

CHAPTER 7

The role of metaphors in acquiring and transmitting knowledge

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7.1. Introduction

In a world of work where services are increasingly replacing industrial production, employee knowledge is becoming increasingly important. Knowledge is frequently the main means of production and knowledge is the product being sold (Nonaka and Takeuchi, 1995; Probst et al., 1997). Organisations are adopting more flexible work structures and, more than ever before, employees in various departments of an organisation must now work together, for restricted periods of time, in project groups that are frequently distributed across various sites (Boos, 1996; Tschan, 2000; Turner, 2001). This places high demands on employees with respect to cooperation and communication (Moser, 2002; Moser et al., 2000).

People with varying qualifications and different tasks and roles now have to communicate with each other in person, by telephone and electronically to contribute their knowledge to the work process. Knowledge cooperation in interdisciplinary work groups requires a high level of understanding of the entire work process. It demands the ability to perceive a product from a variety of perspectives and the ability to articulate one's own perspective in such a way that it is easily understood (Moser, 2003a; Thompson et al., 1999).

The concept of 'work process knowledge' describes an essential component of these new work demands: it refers to knowledge of how work processes (production, sales, development, and so on) are organised (Fischer, 2000; 2001). This knowledge comprises academic/technical knowledge of the specific field, knowledge of the required machines and facilities, knowledge of the customer base and the market and also knowledge of the culture of the organisation, that is, the way in which projects are usually processed in a specific organisation.

Important components of work process knowledge are acquired via experience and they usually remain tacit. New working methods are now making it necessary for organisations to make this implicit knowledge explicit to a certain extent. Explicit knowledge is required so that knowledge can be exchanged in interdisciplinary groups and so that mutually produced goods can be developed and sold.

If we wish to make implicit knowledge explicit, language is of crucial importance. For one thing, language is the medium in which various implicit perspectives of the same object and implicit knowledge of this object are represented. In knowledge management projects, implicit knowledge has to be captured largely via analysis of actor-specific language. First, techniques of communication and language analysis are core methods of knowledge management. Second, language is the main medium for representing implicit knowledge as well as the medium for reflecting upon and discussing the meaning of this implicit knowledge.

A possible method of capturing and representing implicit knowledge in language is via metaphor analysis (Moser, 2000a, 2000b, 2001, 2003b). Taking the example of knowledge management, this paper sets out to demonstrate how metaphors can be used to explicate the implicit understanding various actors have as well as to create a mutual basis for communication and knowledge in interdisciplinary work groups. The fundamental issue we must address is the question of how knowledge is represented to allow a sufficient degree of understanding to serve as the basis for action in decision-making, planning, and problem solving (Moser, 2003a).

7.2. The metaphorical representation of knowledge

Metaphors are analogies that project a so-called 'source domain' (the water cycle, for example) onto a 'target domain' (money, for example). In this mapping process, the cognitive structural template of the source domain with its slots is projected onto the target domain. The process of building metaphors using analogies can be illustrated using the example of the metaphor model 'money is water'. In this metaphor model, 'water' is the source domain, and 'money' is the target domain. ⁽²⁹⁾ The source domain 'water' has the following structuring:

⁽²⁹⁾ The domain 'money' can be structured cognitively using other source domains, as well. Language often offers alternative possibilities, as the other examples of metaphors in the domain 'knowledge management' that are presented here will show.

Cognitive structuring of the source domain 'water':

Source – River – Ocean

Cognitive structuring of 'water' transposed onto the target domain 'money':

Money source – Flow of money –

The three slots of the source domain are transposed onto the target domain, which allows the abstract concept of 'money' to be structured cognitively and understood in analogy to the water cycle. As this example shows, it is not necessary that every slot of the source domain be filled in the target domain as well. In German, for example, there is no metaphor 'ocean of money'. However, based on the underlying metaphorical cognitive model of money = water, the expression 'ocean of money' is understandable all the same. Inverted, however, in the transposition process no new slots can be created in the target domain that are not given for the source domain. This would destroy the basic analogy between the source and target domains.

In the German language, the metaphor model 'money is water' has led to the creation of a great number of metaphorical expressions. The same is true of English, as the following examples show: 'source of income'; 'flow of money'; 'capital flow'; money 'circulates'; money can 'pour in'; money goes 'down the drain'; money sources can 'run dry'; money runs through your hands 'like water'; you can 'swim in money'; you can be 'solvent'; assets can be 'liquidated' or 'frozen', and many more.

As the above examples show, our concern is with lexical metaphors or conventional metaphorical expressions that are commonly used in any particular language. Such metaphors are learned during language acquisition. We do not include metaphors that are constructed deliberately for literary texts, for example, or for advertising or politics.

This understanding of metaphors is based on the metaphor theory of cognitive linguistics first formulated by Lakoff and Johnson in 1980 in 'Metaphors we live by' (Lakoff and Johnson, 1980). The theoretical assumptions presented in that publication led to a new understanding of metaphors and triggered a large body of empirical research and literature in the fields of cognitive linguistics and the cognitive sciences, particularly in the English-speaking world (Ortony, 1993). Since then, Lakoff and Johnson have undertaken several revisions and further specifications of their original theses (Johnson, 1987; Lakoff, 1987 and 1993). The metaphor theory in cognitive linguistics following Lakoff and Johnson starts out from the following assumptions (Moser, 2000b, 2003b): when a metaphor is created, experience that was originally sensory (for example, the experience of water

that we drink or that we swim in) is transposed onto abstract contents (such as money, electric current) according to the principle of analogy build in Metaphorical transposing, therefore, transmits a sensory quality as well: being an aid towards cognitive structuring that make abstract concepts comprehensible, 'tangible', and accessible. With this, metaphors can reduce complexity and establish meaningful references to known experience.

The models that underlie metaphors are not an expression of language but an expression of thought. These models are an indication of the cognitive structuring of experience, that in turn determines actions and thinking.

Metaphorical expressions cannot be generated and combined arbitrarily. Cultural and social conventions determine whether a metaphor is comprehensible and socially acceptable in a particular language culture. These conventions are reflected in the lexical metaphor stock of a language and they even undergo historical development (for example, the development of the automobile and the computer has given rise to new metaphors, such as 'change gears', 'improve team interfaces', and so on). Lexical metaphors have several characteristics that are pertinent to the investigation of work process knowledge.

The use of conventional metaphors is necessary both in everyday and technical language. It is virtually impossible to construct a sentence that does not contain lexical metaphors. This means that access to implicit knowledge is possible by means of metaphor analysis of practically any language material, whether in oral, written, or electronic form.

Metaphors and their correct use are learned implicitly via imitation during language acquisition. Later they are further differentiated and expanded through experience, such as, for example, in the context of work and professional socialisation and through the acquisition of a specific technical language. This means that a person's specific metaphor use shows individual and idiosyncratic features that have arisen from a specific experience and activity context. These features are characteristic of particular organisational culture within an enterprise.

The use of lexical metaphors is not normally conscious and it is just as automatic as the use of correct grammar and syntax rules. People usually only become conscious of the thinking models that underlie metaphors and their importance for the understanding of complex and abstract concepts when they learn a foreign language or receive special training (such as, for example, the metaphor workshop that will be described below). For this reason, conventional metaphors are rarely (or only to a minor extent) used deliberately as strategies for self-presentation. This means that metaphor

give us a relatively 'unadulterated' access to implicit knowledge.

Despite these important characteristics of metaphors for representing experience and investigating implicit learning processes, the cognitive metaphor theory has not received much attention in psychology as a whole and in work research in particular. The theory not only relates to the concept of 'work process knowledge', but also to central theoretical approaches in psychology, particularly to the theory of mental models (Gentner et al., 1989; Gentner and Stevens, 1983), to research on analogical reasoning and problem solving (Vosniadou and Ortony, 1989) and to the concept of schemata in cognitive psychology (Anderson, 1996). An overview of the psychological literature on the significance and function of metaphors is presented by Moser (2001, 2003b).

7.3. The function of metaphors for work process knowledge

Current projects under way in innumerable enterprises and organisations under the catchword 'knowledge management' aim to visualise the knowledge of individuals involved in the work process to better support the exchange of knowledge, the documentation of available knowledge and the generation of new knowledge in the work process (Nonaka and Takeuchi, 1995; Probst et al., 1997).

As central aspects of work process knowledge, the knowledge that employees have, in particular their implicit knowledge and experience, is one of the most important resources of an enterprise and critical to its long-term success (Glases et al., 2002; Moser and Schaffner, 2003). The ultimate hope of the enterprise is that knowledge management will result in economic gain. If more effective knowledge exchange and improved explication of existing knowledge leads to a minimisation of knowledge loss, then disastrous and costly misunderstandings can be avoided (Moser, 2003a).

In many organisations, work takes place more and more frequently in interdisciplinary teams with team members in different workplaces at various sites, primary communication being electronic. This places increasingly higher demands on the communication and cooperation abilities of individual employees (Moser, 2002). One of the greatest challenges for successful knowledge management concerns employees' so-called 'implicit knowledge', the kind of knowledge that is represented in metaphors.

Implicit knowledge refers to that part of knowledge that can only to a very small extent be put into words and tapped directly as 'fact knowledge

(Neuweg, 1999). Instead, implicit knowledge is expressed much more in the way and the manner in which a person structures and solves a problem. everyday language, the way that implicit knowledge works is often called the result of 'experience' or 'intuition'. Even qualified experts find it very difficult to say how they reached precisely that particular solution to a problem or describe the details of how they went about solving it. This is because these processes are usually implicit and automatic.

The following passage aims to sketch out how it is that metaphors can be used to explicate implicit knowledge. Metaphor analysis has advantages over other language analytical techniques, in that it can be complementary and easily supported via graphical representation (Moser, 2003a, 2003b). For the analysis of work process knowledge in particular, there are several further reasons why metaphor analysis is interesting:

- (a) metaphor creation is one of the most important strategies used for the representation of complex and abstract concepts in technical or everyday language. This is also particularly valid for such abstract concepts as the experience and knowledge that knowledge management projects attempt to capture. Precisely because these concepts are so abstract, metaphors are a central means of reducing their complexity and making them tangible and accessible;
- (b) creating analogies in general and, more specifically, creating metaphors is a central aspect of acquiring new knowledge. By forming analogies we can structure and understand new and unfamiliar knowledge along the lines of the familiar. This is indispensable if we are to remain capable of making decisions and acting in uncertain and new situations. Familiar metaphorical models of thought are applied to new knowledge and the new knowledge basis can be structured according to the new generated metaphors;
- (c) each metaphor model emphasises particular possibilities and eliminates others. For example, the 'money is water' metaphor model determines all the things that can be done with money (let it flow, freeze it), where it comes from (fed from a source), and so on. In addition to the representation of declarative as well as procedural knowledge of money the metaphor model 'money is water' also implies, at the experience oriented level, that money and money circulation are things as natural as rain and snow and that they follow natural laws. It is reasonable to assume, therefore, that metaphor models direct our attention selectively to particular aspects and thus serve as potential guidelines for action (for a discussion of the relation between cognition and action, compare Moser, 2003b, 2003).

In connection with knowledge management projects and the processes of knowledge exchange and knowledge cooperation, it is important (Moser, 2002) that the use of metaphors truly clarifies the subject or problem, and also significantly increases its communicability and transferability.

Finally, the importance of the emotional content of metaphors should not be underestimated. As the examples of metaphor models of knowledge management outlined below will show, the emotional content of metaphors varies widely and this emotional content has a central motivating or demotivating function.

7.4. Explication of implicit knowledge via metaphor analysis

Let us examine how metaphors can be implemented in the framework of knowledge management projects to explicate implicit knowledge. The following examples of metaphor models illustrate some of the various ways that people responsible for knowledge management in their companies conceptualise and understand knowledge management metaphorically. We will see what effects these different understandings can have on knowledge management.

Examples have been taken from a knowledge management workshop held for heads of knowledge management from 15 different companies. As the basis for metaphor analysis, the participants wrote texts on the core problems in their own knowledge management projects in their companies. At the workshop, they were given instruction on how to identify the metaphors in their own texts, assign their metaphors to a metaphor category (such as water, war, and so on) and create graphical representations of their main metaphor models (for details on the method of metaphor analysis, see Moser, 2003b, 2003). The various metaphor models and their implications for knowledge management were then discussed and alternative metaphor-models were sought. The main crux of the discussion centred on the differing perspectives that the various metaphor models transmit, the resulting potential misunderstandings in team communication that can arise from them, the motivational potential of these models and their heuristic value for knowledge transfer in the framework of work-related cooperation (Moser, 2002).

The 'metaphor workshop' aimed, on the one hand, to reveal the different implicit perspectives and their possible resulting consequences for knowledge cooperation. On the other hand, the workshop aimed generally to increase sensitivity to the fact that implicit knowledge is significant.

Determining the congruencies and divergences in the participants' implicit knowledge and encouraging participants to look consciously at various concepts of knowledge management are crucial to the success of knowledge management projects. Both of these aims can be achieved via metaphor analysis. The overall goal of the 'metaphor workshop' was to improve knowledge cooperation among the participants, or to facilitate such cooperation. In addition, in the course of a workshop new knowledge generated continuously. This new knowledge basis is of great value for further cooperation, because it arises from socially shared mental models. Last but not least, the recognitions gained in 'metaphor workshops' can serve as the basis for further knowledge management strategies, such as the design of tools, databases, and so on (Dutke, 1994; Mambrey and Trepper, 1996).

7.5. Metaphor models of knowledge management

The following presents three different metaphor models identified by the workshop participants and then represented graphically. While this paper cannot go into the details of identifying metaphor models on the basis of individual metaphorical expressions and statements and illustrating them graphically, further information on the method of metaphor analysis can be found in Moser (2003b).

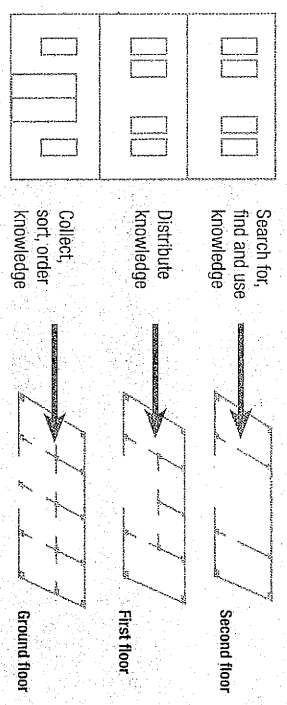
7.5.1. 'Knowledge management using the metaphor of a library'

One metaphor model that was often used for an understanding of knowledge management was to imagine knowledge management as a library (see Figure 1). The central aspects of this metaphor model are the sorting and classification of knowledge and the accessibility of knowledge that, thanks to careful cataloguing and ordering, can be found and used. The underlying metaphor model is a building with several floors, doors, stairway and rooms that allow knowledge to be arranged precisely. With a good map the catalogued knowledge can be found, checked out, and used.

The 'library' metaphor-model of knowledge management implies that the knowledge should be accessible to all who have entry to the building and its individual rooms. In contrast to the second model below, 'knowledge management as contested treasure' (see Figure 2), there are no 'owners' of the knowledge and no others that fight to obtain possession of the knowledge. Instead, the available knowledge is equally accessible to all who have a key to the building and its rooms. One aspect missing from the model, however, in contrast to the third metaphor model shown further

below in Figure 3, is the fact that knowledge is also dynamic and thus can change. There are other missing aspects, namely that some knowledge is superfluous or unimportant and should not be collected and that knowledge can be bound to persons or situations. In the library metaphor mode of thinking, knowledge is something that is static and has no context; it is basically always valuable and should therefore be collated and stored.

Figure 1: Knowledge management using the metaphor model of a library



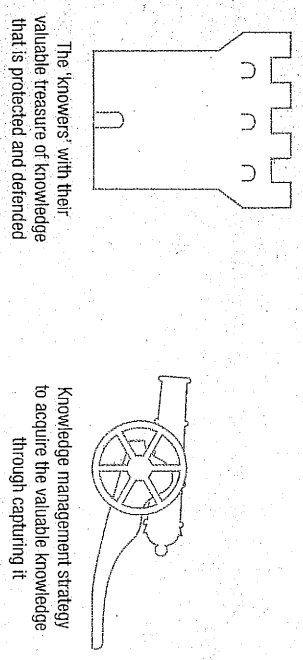
The library metaphor model is therefore, not a conception of knowledge management that deals with the management of information. This model does not instead focuses on the management of information. This model does not consider some core aspects of knowledge, such as context-dependency and reference to action (Moser et al., 2000).

7.5.2. Knowledge management using the contested treasure metaphor model

A very different understanding of knowledge was revealed in a metaphor model that sees knowledge as a contested treasure (see Figure 2).

Just as with the aforementioned conception of money in analogy to the water cycle, the way that knowledge is understood also has very specific effects on cognitive structuring. A metaphor-model that views knowledge as a contested treasure focuses on the aspects of value and possession of knowledge. In this model, knowledge is unquestioned and always valuable. There is no qualification concerning important versus unimportant or lack of knowledge. Just like money, knowledge is something that you can have or not. This model is not interested in what 'currency' the knowledge is in, how it is used, what its significance is, and so on.

Figure 2: Knowledge management using the contested treasure metaphor model



The idea that someone may well have valuable knowledge, but that it knowledge might be completely irrelevant and worthless to someone else in another context, cannot be represented in this cognitive model. This idea directly to another important aspect: according to this understanding knowledge is a valuable possession that must be protected and defend and therefore, captured or bought. As knowledge is of unquestionable value it is not simply disseminated or donated generously; it is hidden behind defensive barriers.

Due to the non-reflected valuation of all knowledge and bearers knowledge in this model, knowledge is bound inseparably to power. He she who has knowledge, has the power and will therefore protect all the know and strive to gain even more knowledge. A criticism of this model is failure to consider the idea that knowledge can also be something dynamic something that arises only in the exchange between persons and, with this is also perhaps fleeting, transitory, and – metaphorically speaking – something that can be buried within the 'castle walls'. The 'half-life' knowledge, one of today's common metaphors, could not be applied in this metaphor model, nor the context-bound nature of knowledge.

The analysis of this metaphor model leads us to an important insight: a treasure metaphor model of knowledge, no more than the library metaphor model, is a mental model not of knowledge but of information (27). The contested treasure comprises important pieces of information that are relinquished, but hoarded. They are not pieces of information that become

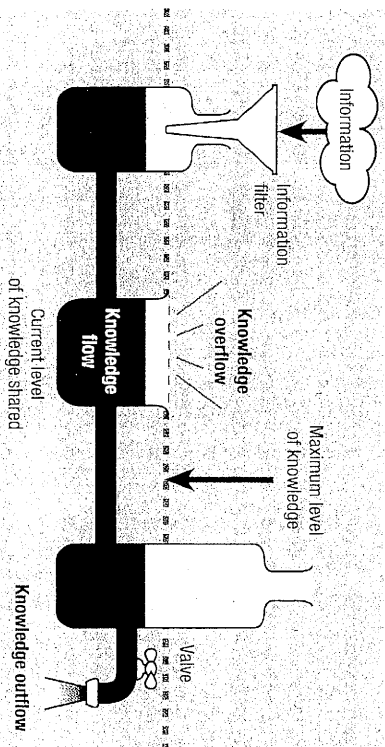
(27) On the distinction between knowledge and information, see Moser et al., 2000.

visible and attainable only in application, that is, in exchange in concrete situations. Managers that hold this metaphor model of knowledge, whether consciously or not, will never conduct true knowledge management; at best it will conduct good information management. The contested treasure metaphor model of knowledge leaves unconsidered the core characteristics of knowledge, namely its context-bound nature, its reference to action and its relatively transitory nature. These characteristics are removed from our field of attention; they are 'in hiding', as the cognitive linguists would say, and they have no chance to serve as guidelines for action in the management of knowledge.

7.5.3. Knowledge management using a canalisation system metaphor model

The third example reveals a completely different understanding of knowledge and knowledge management (Figure 3). In this metaphor model, knowledge is seen as something that is as dynamic and transitory as the water cycle. Relevant pieces of information are filtered out by the company and funnelled into a canalisation system that brings all employees to the same level of knowledge, since the information flows everywhere. Finally, after successfully flowing through the system, information leads to the company's know-how outflow (product). In this model, the employees are represented metaphorically as containers that take up and filter information and are themselves built into the company's own information channels.

Figure 3. Knowledge management using a canalisation system metaphor model



The knowledge management as canalisation system metaphor model makes several implicit assumptions about knowledge. In this perspective not every bit of information is relevant, only current knowledge. There can't be too much knowledge, so an overflow tank exists to protect against a flood of knowledge and it is essential that all employees have the same level of knowledge, and potentially the same knowledge, at their disposal. What is dynamic model of knowledge management leaves out of consideration the role of experience and the role of existing knowledge that, to follow the metaphor, could be imagined as built-up sediment at the bottom of the system. Instead, the permanent flow of new information continually flushes existing stores of knowledge right out of the system. Although there always remains room for new information, existing knowledge cannot accumulate.

7.6. Revealing varying actor perspectives through analysis of metaphors

The above examples show that the analysis of metaphors allows us not only to explicate implicit knowledge, but also reveals the differing perspectives on the same object, with their peculiar advantages and disadvantages. Each of these are central aspects of work process knowledge. It is important to remember that at the level of metaphor analysis, there is no right or wrong understanding of knowledge management. What analysis reveals are the varying perspectives that each emphasises different features and, depending on the goals of knowledge management, serve the purpose for better or worse.

Analysis of metaphor models allows access to varying perspectives thinking and discussion and explicates previous implicit knowledge. Everyone involved in the analysis, such as the members of a work group, can profit from the different perspectives of the others and learn from the way that experts structure the problem cognitively. Most important, however, analysis of the underlying mental models brings a deeper, shared understanding of the cooperation partners, because it goes beyond mere understanding of facts to encompass conceptual thinking.

This conceptual level is essential for an understanding of whole work processes. It supports knowledge cooperation in flexible organisational structures (Moser, 2002). Understanding how others conceive of an object makes individual and group-specific views of self and the world visible. In the last we gain access to these central components of company culture that are probably much more frequently the cause of communication problems.

than missing information or lack of knowledge of certain facts or technical terms.

When we concentrate on pure information, the essential characteristics of knowledge are lost: the context and action references, as well as individual and social perspectives that make information knowledge, cannot be represented. In contrast, the central characteristics of knowledge can be captured very well in metaphor models, for they exhibit precisely these characteristics of context-reference and give representation not only to structures, but also to processes. This is particularly important for cooperation in interdisciplinary teams, whose members have formed very different mental models during the course of work and professional socialisation. Here, it is essential to create a new, common basis of understanding that builds on a shared mental model. Taking our example of knowledge management in companies, this means that a new knowledge management tool should be based conceptually on central metaphor models that ideally represent the common denominator of a shared understanding of knowledge, or one's own work activity. This central metaphor model should be extendable and amenable to further differentiation, so that specific applications, perspectives and needs can have a place without losing the shared basis for communication.

The richness of the metaphor model is essential to the flexibility and developmental capability of the chosen knowledge management strategy. Incongruence in the conceptual understanding of an object alerts, triggers curiosity and serves to motivate team members, while noting congruencies can result in a fundamental expansion of knowledge.

Finally, we should not forget that different metaphor models vary in emotional content, as illustrated by the metaphor model examples: 'knowledge management as library', 'knowledge management as contested treasure', and 'knowledge management as canalisation system'. The implicit intentions communicated in knowledge management projects via the use of metaphors have a considerable motivating or demotivating effect on employees.

The present contribution has attempted to show that metaphor analysis is a method of linguistic analysis that is well suited to capturing central aspects of work process knowledge. It is also well suited to tracking down the underlying cognitive processes in representing experience and implicit actor perspectives.

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