach everybody who has the right equipment, and the recipients can experiences the same stimuli at the same time in spite of geographical distance (Tække 2002: 32). Being in this space is rather passive with broadcasting,

⁴ Luhmann dose not have a finished list of SGCM, but says that it is an empirical matter to find them.

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you can change the channel, but you cannot alter the forms in the medium, just watch them. You cannot mold this medium.

The television medium captures what is said but also how it was said, the expression in the face when it was said and many of the details from the context in which it was said. Television has exposed backstage information for most of the different print-created closed information systems.⁵ Now we know how the doctors talk to each other after the ward round, and that the president gave the same speech today as yesterday and that he has problems with his wife etc. The children know what the parents are saying when they close the door, and women know what men are alike when they are away from home etc. Electronic media integrate information systems by merging private situations into public ones. The print medium has an on stage bias giving abstract impersonal and formal messages while electronic media has a backstage bias revealing personal expressions and private feelings (Meyrowitz 1985: 93-95).

It is important to note that new media does not mean a cancellation of the former kinds of media. They are integrated in one constellation, a media matrix (Ibid: 339). We therefore end with an addition scheme as Niels Ole Finnemann (2001) suggests" Speech+ written texts+ print+ analogue electric media+ digital media." Through socio-genesis, social systems are processing in an environment with more and more possibilities and with more and more diversification. For the society as medium for actual social formation, print is a special boundary. Information about the world by printing press started to be lifted out from situations to be restructured on a more global level (compare to Giddens, 1992, p. 17). "*Whatever we know about our society, or indeed about the world in which we live,*" says Luhmann (2000: 1) "*we know through the mass media*". For Luhmann the mass media is a function system separated out by the use of copying technologies used to disseminate communication and includes all institutions of society doing that. No interaction can take place between sender and receiver; it is ruled out by the interposition of technology.⁶ Like the other function systems, it has its own code, which is information +]- and its own historically developed programs for the selection of what is information and for what is not (Ibid: 18). The organizations that produce mass media communication are dependent upon assumptions concerning acceptability. This leads to standardization and to differentiation of their programs not tailored to individuals. Therefore individual participants have the chance to get what they want, or what they believe they need to know. The mass media constructs a reality, but it is not subject to consensus. One must cut the reality into shape individually but beware of believing that it is generally valid (Ibid: 92-94).

That the individuals who are loose coupled to society also have access to electronic media means that the functional differentiation of society is exposed; now everything seemed possible, e.g. women's liberation, children's rights, the youth movement of the late 1960s, etc. The more a

⁵ Meyrowitz (1985: 35) defines social situations as *information systems*, and the concept "backstage" means what people normally try to hide; e.g. going to the toilet, talking behind others back and all in all what is inconsistent to the self that is formally presented in public (see Goffman 1959 and Meyrowitz 1985).

⁶ Exceptions are possible but newer include interaction with all participants.

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media supports the relationship between physical isolation and informational isolation, the more it supports the separation of people into many distinct positions. The more a media allows people to gain access to information without leaving old places and without severing old affiliations, the more it fosters homogenous positions, e.g. socialization stages (Meyrowitz 1985: 61). When looking at minority groups this becomes clear; they would not have been possible without electronic media to show the group from the outside as a special group excluded from the larger reference group. The members are united in their feelings of exclusion from certain rights and experiences. The sense of restriction, felt by many minority group members, might be the result of the sudden access to a larger, more inclusive information environment. To know about and be constantly exposed to places you cannot go and things you are not allowed to do makes you feel more isolated (Ibid. 133). So electronic media absolutely creates a more complex society. The more people share similar information systems, the greater the demand for consistency of treatment. We know that from the very complex welfare states in Europe, and at the same time people expect to be treated in their individual and unique situation. Electronic media has an effect by reducing the informational isolation but they do not alter the functional differentiation structure of society but creates society as a far more complex medium for actualizing possibilities.

Digital media

Digital media can be seen in contrast to analogue electronic media; the latter has similarities to what it is representing while the former has not (Poster 2001: 14). For example though the sound recordings on tape or vinyl use different material than the acoustic event. What remains is a relationship of isomorphism or similitude between them, i.e. some individuals are able to *read* the grooves on vinyl disks and say which piece of music is inscribed in it. (Ibid.). Not so with the digital media, which changes the input into a series of zeros and ones according to an arbitrary formula that maps the sound event. In the digital media we enter a micro-world constituted on 1's and 0's under the linguistic text as 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.*" (Finnemann 2001: 32) According to Finnemann (1997bp. 143) the computer can be defined through tree functional plans: a notational representation plan that is invariant (the semantic empty letters), an algorithmic syntax plan that is variant because the algorithms can always be alternated, and an interface plan defining the semantic content of the syntax which can also always be alternated. In this way the computer in it self function by tree articulation plans⁷ presenting a loose coupling of the machine and the material processed by it unlike any other machines that all have a rigid coupling between there architecture and their function.⁸ This loose coupling is a triumph for the text culture because now all forms of stable knowledge can be produced, edited, stored, copied, distributed and retrieved in the same symbolic system of representation. I the computer medium both pictures, music and linguistic text is processed in

⁷ More precisely it is only two plans because the concept is about the distinction between plans: semantic] syntax] alphabet, the two plans in a doublet articulation system uses the fact that it on the second plan consist of elements without semantic in them selves which is used on the first articulation plan to make an eternal number of different semantic structures.

⁸ This architecture plus the fact that the binary alphabet is total empty for semantic content (the linguistic letters is not e.g. there are a distinction between vowels and consonants) makes the computer a multi semantic machine that can both mediate music, linguistic and pictographic forms (Finnemann 1997). It is the variable syntactic structures that define the semantic content of the material that they them selves are constructed by.

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the same alphabet i.e. in the micro-world constituted on 1's and 0's. (Finnemann 1997b) The societal consequences of this is hard to figure out for now being on the macro plan and maybe we must wait for a new medium in the media matrix to figure out what the consequences was. According to Dirk Becker (2000) we can look upon the contemporary use of the WWW as the social systems ongoing loosely coupling of the new medium, making new forms within it, i.e. the experiments of using the digital medium for uttering substance in various ways. This can also be looked upon as a process of remediation (Bolter & Grusin 1999), and as recombination and mutation in the generic population of Web-pages (Andersen 1998) or as effect loops between the new medium in the media matrix and the social systems (Meyrowitz 1985). So we can describe imported trends in the process of loose coupling made possible by the digital media from out of the different theories, we do not know where the process will lead but it is possible to point on a number of alterations by now:

Digital media also in another way creates a third articulation plan namely by a new loose coupling of the materiality of the geographical space. The substratum is the computer and its accessories (monitor, Internet, hardware, software and energy) and the materiel content is illuminated dots of light and sound. The third articulation plan consists of the computers functional architecture making it possible to create, store and share both acoustic and optic constructions in and through the digital media, sound in speech for example: sentence] morpheme] phoneme] sound] the functional architecture of the computer. Representation here is still the mediation of the selection of information and uttering, and understanding is still up to the addressee limited to the social complexity into which she has been socialized, i.e. the possible couplings of actual and potential internalized by the individual from a social environment. The geographical space is reduced in regard to the time it takes to represent a communication contribution for social observation as in the electronic media. But the third articulation plan lets cyberspace emerge as a parallel space for following the intentional object (Tække 2002).⁹ It makes it possible to be active and not only passive, i.e. you can construct places for social processes (for instance newsgroups, chat rooms, active worlds) where participation is possible despite of physical absence. This means that it is possible for social systems to emerge in cyberspace with other codes than the code of the mass media. With the example of the minority groups they now cannot only become aware of others like them, but also communicate with them making social systems in cyberspace. In a way this was possible with the simple technology of handwriting on paper, but this medium had both a time and a space bias in comparison with digital media, that did not make it possible for self-organizing interactive systems to emerge. Cyberspace-interaction is a situation where alter and ego at the same moment of time through cyberspace have their attention directed to the uttering of each other (Tække 2002: 41). Of course communication is sequential and will always have a delay, a newsgroup can have intervals up to several days, but sent by the Internet the uttering can be directed to as many as have subscribed to the group. Such a communication system would have been too complex in other media. So the digital media is a loose coupling of writing in space so e.g. texts can be circulated, constant updating / altering / negotiating meaning content and structures creating an increase in the dynamics of society (see Terje Rasmussen (2003) about the increasing space bias) The digital media is also a medium for the mass media such as

⁹ You could say that the functional architecture of the computer is a parallel to the functional architecture of the geographical space and therefore fits the philosophical description of space.

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newspapers on WWW giving them a new scope for handling the code of information +]- in the distribution of news.

The digital media gives a much larger scope to handle complexity, for example in the industry were both the departments of administration, R&D and production now all have the same basic digital technology making it is possible to differentiate the single units according to the demand of the market. But again, it is only complexity that can reduce complexity and the individual knows a lesser part of the social subsystems than ever before. For instance the business manager in a flat management structure must just trust that his employees make the right decisions on the spot; control becomes retrospective.

This has only been a very brief overview of some of the possible correlation between the social medium and its ontological basis in space, language and technology. These correlations are examples of social loose couplings of the material substance of the world into something, where meaning (actual] possible) could be printed, mediated through time (storage) and space (interaction). We end up with the most complex societal medium (possible couplings between possible and actual) until now, for making social forms (actual couplings of actual and possible). In this very differentiated and diversified society, we shall lastly look at a case of social emergence in cyberspace (on the basis of the third articulation plan) exemplifying the social micro level in regard to the social macro level.

Newsgroups as self-organizing interactive systems

The interpretation of newsgroups is realized by a strategy for analyzing communicative systems strongly inspired by Luhmann (Tække & Holmqvist 2002). It gives a three-tiered picture of News as, a.) A form in the medium of society differentiated by the technological medium of News and later also by the history of News, i.e. culture, b.) The single group as a form in the medium of News differentiated partly by the technology again, and partly by the newsgroups border of meaning and c.) The single communication as a form in the medium of the group producing / reproducing the border of meaning.

News and Society

News is the wide-ranging concept for all the newsgroups; it is a form in society differentiated out by the technology that de-couples it from other communication. It is an actual coupling of communications in the newsgroups creating News as a medium of possibilities separated from the possible communication in society. When News started in the 1980's the individuals attending News were all early advanced computer users, most of them actually working with computer technology and was trained in science. This meant that the norms for communication were influenced by a quantitative way of thinking, e.g. your signature must not take up more room than a third of the space in the email. Also a set of rules can create a rational way of handling the process of communication one time for all. We could also say that a Habermasian way of thinking, where rational consensus is thought to be the result of communication if the communication situation is ideal, is the implicit understanding of the organization of the group's communication process. This mean that News was organized so different topics could be kept in different groups and that the norms for the communication, e.g. how to address others was thought of as governed by rational rules. In the perspective of self-organized autopoietic

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systems, we could say that they were and are directed by the history of news, by a news-culture developed over time in the iterative communication, reducing the complexity by excluding possibilities, making a border of meaning for news, e.g. the netiquette.

Newsgroups and News

The single newsgroup is a form in the medium of News, differentiated partly by the technology and partly by the single newsgroup's border of meaning. If the complexity of a newsgroup gets too high, e.g. if there are too many relevant topics, a new group form or we could say that there is a bifurcation. When a group is born it is differentiated in the factual meaning dimension communicating something separated from everything else. In every groups you can find a foundation telling what the group's topic is about and what it is not about, differentiating it from all other groups. Many groups also have a FAQ with answers to the most common questions for an interpretation of the topic. Seen from the time dimension it is the past that gives the horizon of possibilities for actual selection of understanding and for the expectations for the future. Seen from the social dimension history with the results of negotiation as the consensus giving a feeling of trust to what you can find in this group and what you cannot.

Communication and newsgroups

The single communication is a form in the medium of the group, producing the border of meaning as it is, or trying to modify it by new meaning proposals hoping to get them *conditioned* (making it a condition for further communication). To reproduce the group as it is, is to condense what has been said before actualizing and confirming it. To negate a new proposal of meaning is to annul it creating memory of it as not part of the system. Because autopoietic social systems always have an unstable environment they are unstable themselves so their processing cannot be reduced to something managed according to the netiquette, the foundation or the FAQ or the rational or quantitative norms of News but of cause in relation to them. New things emerge in the surrounding world that relate to the topic of the group and the group must produce new semantics to cope with it, i.e. defining it in relation to everything else, which frequently is a rather confrontational process. Some groups are coupled to a single SGCM for instance many of the groups discussing computers related topics are bound to the SGCM of technology with the code effective | not effective, giving the premises for acceptance or rejection of a meaning proposal. The acceptance or rejection is conditioned by programs developed over time in the single groups giving them a border of meaning, as an interpretation scheme that determine what is effective. In such a group it does not help to say that with regard to the price this solution would be the best. But many other groups have their own code which can be understood as historical given pre-selections of one of the values in a couple of SGCMs.

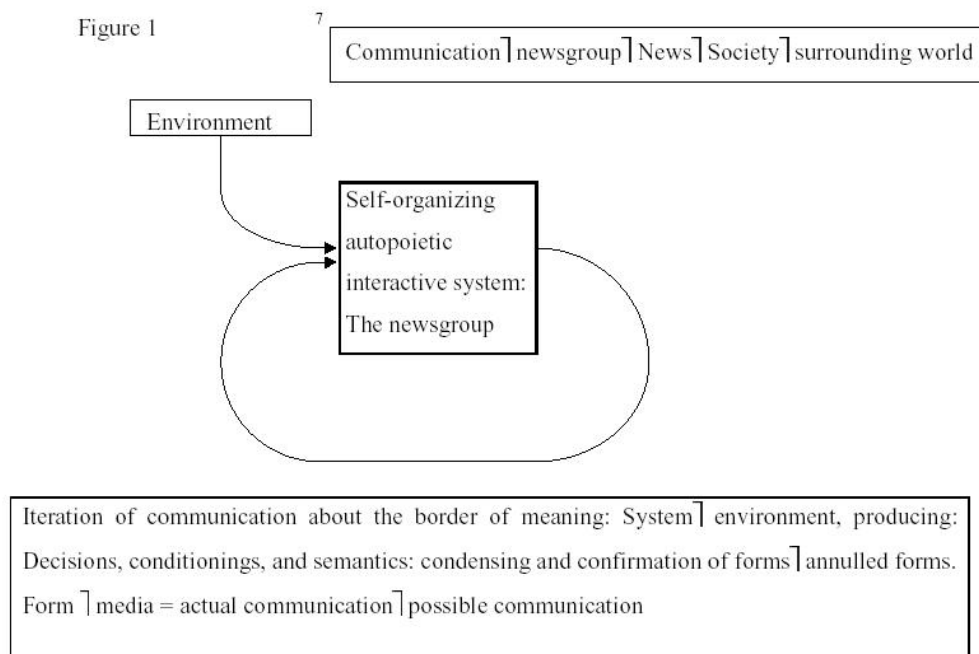
A newsgroup I studied in 2001 (dk.fritid.dyr) processed communication about pets and animal rights; most of the communication was easygoing reproducing the system's border of meaning by answering questions like, "Which vitamins should I give my lizard?" At most, the border of meaning is implicit, but if somebody tries to get a meaning proposal in opposition to it, it will be defended strongly making it explicit. Also some questions can trigger this, e.g. a person with a girl-name wrote in and asked what she should do because her desert rat was bleeding from the belly. She wrote that her friends had said that she must put it down or take it to the veterinary surgeon, but what about the price? She got an answer saying that: if you have pets you must always pay (money), it would be evil to kill it (moral) and illegal (law) and that she did not love

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her rat if she killed it (love). This is the attitude of that group and they have the following border of meaning: We have the right attitude toward animals] others. The system receives identity by the production and reproduction of opinions by making it clear what is system and what is not system. In many groups there are very unpopular members who are not thrown out permanently, giving other members the possibility to reproduce the border, getting identity out of it. Theoretically it is the re-entry of the distinction, separating the system from the environment, into the system that appears by producing it, when a member says something in opposition to the border and the others gets the possibility to defend it, making it explicit. The border of meaning is the dictator of social systems, deciding what can be said and how you can say it and no individual can determinate it. In the newsgroup, dk.fritid.dyr, you couldn't talk about your feelings on topics other than animals in the narrow sense directed by the border of meaning.

A narrow border of meaning caused the utterances of the group to be limited. This left the individual limited to the possibilities of actualizing individual potential. There are no social systems such as the family or the job and especially newsgroup that can equalize the individual and the social – we are banished from Paradise, de-coupled from or only loosely coupled to the social as surrounding world. Alterations in the system border of meaning are possible; the structure of the system can be altered through the very same structure. Every time a form (a communication contribution) is printed into or molded into the medium (the newsgroup) it is altered. From the time dimension we could say that what happened before, even though it cannot be altered, we could do in another way next time in a similar situation. There is a lot more to say about the strategy of analyzing and about newsgroups but this is just to show that self-organizing interactive systems can be described by the concept of medium.

Figure 1



10

¹⁰ The surrounding world consists of what does not communicate for instance psychic systems or stones. What communicates has an operationally produced boundary, a difference to what does not communicate. This →

Figure 1

Actual communication is, in regard to meaning, an actual coupling of the actual (what is said) to the possible (what could also have been said but was not) binding them together by the distinction. That the actual group is a form in the medium of News means that it differs from all the other groups, having another selection of possibilities for formation. With regard to News as a form in society means, again at this level, that it has only a selection of possibilities for formation. Society is a form in the surrounding world (see note10).

Medium Theory and Social Systems

In this article I have tried to give a picture of a new inter-disciplinary field of medium theory that captures the interplay between social systems and different kinds of media by using only one logical and theoretical tool. I have presented an abstract concept of media that goes beyond the term of *transmitting* and suggests the *difference of form and medium* instead, giving a theoretical scope to describe space, matter, technology, life, perception, consciousness and communication with consistency. By this medium theory it is possible to retell the history of man in relation to the increasing number of technologies of communication, from the emergence of oral language to computer mediated communication.

On the macro level I have selectively been following Luhmann's theory but I have made correlations to technology. Maybe Luhmann and many other theorists have abstained from making such correlations because they are cautious about a deterministic approach to social systems. On the one hand, Luhmann already has proclaimed that there are such correlations by saying that the social level of system formation is inappropriate from a zero point of evolution if it had not been for the emergence of different kinds of media. On the other hand it is not more deterministic to make the correlations in the way I have presented here than it is to say that gravity or other limitations define the scope for making a life. Then why did Luhmann not make such correlations? Maybe it did not interest him or maybe he just hadn't time to do it, but as he says in one of the first citations, *if the capacities of reproduction and storage increase, new structures become possible*. What meaning that becomes actualized is not determined, just that the scope for new meaning has been increased, and that is exactly what has happened through the socio-evolution by the interplay between new communication technology and social structures. This process we have been following in this article has ended up with the functionally differentiated society with its loosely coupled individuals and so many possibilities that they will never get to know more than a few.

On the micro level (also heavily drawing on Luhmann), we have seen that this medium theory can capture concrete social formations as self-organizing interactive systems and place them in

difference is copied into the system, as a distinction between self-reference and other-reference, as a re-entry of the difference into that which has been distinguished by it (Luhmann 2000: 10). As this process started the internal social differentiation process also started in interplay with new media forming the social evolution as I have described it. In this Illustration we see how the autopoietic social system is differentiated in regard to the communication in a newsgroup with help of what we could call a form | media ladder. One thing to say about it is that even in the functionary differentiated society with its millions of social possibilities, there is always a concrete communication situation that determines the border for what can be said if you want to make a social inclusion.

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relation to the macro level. It is possible to analyze how they make a border of meaning, how they reproduce it, and what possibilities it has for the communication in the group. This at the same time counts as an example of the situation of the individual in the modern society: there is always a border of meaning when we want to belong to the social that determines what we can say.

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