

Why we understand each other: the role of the context

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Abstract. This short paper addresses the problem of mutual understanding from an anthropomorphic point of view, highlighting the underlying basic mechanisms and principles. Then the paper extends the considerations from people to organizations showing that, when two organizations communicate for cooperation, a message usually transports only a fraction of the required knowledge. The greater part of knowledge involved in a business transaction is represented by the contextual knowledge. If such a knowledge is not aligned, interoperability is hard to achieve.

1. Preface

The basic assumption of these notes is that it is useful to consider the knowledge base of an organization as a simplified model of the knowledge structure that a person has in his or her mind.

From this descends the interest in analyzing the most recent and credited theories, related to human intellectual evolution and communication issues, in order to gain useful insights to approach interoperability issues between organizations.

In particular the focus is on the factors that make possible mutual understanding between two knowledgeable actors.

Since the first philosophers started to consider the mechanisms of our comprehension of the world around us, there has been a sort of "great divide" between those that believed in the existence of a real world, with precise behaviors to be investigated, and those inclined to think that each of us is really "inventing" external behaviors, or at least isolating those behaviors, out of an extremely complex and unmanageable tangle of happenings, that are of some utility for us. This scheme is of course extremely coarse, but it is useful for the theme of these notes. In particular we want to refer to a rather recent paradigm, that has been synergic with the Artificial Intelligence studies, that is *constructivism*.

Some researchers, like for instance Ernst von Glasersfeld [1], consider the neapolitan philosopher Gian Battista Vico [2] the first to set the stage for constructivism, when he separated the "poetic knowledge" that perceives the rationally unknowable true essence of things, and the "rational knowledge" that proposes usable and useful schemes for nature, in order to exploit its behaviors.

What is interesting here is that constructivism considers knowledge a personal integration of each single percept (that is something that we perceive from the context),

each single idea and concept, into an ever more complex structure in our mind. This structuring activity starts at birth and last for our entire life, and is at the same time condition for, and result of, each new experience.

Each of us builds its own knowledge of the world, and this knowledge "is" the world. Because of the uniqueness of our experiences, there cannot be two identical knowledge sets, that is two identical (perceived) worlds.

That is the reason of the question that titles these notes: how is it possible that, living in slightly or vastly different universes, we (more or less) understand each other?

2. Universality of the "assembling procedures"

One important father of constructivism was Jean Piaget [3]. He described the mechanisms that infants and children use in order to gain concepts like the permanence of physical objects even when they are out of sight, or the relevance of one's position in considering a scene.

His studies demonstrated that: (i) there are specific (knowledge) stages that a child has to go through; (ii) the age at which a particular stage is reached is largely constant across different environment (even if the investigated population was rather homogeneous). He reached the conclusion that these mechanisms are universal, innate.

Another champion of this universality of knowing processes is Noam Chomsky [4], particularly in relation to the learning of languages: in addition to the imitation of grown-ups (that surely has a role in this exercise) a child uses "instinctively" the application of schemes, so that for instance many of the early mistakes that a child makes, derive from the extension of regular schemes to irregular verbs.

We are saying that not only knowledge is assembled in our mind, but that this exercise is done more or less in the same way by each of us.

Even this uniformity of learning processes could not ease our problem by itself: if during this exercise we go on and collect and collate different concepts, and build structures with different "architectures", again at any stage of the development we could easily have incompatible world views.

3. Communications between people

A main issue is the way knowledge is communicated between people. In the first years of a child's cultural development, imitation is very important, and it plays a central role also later, when learning specific competencies.

Knowledge anyway spreads by using mechanisms that are more effective than imitation. The communication of concepts, shared goals, beliefs, are mainly communicated through the world, through spoken or written text.

J. B. Plotkin [5] describes two effects of the capability of verbal communication in humans: a progressive uniformity of mental states and a faster and more effective communication, in particular in emergencies. many animals have specific "danger cries", but those are apparently rather limited in semantic value.

These aspects have integrated beliefs and behavioral schemes, and made possible the gradual substitution of "knowing how" with "knowing what". In fact, with the enrichment of linguistic communication, it was possible to share issues and tentative solutions regarding the meaning of the different situations.

Imitation can easily transfer the immediate dynamics of a process, but cannot communicate the contextual situation, cannot provide that understanding of multi-level relations that can make one's behavior ready for the turbulence of a complex environment.

Effective knowledge transfer is very much related to the sophistication of language, and the turning point is difficult to pinpoint.

It is worth underlining that the value of language for knowledge transfer depends on the basic idea one has regarding the relation of mental states to the world: if the adopted paradigm is that of language as the codification of a fixed reality "out there", the communication process consists in a codification - decodification, where only imperfections (in the two sides of the process) can occur. At best knowledge is replicated, evolution is mainly the result of reproduction errors.

If, on the other hand, we take the constructive paradigm, what a person wants to communicate is more than what his or her words or actions show. According to Grice [6], or Sperber and Wilson [7], when we hear or read some sentences, beside decoding the meaning of them, we try to imagine what the author intended to communicate. We try to understand the core of what the speaker wants us to perceive.

This approach considers the value of each new experience in relation to the pre-existing cultural structure in our mind: each new experience is inevitably transformed in order to be integrated, is never simply replicated.

The semantic value of a percept is in part in the perception itself, but in greater part in the mind of the perceptor. Knowledge is not (only) contained in the messages, but in the reception and integration of them.

When a person receives information related to a "thing", has to build a model of that thing in his or her mind, and cannot copy someone else's model.

4. Communications between organizations

If we apply the same constructive paradigm to the communications between organizations, we see clearly that the issue is not much in how we define communication protocols, but in how we make sure that the "world views" of the organizations are compatible.

As for people, it is the knowledge bases of the organizations, not only their ontologies, that play a role in mutual understanding.

The knowledge base, in turn, is mainly constituted of all the data managed within the organization, both structured and unstructured, plus the governing ontology.

As far as the information exchange relates to structured data (such as purchase orders, invoices, etc.), a protocol based on XML can provide interoperability.

Also data like drawings or geometric models can be formalized in order to be exchanged.

The problem comes when the sort of knowledge that organizations need to exchange is that embedded in texts or images: in his case more than knowledge we should say that what is exchanged is information, that can become “knowledge” in the mind of the receiving person.

Compared with human communication, organizational exchange has typically been much more limited in semantic scope. This difference is probably going to become smaller, as knowledge is increasing its importance as an enterprise asset.

Within an industrial district, for instance, it is becoming common the sharing not only of domain specific issues, but also of social and cultural problems, trends, perspectives.

In this respect interoperability between enterprises means much more than exchanging mechanical drawings, commercial documents and the like, and becomes more and more a cultural exchange, semantically demanding, and involving a common cultural evolution.

Because of this trend, we think that the issues of organizations interoperability could get useful hints by the theoretical and cultural tools of people’s communication.

A first example of this approach could be the extension of an organization’s knowledge base to documents related to its territorial and social context: in this way the organizations that share that same context (for example operating in the same district) could build compatible knowledge structures, exactly like people sharing the same culture.

This kind of contextual extension requires the discussion of methods and techniques that cannot be resolved at this time in these notes.

Bibliography

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