Philosophical foundations for a zigzag theory structure

Martin Andersson
Stockholm School of Economics
Philosophical foundations for a zigzag theory structure

Martin Andersson
Stockholm School of Economics, department of Information Management
martin.andersson@hhs.se

ABSTRACT
This paper describes a specific zigzag theory structure and relates its application to the information systems field. The foundations discussed are related to reality, knowledge, action and theory structure. The zigzag theory structure can be differentiated and used to describe task processes such as information systems development, and the use of information systems in business processes.

Keywords
Ontology, epistemology, zigzag theory structure, information systems.

INTRODUCTION
The questions about what is real and how we can gain knowledge about reality are fundamental to research as well as change processes in organizations. Lundeberg (1993) stresses the importance of these questions in the basic encouragement to “perceive reality as it is”. The background to the basic philosophical foundations presented here is that I am working with a framework for project result improvement in organizations (see Andersson, 2003). In this work, I have had two difficult challenges before developing the domain specific contents of the framework itself. The first has been to find a suitable theory structure for the framework. What types of constructs should I use? How should the constructs in the framework be related to each other? I found the idea of “causality”, which is often explicitly or implicitly used in models and frameworks, to be problematic, and sought a theory structure that was more in harmony with the social context I was studying. The second challenge has been to describe the link between the framework and reality. How are the concepts in the framework related to reality?

In this paper, I will present the basic foundations for a zigzag theory structure in a condensed form. For me, philosophical inquiries contribute to making my assumptions explicit. I have no basis for arguing that the view presented here is superior to any other. What I want to do is to provide a comment that can provide inspiration as a complement to other views. Such discussions can be beneficial for the development of domain specific theory (Markus & Robey, 1988, p. 583). I have developed what is written here in my own unique way, with lots of inspiration from others, and I do not expect other individuals to be different in this respect. The paper is therefore written to inspire rather than to convince.

The basis for the view I take is a theory structure presented by Bateson (1979). I have chosen to use the term “zigzag theory structure” to refer to what I see as one of the core messages in his theorizing. However, I have made my own interpretation of Bateson’s texts, in some cases changing the meaning of central concepts. I have also added other references, and tried to create a view that is internally consistent and coherent. It is a structuration and selection of concepts that I find central and useful as a basis for developing domain specific theory. The main part of the foundations are described prior to adopting an information systems, or information management perspective on reality. The paper thus provides the foundations for theory development. In the following, I will describe the view taken on the relationship between reality and knowledge. I will also describe the relationship to acting in task processes, and link to information systems.

KNOWLEDGE IS A SUBSET OF REALITY – KNOWLEDGE ABOUT REALITY IS INDIRECT
What is the relationship between knowledge and reality? In my view, the inquiry needs to be addressed from two sides at the same time. In order to provide a view of what is real, we also need to provide a view on how we can know that it is real. Heidegger has argued that by asking a question such as “What is ‘Being’?”, we can see that we already have some understanding for the Being we are directing our inquiry towards, and by being able to inquire, the inquirer is an entity, and as such has its own character of Being (Heidegger, 1962, pp. 24-25). In other words, even by simplifying the question by removing the presupposition of knowledge, the bare asking about reality implies that there is something like knowledge. The term “knowledge” will initially be treated in broad sense, including description, experience, information, meaning, idea,
frame of reference, model and perspective. I use several words since I want to relate to the terms used by the authors I refer to. In the section related to epistemology, I will describe the terms I use, and the relationships between them.

I start the presentation of my view with a statement of a unity between knowledge and reality. When we look at a number of trees, we can say that we believe that the trees exist in reality. However, the knowledge about the trees also exists in reality, since we who have the knowledge are a part of reality. Knowledge about reality is thus a subset of reality and therefore as real as reality itself.

We can now discuss the relationship between knowledge and reality. I take the stance that it is not possible to perceive reality directly (Bateson, 1979). Korzybski (1941) used the statement “The map is not the territory” which addresses the difference between reality and descriptions of reality. In the case of the map, it is clear that there is a distinction. We can hold the map in our hands, but it is much more difficult to hold the reality the map refers to in our hands in the same way. Bateson (1979) expressed the idea in more general terms by saying that “the name is not the thing named”.

Thought can be about pigs or coconuts, but there are no pigs or coconuts in the brain; and in the mind, there are no neurons, only ideas of pigs and coconuts. There is, therefore, always a certain complementarity between the mind and the matter of its computation. The process of coding or representation that substitutes the idea of pig or coconut for the things is already a step, even a vast jump, in logical typing. The name is not the thing named, and the idea of pig is not the pig. (Bateson, 1979, p. 205).

The indirect relationship between knowledge in a wide sense and reality can also be described in terms of the infological equation that was developed by Langefors (1966). In short, the equation states that information is the result of an interpretation process in which data is interpreted using the frame of reference of the person making the interpretation. The frame of reference consists of the total experiences and knowledge held by the person. Since different persons have different frames of references, the same data can have different meaning for different persons. There are thus multiple versions of knowledge even related to the same part of reality.

KNOWLEDGE IS GAINED THROUGH MULTIPLE COMPARISON

If it is impossible to get direct information about reality, what can we do to improve our understanding of it? We need to find some other anchor for our evaluation of reality than reality itself. Bateson has described a manner of search that he calls the principle of double or multiple comparison. The principle can be summarized in the simple statement that: “two descriptions are better than one” (Bateson, 1979, p. 71). He illustrates the idea with the added value of having two eyes rather than one. The depth information is achieved by comparing the descriptions from both eyes. In other words, by comparing descriptions with other descriptions we can get additional information. In a more general sense, Bateson describes explanation as “the mapping of description onto tautology” (Bateson, 1979, p 87). To simplify the presentation of Bateson’s argument, we can use the word ‘model’ instead of ‘tautology’.

Tautology contains no information whatsoever, and explanation (the mapping of description onto tautology) contains only the information that was present in the description. The “mapping” asserts implicitly that the links which hold the tautology together correspond to relations which obtain in the description. Description, on the other hand, contains information but no logic and no explanation. (Bateson, 1979, p 87).

A model contains no information whatsoever about the reality that is to be explained. It is just a model. The process of explanation is about finding a model, such as that when we compare our description of the phenomenon with the model, the mapping becomes acceptable to us. To create an explanation, we thus seek a reasonable fit between our description and our
model. The influence goes in both directions. What models we have to choose from influence what descriptions we can make, and the descriptions we have influence what models we find reasonable. The descriptions can be either quantitative or qualitative. In both cases, it is our description of reality that is compared with the model, rather than reality itself. Lee writes that there is no way to induce, generalize or otherwise formulate theory from data or observations alone (Lee, 2003). The process of finding an explanation is thus abductive rather than purely inductive or deductive (Bateson, 1979).

The explanation becomes acceptable if we are willing and able to accept the links of the model. This is a matter of personal faith. Bateson writes metaphorically that the point of the probe always is in the heart of the explorer (Bateson, 1979, p. 93). The model provides a good explanation in my mind. Are there then only different tautologies and descriptions, or can some mappings be called “truth”? According to Bateson, the closest we can come to truth is our ideas about patterns (represented by the arrow in Figure 2). Since direct perception of reality is not possible, patterns of ideas is as close as we can get to ultimate truth both in terms of knowledge about the world, and as a subset of reality.

FORMAL CATEGORIES OF REALITY: FORM, PROCESS AND RELATIONSHIP

Until now we have not discussed the types of categories that we have based the ontology on. What are knowledge and reality really examples of? Under what general form can they be ordered? Husserl (1900/1970) placed great value on the formal essence of concepts and laws, and argued that we should go back to the essence of theory in its pure form, which regulate all specialization of the idea of theory in its possible kinds. He distinguished between the formal ontology and the material ontology, which provides the concrete categories of the formal ontology.

The formal ontology I will use here is based on the theory structure provided by Bateson (1979). It can be related to cybernetics (see for example Ashby, 1954), structuration theory (Giddens, 1984), context theory (Wilden, 1987) and the structure of metaphysics described by Pirsig (1991). My selection and use of this theoretical structure has been inspired by the work of Lundeberg (1993). Bateson held the principle of avoiding paradox in theory high, and used ideas from the theory of logical types, provided by Whitehead & Russell (1910), as one important cornerstone. However, in applying the theory of logical types to ‘reality’, he found that classification in different logical types was not sufficient. The division in classes, was not rich enough to describe mental and biological systems. He argued that these were characterized by a dialectic zigzag ladder between what he calls form and process. Bateson (1979) writes:

…”when we take the notion of logical typing out of the field of abstract logic and start to map real biological events onto the hierarchies of this paradigm, we shall immediately encounter the fact that in the world of mental and biological systems, the hierarchy is not only a list of classes, classes of classes and classes of classes of classes but has also become a zigzag ladder of dialectic between form and process.

The idea of form and process provides two central formal constructs. The metaphor with a zigzag ladder also provides a basis for describing relationships between forms and processes. The formal ontology provides my most basic assumption about the structure of reality. This theory structure provides guidance for further theory development.

Figure 2. Explanation, the mapping of description onto tautology.
A central difference between form and process is that process as a construct includes dynamic time, whereas forms do not have dynamic time as a part in the concept. The zigzag ladder is described as dialectic, which is important since it opens up for a type of relationship that involves mutual influence between forms and processes over time. The term dialectic is here used to refer to tension that can have influence in both directions of a relationship. The zigzag ladder can also be described in terms of dialectic hierarchic control, or as cybernetic calibration. Higher levels control, or govern lower levels in dialectic processes of calibration, where lower levels also can limit the possibilities of control.

MATERIAL CATEGORIES OF REALITY: MIND AND NATURE

The material ontology provides the concrete categories that are based on the principles from the formal ontology. Reality is assumed to consist of related forms and processes in accordance with the zigzag theory structure. We have distinguished between reality and knowledge about reality, stating that knowledge about reality is indirect in relation to the reality it is about. The map is not the territory, the name is not the thing named and we never have pigs or coconuts in our heads. However, we have also stated that knowledge is a subset of reality. In terms of ontological assumptions about reality, there are at least two “sorts” of reality. A critical line between them is whether the reality we refer to is fundamentally about knowledge or not. Knowledge can only exist if there are minds – and minds can only exist in reality.

Bateson worked with creating a set of criteria for mental process (Bateson, 1979, pp. 97-137). In his view mind requires collateral energy and consists of interacting parts, which have the possibility to identify and be triggered by differences. The modes of mental process are circular determination, or more complex patterns of interaction. The differences treated by mind are coded versions rather than the differences in themselves. He argued that mind must be capable of distinguishing between logical types, for example between message and meta-message. The important point is not that this list of criteria for mental process and mind is in any way final. The message is rather that it is an assumption that the logics of the workings of mind are partly different from the logics of the workings of the rest of reality, and that criteria for differentiating between them are important. Based on the work of Bateson, I take it that there are two main sorts of reality: something that we can call mind and something that we can call nature (Bateson, 1979).

The relationship between mind and nature is here seen as one of hierarchical dependence. Mind builds on, and interacts with nature, and cannot exist without nature. For Bateson, mind and nature was a necessary unity in ‘creatura’, the world of the living (Bateson, 1979, p. 7). This is also in harmony with the view presented by Wilden (1987, p. 74). He distinguishes between four orders of complexity: inorganic nature, organic nature, society and culture. According to Wilden, these orders of complexity form a hierarchy of dependence. The relationship is called “dependence” since each higher order of complexity as an open system is dependent on, and therefore limited by, the orders below. For example, society cannot exist without nature (Wilden, 1987, p. 74). Pirsig (1991) has described the world in terms of four levels that can be described as static or dynamic in a similar fashion. The four levels in his view are inorganic level, biological level, social level and intellectual level. He describes their relationships as dialectic interplay between the levels. Higher levels strive to dominate the lower, which partly act as resistance. In Bateson’s view, the world of the living evolves in two great stochastic processes; evolution and learning (Bateson, 1979).

I use the basic idea of mind and nature from Bateson, and also include the idea of process in the material ontology. Bateson did not formally present the model as shown below. In my use of this theory, nature can be described in terms of organic and inorganic. This is similar to and inspired by the ideas presented by Wilden and Pirsig. I use the terms evolution and learning as the processes that bridge the inorganic with the organic, and the organic with mind.
In essence, what I assume exists is the *principle* that reality is organized in a zigzag structure, and I use the names mind, organic nature and inorganic nature to refer to the forms of reality, and the names learning and evolution for the processes in which the forms are changed over time. An important difference between evolution and learning is that learning is a matter of a single lifetime, whereas evolution is a matter of multiple generations of many individuals. The relationship between higher and lower levels is one of hierarchical dependence. Higher levels are dependent on lower levels for their existence. However, there is also another type of dependence that goes in the other direction. Higher levels can influence lower levels in partly stochastic processes.

**EPISTEMOLOGY: LEVELS OF LEARNING**

We can now go on and focus the discussion on different levels and processes of mind. The view I take here is developed based on Bateson (1979), Langefors (1966) and Bandler & Grinder (1982). These authors have addressed processes of mind on what can be described as several levels of form and process related to learning. There are overlaps in the views of the authors, so the argument I present could be presented differently and the names I have chosen could have been chosen differently. Langefors (1966) presents ideas about the relationship between data and information in his infological equation. Bateson (1979) provides ideas about the relationship between information and knowledge. Ideas of Bandler & Grinder (1982) can be used to link knowledge and perspective taken. Support for parts of this view can also be found in Checkland & Holwell (1998, p. 90). They provide links between data, capta, information and knowledge.

In the view presented here, there is an interplay between what can be perceived (data), our perceptions, the capta we gather from our perceptions and the processes of interpretation in which this capta is transformed to information. This reasoning is based on the infological equation (Langefors, 1966). Data is here defined as what can be perceived, and capta is defined as what is captured from what can be perceived. Capta is thus a coded subset of the data available. Capta is the basis for our interpretations. The information we have as a result of our interpretations can be used in processes of explanation, making use of the knowledge we have at the time (Bateson, 1979). The knowledge to use is influenced by the perspective taken in processes of framing (Bandler & Grinder, 1982).

It should be noted that I now use the term knowledge in a restrictive sense. Knowledge can only exist in mind. Another central requirement for knowledge is that it is related to a class of phenomenon, or the general, rather than the specific. If it is related to the specific, it is information. Generalizations that do not contribute to explanation are not seen as knowledge here. A pattern is just a pattern if it cannot be explained. With this view, truth in mind is the result of a successful mapping of information onto knowledge in a process of explanation, framed from a specific perspective.
Andersson

Philosophical foundations for a zigzag theory structure

Figure 5. Mind and learning.

All levels of form and process are required over a lifetime in order to stop mind from runaway or standstill. This can be described with the cybernetic idea of moderation and control. Perspective and processes of framing are required in order to moderate and control all the information that is built up and be a basis for selecting what knowledge to use in our explanations. Without moderation, information overflow will be the result. In the other end, data is required in order to feed processes of perception and interpretation. With this view, mind can be described as having the potential to do otherwise, or having a weak form of free will (Walter, 2001). The awareness of different framings is important in this respect since it provides a possibility to choose from what perspective a situation is to be understood, rather than taking a certain perspective for granted without conscious reflection.

Having framed the above as an epistemological issue, we must also acknowledge that what has been said is assumed to be a part of reality. Therefore, it could as well be described as ontological assumptions about the workings of the mind with regards to learning. However, since these processes are processes of learning, I refer the descriptions of mind and learning to the epistemological part of the presented view. A summary illustration of the formal ontology, material ontology and epistemology is presented in Figure 6.

Figure 6. Formal ontology, material ontology and epistemology.

LEARNING AND ACTING IN TASK PROCESSES

On the individual level, learning can be described for a particular individual in terms of interactions between mind and body (organic nature). We can now continue to ask about relationships between mind and acting, and between acting and artifacts (inorganic nature). The two main columns from Figure 5 have been vertically mirrored in Figure 7 below. I have done this to describe the relationship between learning and acting. The main line of argument in the model goes from the bottom left side of the model, up to perspective and then down to action on the right side. Without a process of framing, there is no basis for judgment (inspired by Gadamer, 1975). Framing can influence decision processes (Kahneman & Tversky, 1979). Without knowledge, there is no basis for arguments to use in decision processes as a basis for projecting a course of action. The processes of representing and signalling are required to initiate bodily action. However by reframing on the left side, new arguments can be found on the right side. By projecting a course of action, difficulties can be foreseen, forcing the line of
argument back to the left side to find new knowledge. Also, new capta can result in that the line of argument does not hold. The explanation from the selected perspective may not be sufficiently valid in the light of new information. It should be noted that the mentioned processes often are unconscious and that dialectic calibration is assumed to characterize the relationships.

The explanation from the selected perspective may not be sufficiently valid in the light of new information. It should be noted that the mentioned processes often are unconscious and that dialectic calibration is assumed to characterize the relationships.

The lower levels provide a schematic interface between mind, body and the rest of reality. Data (from reality) is perceived and action (in reality) is signalled via bodily organs. Learning and acting can be described as interplay between mind and body. Performing tasks can be described in terms of interplay between body and artifacts. Over time, we can describe processes as preconditions and results on the mind, body and artifact levels. A person’s use of an information system covers all levels of reality described here. Mind interacts with body, which interacts with the information system. This description of a process in terms of preconditions and results on different levels is inspired by the X-model (Lundeberg, 1993).

From an information systems perspective, information systems artifacts are in special focus. We should here link back to Figure 2 and highlight that an “information system” is a model in our minds. To describe a phenomenon as “an information system” is a matter of framing. We have no direct perception of “artifacts” in reality. We can use the name “represented information” to refer to the contents of information systems as a reminder that the artifact that has been created is different from the information in mind. Represented information is then different from data in that represented information is the artifact result of a conscious process, whereas data is everything we can perceive. Task processes on different levels can be described using the model in Figure 8. For example, the model can be used to describe information systems strategy development, information systems development and implementation, and the use of information systems in a business process.
CONCLUSION

I started this paper by referring to Lundeberg’s basic encouragement to “perceive reality as it is”. It is a part of reality that persons have different perspectives on reality. When theory is developed from an information systems perspective, some aspects of a phenomenon in reality are highlighted, but other aspects are left out of the picture. A consequence of making the distinction between a phenomenon in reality and the perspective that provides the framing is that it is important not only to describe the model and the information the model contributes to explaining, but also to explicate the perspective that has been used in the development of the knowledge. The zigzag theory structure as described in Figure 5 is thus an invitation to ask the question: from what perspective is the explanation believed to be true?

By separating ontology and epistemology from the perspective used in theory development within the information systems field, the assumptions about what is real and how knowledge can be gained can be used in the development of theory. The organizations, persons and information systems we study are presumably subject to the reality described in the philosophical foundations. These foundations can thus provide one anchor for theory development. In other words, the philosophical foundations have concrete implications for theory development both as inspiration for theory development and as a reality check for the theory we create. The zigzag theory structure thus provides an opportunity to reflect on the question: what are the relationships between elements in a given model and reality?

The zigzag theory structure provides a basis for differentiating descriptions of reality on several interrelated levels, which evokes the question: what type of logic is suitable for describing the type of reality I am referring to? Since the zigzag theory structure explicitly includes time in processes, an important implication is that theory development needs to take the consequences of the existence of time in the theory that is developed. The route taken here has been to open up for the possibility of mutual influence between forms and processes on several levels over time. One consequence of this idea is that prediction may involve circular determination, or more complex patterns of interaction. Where there is the possibility to do otherwise, where something like mind can learn, and where there is something like evolution, prediction is contingent on the specifics of a particular process.

As indicated in the introduction, the aim has been to provide a structure related to some concepts I have found important. I believe that the philosophical foundations of information systems are inherently personal. Hopefully, this small contribution can provide inspiration in some part of what has been discussed.

ACKNOWLEDGMENTS

I am grateful for the financial support provided by the Stockholm School of Economics and VINNOVA and for the support of my colleagues at SSE. I particularly want to thank Professor Mats Lundeberg, who has encouraged my attempts to explicate fundamental patterns and assumptions. I am also grateful to the persons in the organization “Alfa”, where I carried out the clinical work that has inspired the development of the ideas presented here and to the reviewers who provided valuable comments on the paper.

REFERENCES


