Knowledge, Complexity, and Understanding

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The strange thing about television is that it doesn’t tell you everything. It shows you everything about life on earth, but the mysteries remain. Perhaps it is in the nature of television. — Thomas Jerome Newton in The Man Who Fell to Earth

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During most events concerned with knowledge management, someone starts a presentation by saying that they will not revisit the problem of the distinction between knowledge and data. Usually a sigh goes through the audience, seemingly signifying relief. But why relief? Is it because they will not be bored with an issue that has been resolved already, or because they are glad that they will not be confronted with these thorns again? I suspect that they want to believe that the first reason is the case, but that in fact it is the second.

In what follows I therefore want to problematize the notion of “knowledge.” I will argue that when talking about the management of “knowledge,” whether by humans or computers, there is a danger of getting caught in the objectivist/subjectivist (or fundamentalist/relativist) dichotomy. The nature of the problem changes if one acknowledges the complex, interactive nature of knowledge. These arguments, presented from a philosophical perspective, should have less influence on the practical techniques employed in implementing knowledge management systems than on the claims made about what is actually achieved by these systems.

**THE TRADITIONAL TRAP**

The issues around knowledge—what we can know about the world, how we know it, what the status of our experiences is—have been central to philosophical reflection for ages. Answers to these questions, admittedly oversimplified here, have traditionally taken one of two forms. On the one hand there is the belief that the world can be made rationally transparent, that with enough hard work knowledge about the world can be made objective. Thinkers like Descartes and Habermas are often framed as being responsible for this kind of attitude. It goes under numerous names including positivism, modernism, objectivism, rationalism, and epistemological fundamentalism. On the other hand, there is the belief that knowledge is only possible from a personal or cultural-specific perspective, and that it can therefore never be objective or universal. This position is ascribed, correctly or not, to numerous thinkers in the more recent past like Kuhn, Rorty, and Derrida, and its many names include relativism, idealism, postmodernism, perspectivism, and flapdoodle.

Relativism is not a position that can be maintained consistently,¹ and of course the thinkers mentioned above have far more sophisticated positions than portrayed in this bipolar caricature. There are also recent thinkers who attempt to move beyond the fundamentalist/relativist dichotomy,² but it seems to me that when it comes to the technological applications of theories of knowledge, there is an implicit reversion to one of these traditional positions. For those who want to computerize knowledge, knowledge has to be objective. It must be possible to gather, store, and manipulate knowledge without the intervention of a subject. The critics of formalized knowledge, on the other hand, usually fall back on arguments based on subjective or culture-specific perspectives to show that it is not possible, that we cannot talk about knowledge independently of the knowing subject.

I am of the opinion that a shouting match between these two positions will not get us much further. The first thing we have to do is to acknowledge the complexity of the problem with which we are dealing. This will unfortunately not lead us out of the woods, but it should enable a discussion that is more fruitful than the objectivist/subjectivist debate.

**COMPLEXITY AND UNDERSTANDING**

An understanding of knowledge as constituted within a complex system of interactions³ would, on the one hand, deny that knowledge can be seen as atomized “facts” that have objective meaning. Knowledge comes to be

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in a dynamic network of interactions, a network that does not have distinctive borders. On the other hand, this perspective would also deny that knowledge is something purely subjective, mainly because one cannot conceive of the subject as something prior to the “network of knowledge,” but rather as something constituted within that network. The argument from complexity thus wants to move beyond the objectivist/subjectivist dichotomy. The dialectical relationship between knowledge and the system within which it is constituted has to be acknowledged. The two do not exist independently, thus making it impossible to first sort out the system (or context), and then identify the knowledge within the system. This co-determination also means that knowledge and the system within which it is constituted are in continual transformation. What appears to be uncontroversial at one point
may not remain so for long.

The points above are just a restatement of the claim that complex systems have a history, and that they cannot be conceived of without taking their context into account. The burning question at this stage is whether it is possible to do that formally or computationally. Can we incorporate the context and the history of a system into its description, thereby making it possible to extract knowledge from it? This is certainly possible (and very useful) in the case of relatively simple systems, but with complex systems there are a number of problems. These problems are, at least to my mind, not of a metaphysical but of a practical nature.

The first problem has to do with the nonlinear nature of the interactions in a complex system. From this it can be argued (see Cilliers, 1998: 9-10 and Richardson et al., 2000) that complexity is incompressible. There is no accurate (or, rather, perfect) representation of the system that is simpler than the system itself. In building representations of open systems, we are forced to leave things out, and since the effects of these omissions are nonlinear, we cannot predict their magnitude. This is not an argument claiming that reasonable representations should not be constructed, but rather one that the unavoidable limitations of the representations should be acknowledged.

This problem—which can be called the problem of boundaries— is compounded by the dynamic nature of the interactions in a complex system. The system is constituted by rich interaction, but since there is an abundance of direct and indirect feedback paths, the interactions are constantly changing. Any activity in the system reverberates throughout the system, and can have effects that are very difficult to predict; once again as a result of the large number of nonlinear interactions. I do not claim that these dynamics cannot be modeled. It could be possible for richly connected network models to be constructed. However, as soon as these networks become sizable, they become extremely difficult to train. It also becomes rather hard to figure out what is actually happening in them. This is no surprise if one grants the argument that a model of a complex system will have to be as complex as the system itself. Reduction of complexity always leads to distortion.

What are the implications of the arguments from complexity for our understanding of the distinction between data and knowledge? In the first place, it problematizes any notion that data can be transformed into knowledge through a pure, mechanical, and objective process. However, it also problematizes any notion that would see the two as totally different things. There are facts that exist independently of the observer of those facts, but the facts do not have their meaning written on their faces. Meaning only comes to be in the process of interaction. Knowledge is interpreted data. This leads us to the next big question: What is involved in interpretation, and who (or what) can do it?

KNOWLEDGE AND THE SUBJECT

The function of knowledge management seems to be either to supplement the efforts of a human subject who has to deal with more data than is possible, or to free the subject up for other activities (perhaps to do some thinking for a change). Both these functions presuppose that the human subject can manipulate knowledge. This realization leads to questions in two directions. One could debate the efficiency of human strategies to deal with knowledge and then attempt to develop them in new directions. This important issue will not be pursued further here.

There is another, perhaps philosophically more basic, question, and that has to do with how the human subject deals with knowledge at all. Given the complexities of the issue, how does the subject come to forms of understanding, and what is the status of knowledge as understood by a specific subject? This has been pursued by many philosophers, especially in the discipline known as hermeneutics. However, I am not aware that this has occurred in any depth in the context of complexity theory. How does one perceive of the subject as something that is not atomistically self-contained, but is constituted through dynamic interaction? Moreover, what is the relationship between such a subject and its understanding of the world? A deeper understanding of what knowledge is, and how to “manage” it, will depend heavily on a better understanding of the subject. This is a field of study with many opportunities.

Apart from calling for renewed effort in this area, I only want to make one important remark. It seems that the development of the subject from something totally incapable of dealing with the world on its own into something that can begin to interpret—and change—its environment is a rather lengthy process. Childhood and adolescence are necessary phases (sometimes the only phases) in human development. In dealing with the complexities of the world there seems to be no substitute for experience (and education). This would lead one to conclude that when we attempt to automate understanding, a learning process will also be inevitable. This argument encourages one to support computing techniques that incorporate learning (like neural networks) rather than techniques that try to abstract the essence of certain facts and manipulate them in terms of purely logical principles. Attempts to develop a better understanding of the subject will not only be helpful in building machines that can manage knowledge, they will also help humans better understand what they do themselves. We should not allow the importance of machines (read computers) in our world to lead to a machine-like understanding of what it is to be human.

IMPLICATIONS

In Nicholas Roeg’s remarkably visionary film _The Man Who Fell to Earth_ (1976), an alien using the name Thomas Jerome...
Newton (superbly played by David Bowie) tries to understand human culture by watching television, usually a whole bunch of screens at the same time. Despite the immense amount of data available to him, he is not able to understand what is going on directly. It is only through the actual experience of political complexities, as they unfold in time, that he begins to understand. By then he is doomed to remain earthbound.

I am convinced that something similar is at stake for all of us. Having access to untold amounts of information does not increase our understanding of what it means. Understanding, and therefore knowledge, follows only after interpretation. Since we hardly understand how humans manage knowledge, we should not oversimplify the problems involved in doing knowledge management computationally. This does not imply that we should not attempt what we can—and certain spectacular advances have been made already—but that we should be careful in the claims we make about our (often still to be finalized) achievements. The perspective from complexity urges that, among others, the following factors should be kept in mind:

- Although systems that filter data enable us to deal with large amounts of it more effectively, we should remember that filtering is a form of compression. We should never trust a filter too much.

- Consequently, when we talk of mechanized knowledge management systems, we can (at present?) only use the word “knowledge” in a very lean sense. There may be wonderful things to come, but at present I do not know of any existing computational systems that can in any way be seen as producing “knowledge.” Real breakthroughs are still required before we will have systems that can be distinguished in a fundamental way from database management. Good data management is tremendously valuable, but cannot be a substitute for the interpretation of data.

- Since human capabilities in dealing with complex issues are also far from perfect, interpretation is never a merely mechanical process, but one that involves decisions and values. This implies a normative dimension to the “management” of knowledge. Computational systems that assist in knowledge management will not let us escape from this normativity. Interpretation implies a reduction in complexity. The responsibility for the effects of this reduction cannot be shifted away on to a machine.

- The importance of context and history means that there is no substitute for experience. Although different generations will probably place the emphasis differently, the tension between innovation and experience will remain important.

These considerations should assist in developing an understanding of knowledge management that could be called “organic,” but perhaps also “ethical.”

NOTES

1. If relativism is maintained consistently, it becomes an absolute position. From this one can see that a relativist is nothing but a disappointed fundamentalist. However, this should not lead one to conclude that everything that is called postmodern leads to this weak position. Lyotard’s seminal work, The Postmodern Condition (1984), is subtitled A Report on Knowledge. He is primarily concerned with the structure and form of different kinds of knowledge, not with relativism. An informed reading of Derrida will also show that deconstruction does not imply relativism at all. For a penetrating philosophical study of the problem, see Against Relativism (Norris, 1997).

2. The critical realism of Bhaskar (1986) is a good example.

3. Complex systems are discussed in detail in Cilliers (1998).

4. The problem of boundaries is discussed in more detail in Cilliers (2001).

5. An important contribution was made by reinterpreting action theory from the perspective of complexity (Juarrero, 1999). Some preliminary remarks, more specifically on complexity and the subject, are made in Cilliers & De Villiers (2000).

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References

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