

Understanding understanding as pragmatic communication

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Heinz von Foerster conference, Vienna 10-16. November 2003

Understanding understanding

as pragmatic communication

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Introduction

Why do you have to act if you want to learn to see? And what is the relevance for corporate communication?

According to Heinz von Foerster's second order cybernetics, it is because the world of meaningful objects is created by our interaction between our senses and our motor exploration of the world.

In this view, he sided with Jacob von Uexküll and his *Umweltslehre*, Humberto Maturana and Francisco Varela and their autopoiesis theory and Niklas Luhmann's further development of it into a triple autopoietic model with focus on social communication as an independent closed system.

Recursive ness, black box and closure are the fundamental concepts in this revolutionary theory of cognition, information and communication – and it has consequences for practice, as we shall see.

Second order cybernetics

First of all, many researchers consider the second order cybernetic of Heinz von Foerster to be a much deeper understanding of human cognition and communication than both Shannon and Wiener's information theories, in which communication is seen as delivery of information packages transferred from sender to receiver (Brier 1996b). The further development of their theories has led us to believe that we transfer (objective) information from for instance one end of the telephone line to the other, from one speaker to the other, from the mouth of one to the ear of the other, from written messages to the eyes and brain of the receiver (Stonier).

If the receiver did not "get it", understood it, he was "wrong" and had to get it right. This was because the logical and therefore cognitive content of the message was considered to be clear and objective. It was based on logic and the symbols in it were made up on denotative symbols refereeing truthfully to the facts of reality. This was the theory of logical positivism and analytical philosophy. It is a theory that does not include the embodied observer (see Vickery and Vickery 1988) as an example. On the contrary, it deliberately excludes him/her (von Foerster 1986).

In my opinion, it is a very fundamental characteristic for second order cybernetics that it is not only open towards the social side, but it also attempts to include its realization in its theories of cognition and communication. The biosocial constructivism is central to cybernetics (Maturana and Varela 1980). Through its attention on the observer and his existence in conversation, the new second order cybernetics is attempting to bridge the gap between the natural sciences, the arts and the social sciences in a non-reductionistic way. Von Foerster documents this in the quotation below:

"Our cybernetics which was essentially beginning with a theory of observing - I would like to call it cybernetics of the first order - is a cybernetics of observed system. I look at the whole thing: what is the system doing? Can I make an interpretation for it, can I make an interpretation in the sense of what is the purpose of that system etc. etc.?"

But a second later one asks oneself: how come that I am observing this thing? What are the necessary requirements for observation? What are the functions of observing? So second-order cybernetics became then the "cybernetics of observing systems". Now, in making that statement there is a pun because it can mean two things: cybernetics of observing systems in the sense that I look at that thing, and it is an observer, and what is the theory of an observer?"

The second thing I see: I have the theory of observing, I am myself an observer, so I am doing the observing, I am including myself into the loop of argumentation. And in which way can I handle that? So, my proposition here is now that in the second phase of cybernetic evolution a serious attempt was made to cope with the epistemological and the methodological Grundlagen propositions that appear if you begin seriously to include the observer in the descriptions of his observations. With the first appearance of Maturana's autopoietic system for us all who were working in this field the suggestion was immediately made that for the first time we can start here with a biological theory of autonomy, because if we do not stipulate autonomy, observation is not an act of interaction or something like that, observation would just be a transducer kind of an idea, the concept of observation will not appear, only the concept of a transducer, a recorder"

(von Foerster 1981, p. 104)

As you can see, second order cybernetics and autopoiesis theory deal with the problems of an observer observing other observing systems and communicating with them (von Foerster 1981, 1984 and 1986).

Recursive models

The new perspective is that von Foerster is making cybernetic theories of cognition and communication form in this position. In some of his papers, he makes a model of the nervous system as a matrix in which the squares are nervous cells and in between them are the synaptic gaps, which can be filled with transmitters. It is this interface between

the perceptual and the motor part of the nervous system, which in its interaction creates our view of the world. To the left are the sensors and to the right the motor neurons, and the motor neurons also feed back on the sensors, so there is a closed circular network, a non-trivial machine that changes states with every operation. Further, working on these states are the hormonal system, changing the states of the nervous system. So, these two non-trivial machines act on each other¹. Von Foerster then makes a torus out of this model in order to reach a vision of the nervous system and its dynamics (See the first figure below). Below is a quote from his writing about the structure of the nervous system.

"Now I would like to show you something similar, referring to the sensorimotor system. Let us consider the square in figure 7 The small black squares represent aggregates of immediately adjacent fibers, which project out through the motor system. What happens when you move a hand, for example, is that, through the retina, you can observe your changes, which are then immediately fed back into the system through the receptors and in this way return to the motor system. But there is a second loop, or closure, and it is of course the one affecting the synapses by means of the hormones secreted by the hypophysis. The hypophysis, which is thickly innervated, generates a certain quantity of hormones that act on the synapses so that there is a double closure. This double loop can be represented by a figure called a torus (a doughnut). Here, the synaptic cleft between the motor and the sensory surface is represented by the striped meridian at the center of the anterior surface, while the hypophysis is represented by the dotted equator and represents the second loop."

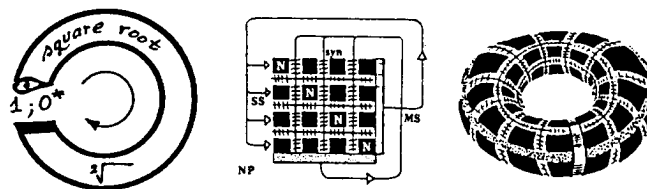


FIG. 7.—Closure in the sensorimotor system

(von Foerster 1993, p. 102)“

The first figure illustrates a function of recursive square roots. This is to demonstrate his idea of perceptual object as eigen-values. This means that some recursive interactions between the perceptual and the motor nerves develop towards stable points. Just as when you feed any number into a function of square rooting that keeps on taking the square root of the result until it reaches a stable output that will end with the number 1 as its eigen value. Thus, we have a stable eigen value that will appear as an object in the mind.

¹ There are now results, which indicate that the immune system is also a closed system, a third non-trivial machine, which again in a dynamical way is connected to the two others. The recursive interaction between these three systems is what we call the biological self!

So, the nervous system feeds back on itself, making a closed system. This is illustrated by the system of squares in the middle. This system is again fed back on itself by hormones, making a double closure. He then uses this torus model to further explain his basic concepts of cognition and autonomy and its consequences for our responsibility as autonomous beings, our ethics:

"The computations within this torus are subject to a nontrivial constraint, and this is expressed in the postulate of cognitive homeostasis:

The nervous system is organized (or organizes itself) so that it computes a stable reality.

This postulate stipulates "autonomy", that is, "self-regulation", for every living organism. ... "autonomy" becomes synonymous with "regulation of regulation". This is precisely what the doubly closed, recursively computing torus does: it regulates its own regulation.

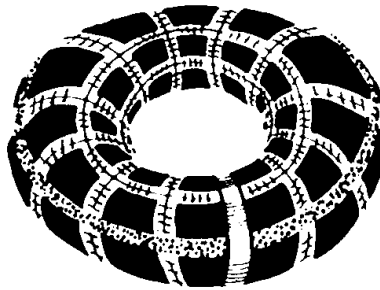


FIG. 19

It may be strange in times like these to stipulate autonomy, for autonomy implies responsibility: if I am the only one who decides how I act, then I am responsible for my action. "

(von Foerster 1988, p. 92)

So choice and responsibility become fundamental in von Foerster's epistemology and his theory of communication. Living (autonomous) systems generate a meaningful world of their own, uphold it and communicate from it as a self-evident background assumption.

The Baltic biologist and nature philosopher Jacob von Uexküll drew the model below to illustrate how objects of perception were a result of interaction between motor and perceptual clues of the nervous system.

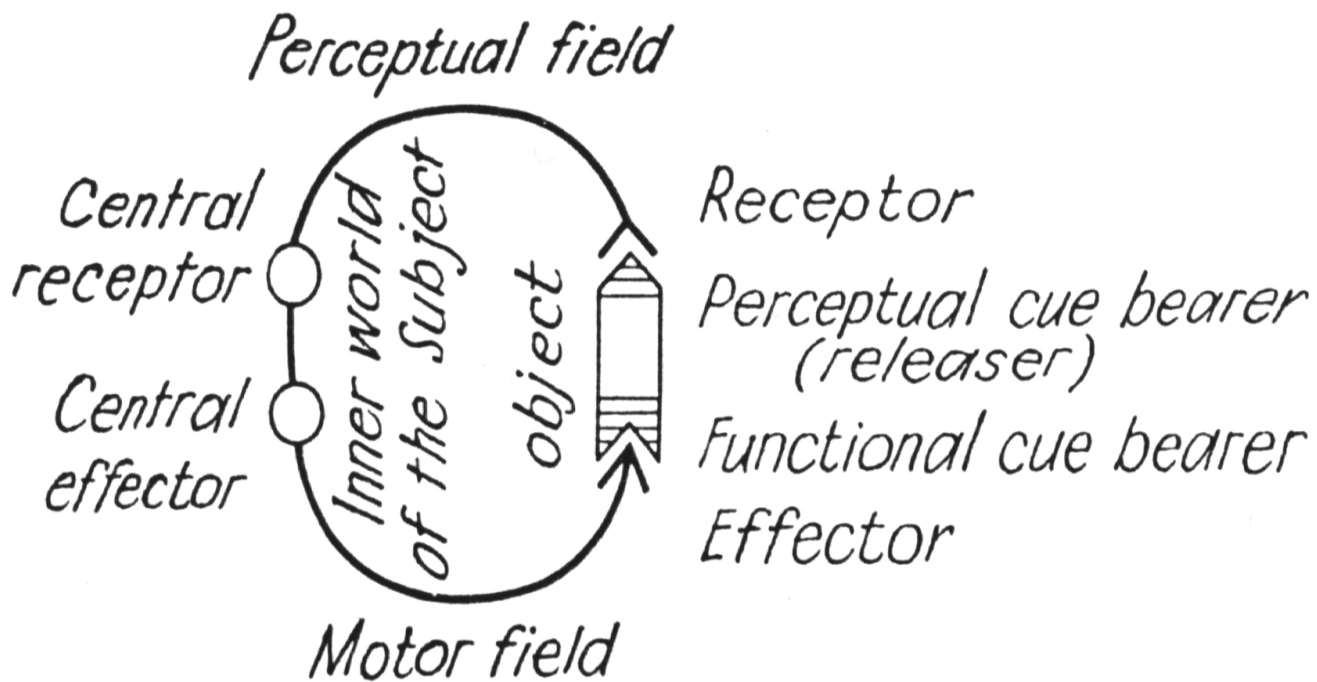


FIG. 3
Functional cycle

Figure 1: Jacob von Uexküll's functional cycle giving a cybernetic model of objects established in our perceptual world.

Von Uexküll's model is very close to the autopoietic model (auto=self, poiesis=creation). Maturana and Varela (1980, 1986) developed in interaction with von Foerster their theory of autopoiesis, in which they underline how living systems create themselves in a closed loop. Thus every input to such a system - that we are - is primarily used in the self-organizing process. There is no objective or direct access to an objective world. Which Maturana illustrates in this way:

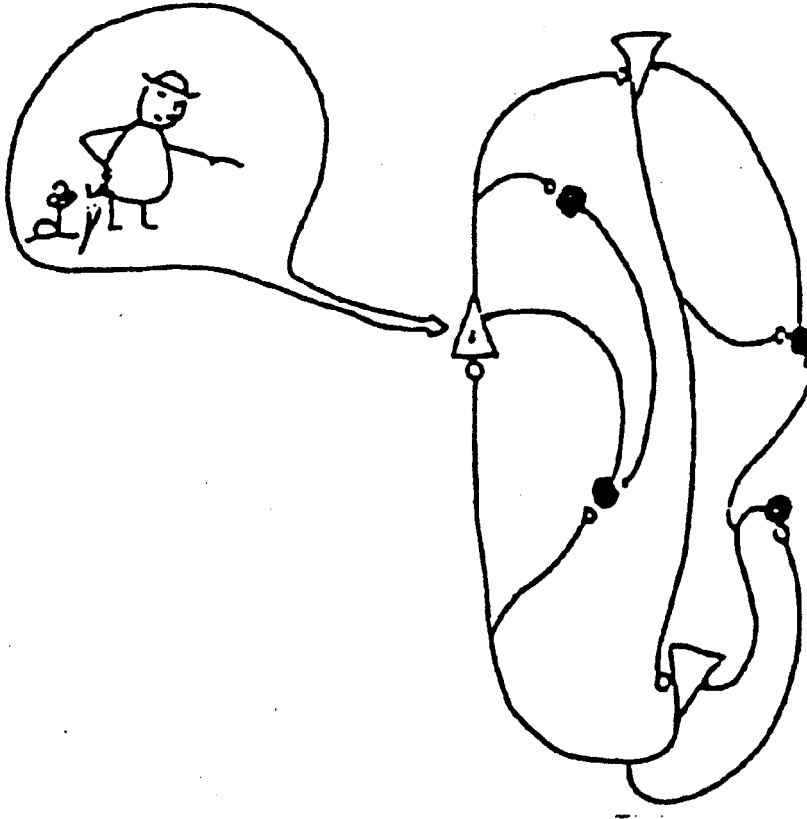


Figure 2: Maturana's drawing of how the nervous system is closed. All nerves are connected and there is nothing special about the impulses coming from the sense organs. They have to fit in with the rest of the system's internal organization for anything outside to be taken as real.

But there is an adaptation to regular stimulations that an organism needs to develop a systematic and regular response in order to survive. They are called *structural couplings*. This is an important model in second order cybernetics.

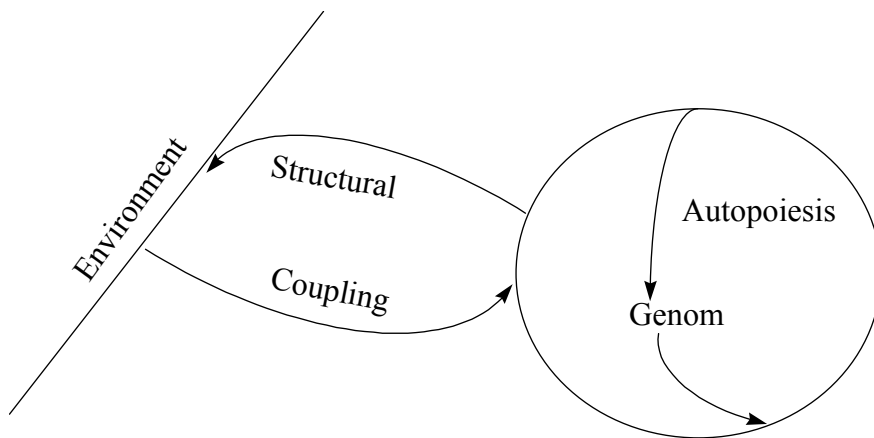


Figure 3: Graphical model of the living system and its autopoietic interaction through its genome with itself and its creation of a structural coupling with the environment that perturbrates it in a repeatable way.

Thus you do get a regular reaction on the disturbance here. The reaction is geared to preserve the system's own organization. On the biological level, it can be hard wired responses to threats, food, mating partner etc. What the ethologists call fixed action patterns.

But according to the German system theorist Niklas Luhmann, who died a couple of years before von Foerster, but was inspired by him as well as Maturana and Varela, you can extend the model to the psychological as well as the socio-communicative level.

Triple autopoiesis: Luhmann's Model

Luhmann thus puts up a triple autopoiesis model. This model of how the human biological and psychological systems organize to be able to communicate can be visualized the following way as can be seen in Figure 4:

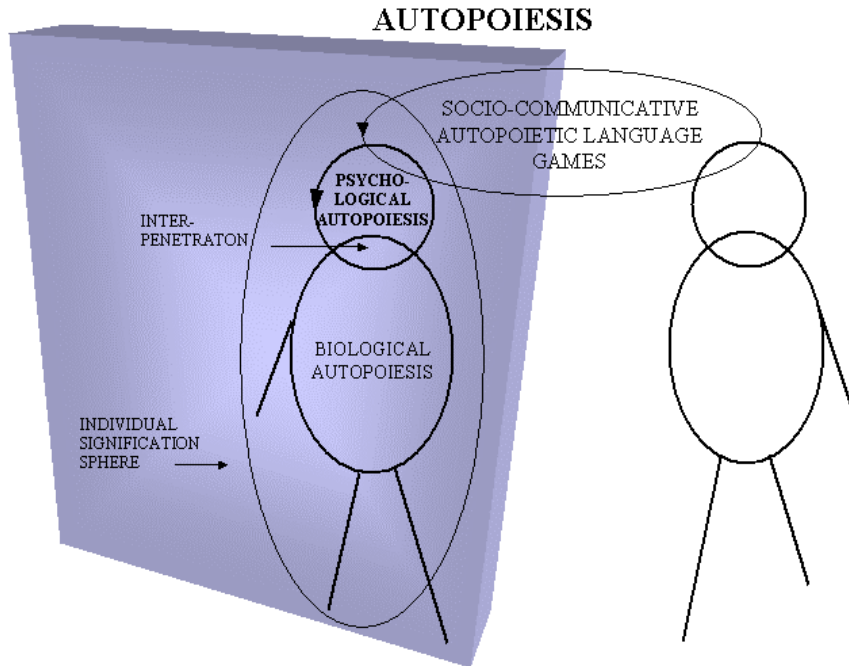


Figure 1: Three organizationally closed systems working separately make communication possible. This figure is the first in a series of visual summarizing of my theory. They are not the theory but very simplified symbolic Icons that hopefully can give some kind of visual overview easy to remember. But one must not forget that they are only symbolic, iconic pictures of the system placing in relation to the body. Psychological processes, for example, are not only in the head and so on. Signification sphere is the biosemiotic term for Uexküll's Umwelt (Uexküll 1934) and Maturana and Varela's (1980) "Cognitive domain". Their surroundings are human bodies interacting with nature and each other in 'life forms'. See Brier 2003.

I have imported Wittgenstein's term 'language games' to describe what goes on in Luhmann's socio-communicative systems (Wittgenstein 1958). The point here is that the way we talk is related to the social activity we are engaged in: the discourse at a board meeting is very different from the chat in the corridor over a cup of coffee afterwards.

Triple practice

So what is this figure telling us that can be useful in grappling with communicational problems?

1. You have to understand the language game of a message on the social level. What is the life form it refers to? What is it all about? Really?
2. You have to "get it" personal on the psychological level. You have to make your own understanding. You can learn text and give the answers you are supposed to, without a personal understanding. But a personal, existential understanding is

necessary to be able to use information practically and creatively in co-operation with others.

3. To learn to act on it, you also have to understand biological (all the way down in your guts). You have to embody your understanding. Your body has to know what it is all about. It has to get the feel of it. You have to get it down into the body as tacit knowledge (Polanyi 1973). One thing is to know about riding a bicycle, dancing tango or making the right Karate kick, but it is something else to actually do it. Knowledge in mind and brain has to be connected to the inherited knowledge of the body, especially of what it is to be a body and move in a way that conserves the body as a living system in a network of meanings and structural couplings related to your life world (Varela et. Al. 1992).

An example from a production company

The company has to reorganize to compete in a difficult market. Production, sales and management have to work closer together to cut down costs and to be more innovative. They have several meetings. But:

1. The production people have problems understanding the words the marketing department uses and visa versa.
2. When they have learned the meanings of the special words, they may still have problems understanding the world they relate to, because they do not have the experience of the sales world.
3. Further the production people have never been in the actual physical situation with other people (potential buyers) and tried to close a sale, looking for that final argument or promise that will persuade the buyer to do it – the right prize being essential one of them.
4. The marketing people do not understand the technical quality fascination of the engineers and toolmakers. They do not have the experience to create complicated objects with their brains and hands using machines.
5. Further the marketing people do not know the pride of making fine things of craftsmanship with high professional quality. They usually see everything as a commodity and mostly care if they can sell it.

Two different social language games, two different life forms (Wittgenstein 1958), very different emotions and existential goals attached to the situation and very different bodily experiences.

Still, they have to cooperate. And they have to get the message from management that is in a completely different kind of political leadership game. Management in knowledge heavy organizations with a lot of specialists does not know very much about the different specialists areas. Still, they have to lead them all.

The specialists have to understand what is wanted. How? By listening carefully?

That is not enough.

1. They have to be a part of the decision process.
2. They have to know all the aspects of the reality they are acting in.
3. They have to understand their part and their interdependency with the other shareholders.

To make that possible they all have to create a common reality together and in practice that give meaning to all. This is the major problem of communication and management in any organization with various types of knowledge specialists that have to work together. In Brier (1996a), I have analyzed the problems of knowledge organization around the problem of document retrieval, which is essential in any larger company.

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09/10/2003

Workshop with Søren Brier at the Heinz von Foerster conference

Understanding is finding a common context

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To understand what somebody else means in communication is only partially a logical process.

1. All communication is done in closed systems, von Foerster and Luhmann say.
2. Wittgenstein talked about language games in specific life forms. Life forms are the things we do: playing, joking, commanding, chatting, giving an order, teaching, therapy, trying to understand each other, being ironic, dominating.
3. Behind the form, there is an intension.
4. The intension is supported by factual information and arguments.
5. To understand something you have to know the context and the intension.
6. All thinking and communication presume a worldview and a theory of the human as the ultimate context. What it is to be a “real man” and a “real woman” differs from culture to culture and in historical times. For instance, in China the concepts are connected to the deepest ontological principle, namely that of Ying and Yang. In the West, they will ultimately be connected to an evolutionary view of the development of life and to the development of culture.

The problem is that most often the context and the purpose are implicit

We do not usually have time to explain everything from the bottom every time we need to tell something to somebody; and often we have not reflected consciously on the deep backgrounds of the ways we speak. That takes linguistic, sociological, historical, philosophical and mythological analysis. Thus:

1. Whenever somebody talks to us, we have to guess on the context and the purpose.
2. Luhmann says that we make three choices or interpretations to construct or interpret a message: Information, utterance and meaning. What are the facts?

How is it said? What is the intension of its relation to the (communication) situation?

We have to abduct the context and the intension in communication

As meaning is so dependent on context and intension, we cannot find out what a message “is all about” if we do not have a context. So we have to make “educated guesses” or what Peirce calls ‘abduction’. We use all of our life experience and compare the situation to that and then we pick an interpretation of what is going on: “Ah, I think that he is actually trying to sell me something, this is not a friendly conversation” for instance.

The context choice can be for instance “business or pleasure” as above, “personal or academic”, “polite or direct” “peer to peer or “higher ranking to lower ranking”. An aspect of that is what the opposite part wants to get out of the communication relationship. If this guy wants to teach us, pull our leg, bring us down or just inform us of something of mutual interest to make a “win-win situation”.

Thus we make abduction. We use all we know to find a connection and meaning in the information that comes from the other person.

Choices of interpretation in communication

Luhmann stresses that both the sender and the receiver have to make their choices to produce a meaningful message. Information is choices related to subject matter, utterance is choices pertaining to the way to say something, and meaning is the choices of interpretation of the listener depending on his evaluation of the human context.

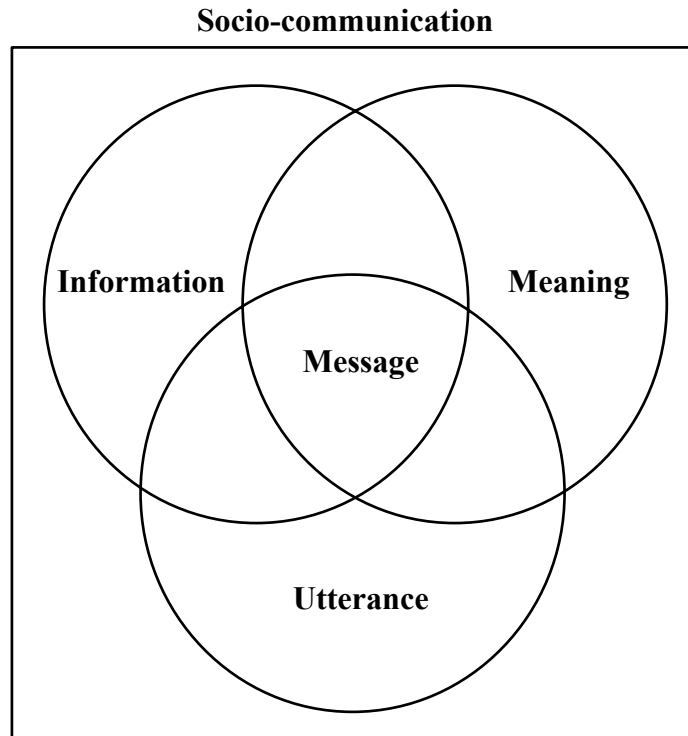


Figure 2: A model of how Luhmann understands of the components of the communicative message. Both the sender and the receiver have to make choices - or selections as Luhmann writes - in all three areas to produce a message. Although, his view of information is partly connected to a Shannon's concept, Luhmann does not believe in its use outside communication.

Examples of the things we guess on:

1. What he is up to? Intentions for our relation.
2. From where does he speak? How does he see himself in relation to me? Friend-foes? Superior-submissive, equal-in command? In our common interest?
3. What is his view of the situation? That I made all the mistakes? We are in trouble? That we need to cooperate?
4. What is his worldview? He is male, I am female and therefore he is in charge? He is white, I am black and therefore? His older and therefore? These communications are to make the other one submit to his understanding? That there is only one reality: the one he sees?
5. Does he have the same view on promises as I, or does he think that they are only valid until the situation changes? Is his concept of truth and rationality the same as mine?

Well, science has shown us that reality is very complex and can be interpreted in many ways. There are many valid interpretations. No one can be taken for given. We cannot expect a common worldview. We have to negotiate and mutually understand to find a common working definition. Never expect other people just to see things "as they are",

because that usually means “my interpretation”. Reality is – to a large degree – a product of our interpretation.

The problems and questions of the workshop

I want the participants to give each at least one story about misunderstanding of contexts and explain what the problem of misunderstanding was: For instance, cultural differences, personal differences, different ways of doing business, worldview and assumptions of gender behaviour, etc. We will go through such a round and discuss those insights the examples give us, and how to avoid the mistakes.