

# Cultural Specification and Temporalization – An exposition of two basic problems regarding the development of ontologies in computer science

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**Abstract:** This paper discusses current conceptions of ontology in computer science focussing on cultural specification and temporalization. It is pointed out, first, that ontologies arrange the world, they do not represent it; second, that ontologies, except logical Formal Ontologies, can be developed within a cultural framework; third, Top Level and Domain Ontologies have to be complemented by Pragmatic Ontologies, if they are to be used in every-day life; fourth, Pragmatic Ontologies magnify the problem of temporalizing ontologies.

**Keywords:** Pragmatic Ontology, temporalization, cultural specification, sense of historicity

According to Janich the use of the philosophical term „ontology“ in the information sciences is not problem-free, as this term does not necessarily provide guidance and help respectively to finding solutions to informative and especially semantic problems. [1] Despite this, the term “ontology” – far removed from the philosophical discourse - has taken root in the computer sciences and by serving as a pragmatic category can contribute somewhat to describing and solving problems. This, however, poses the problem that ontologies have time and again been viewed in a representational context. But ontologies do not represent the world, they arrange the world. That is, the world is not reproduced or mirrored by the use of ontologies in information sciences but is arranged within a specific, actually culturally specific framework.

Even the widespread concept, that philosophical ontologies are descriptive and ontologies in computer science are prescriptive is not substantive, insofar as ontologies do not describe actually anything. Ontologies are dealing with universalia, transcendentalia and most abstract categories respectively and thus help in arranging things and facts. However, they do not reflect a concrete subject and therefore it does not make any sense to call them representations. Ontologies classify the world in patterns, which are generally based on the language and the specific cultural disposition. For example, many Indian family sociologists have changed databases from English to Indian languages, because the English classification of relationships does not capture the specific relationships in an Indian family, especially the important hierarchic structures between first-born and younger siblings.

Thus ontologies arrange supposed representations and this process of being arranged in a certain way, referenced or put into a hierarchical order, gives these representations meaning.

Ontologies in computer sciences could serve quite a useful purpose by serving as structural framework. The fact that ontologies do not represent the world but arrange it is evident in Foucault's famous foreword to „Les mots et les choses“[2], where he quotes Borges by referring to his mentioning of a Chinese encyclopedia according to which animals are arranged by a peculiar taxonomy. This taxonomy distinguishes between animals which are owned by the Emperor, embalmed animals and animals which act as if they are mad. This shows that arranging animals can be done according to very different cultural preferences or classifications. Just think of the significance of cows in every-day life of Hindu India or the value of dogs in our culture compared to China. The taxonomy we apply is only one of many possible ones. Especially if an ontology is to be developed as a „Common Ontology“ (actually an absurd term, there is simply no ‚common ontology‘, because the term is part of a meta language) – cultural specifications or rather cultural bias cannot be avoided.

Any arrangement of things or - as in our case – the arrangement of representations is a symbolic linking [3], which requires a common prior knowledge. The problem of this common prior knowledge was discussed by Rafael Capurro as early as 1986 in his book „Hermeneutik und Fachinformation“[4] for the field of data bank systems in view of classic hermeneutical considerations. The level of common prior knowledge which makes understanding and knowing possible had to be defined prior to creating an informative system. But ontologies claim to integrate this level of common prior knowledge into the system itself. This applies especially to adaptive systems, which claim to have hermeneutic capabilities. That means these systems claim to cover spheres, which were considered belonging to the humanities and the human existence respectively.

At present we distinguish between two main types of ontologies: general ontologies, which integrate various fields, so-called Top Level Ontologies, and ontologies, which define specific ranges of application, called Domain Ontologies. This distinction generally corresponds with the classic philosophical distinction between formal ontologies and content-defined or regional ontologies [5]. The question remains, however, whether this suffices to cover all types of ontologies. It seems that this distinction works in areas of classic, i.e. scientific or specified data bank information systems (Fachinformationssysteme), even if an application-oriented expansion is necessary as in the case of medical implementations.

Problems arise, however, when our every day work is to be supported by ubiquitous computing. While Top Level Ontologies, designed in a rather logical and abstract way respectively, are assessing the top level structures and the general laws governing reality, and Domain Ontologies are busy arranging the world according to content into certain spheres, a Pragmatic Ontology should be developed based on the permanently and fast changing ranges of application. Aspects of temporalization especially are of significant importance in this area.

Generally a Pragmatic Ontology merely intensifies problems inherent to a lesser degree in the two basic types of ontologies. Domain Ontologies and Top Level Ontologies just prove to be more stable and show a sort of greater logical consistency. But as soon as we leave the level of formal logic there these systems are influenced by temporal and cultural factors. The descriptive level already contains cultural implications. Even scientific ways of describing are just an expression of a certain cultural perspective of European science as Husserl demonstrated in his famous Krisis-book [6]. These two basic systems of informatory ontologies are all in all relatively stable systems of structuring. „Top Level Ontologies“ and „Domain Ontologies“ actually gain their stability by means of disarticulation („Desartikulation“ according to Rothacker [7]), for example aesthetic and emotional moments are disarticulated, whereas Pragmatic Ontologies are faced with constant change and therefore have to undergo permanent temporalization and historicization respectively.

Pragmatic Ontologies have to be sensitively tuned into cultural and historical factors and have to be distinguished clearly from naive naturalistic Ontologies, regardless how variedly differentiated they may be. Ideas in naturalistic Ontologies do not disclose their roots in history or *Lebenswelt* and thus also do not disclose that they are subject to change. Pragmatic Ontologies on the other hand exacerbate a problem which is inert in other types of ontologies. This problem, which is not that obvious in the two other types, is the fact that any arranging of so-called representations is done by culturally specific factors and is thus historic, i.e. influenced by cultural and historical preferences. This means that each and every way of arranging is subject to culturally specific articulations and disarticulations. Furthermore there are linguistic and therefore cultural connotations that cannot simply be transferred to other cultures or languages. The term “Euthanasie” in German has a different connotation than its translation in Dutch or English. But less problematic examples clearly show that systems of arranging cannot just be adapted to other languages or cultures. „Die Sonne“ (engl.: the sun)

has a different connotation than the masculine „le soleil“ in French. Cultural and historical specifications respectively cannot be avoided in any ontology which is to be used for actual spoken language.

The general problem is that not just stores of scientific knowledge but applications as well become outdated. It would therefore make sense to equip data with time indicators and expiration dates respectively. Moreover, within certain areas of application assessment preferences should be created – a more difficult challenge- preferences which should reflect the reason for use. Certain applications, for example, depend on whether the user is handicapped or not, or what kind of situation the user finds himself in, i.e. whether he is in an emergency or not.

Especially higher-level applications require the system to make temporal or historical judgments. For example, it has to be understood that in certain contexts Austria has to be defined as a major power. Briefly spoken, the system has to be equipped with some sense of historicity, if it is to support the user successfully in certain applications. It is however obvious that temporalization of ontologies is not merely concerned with temporal logic. Especially historical aspects as such are not merely concerned with temporal logic but primarily a thing of rating, of connotation and referencing respectively, a thing of superposition and hierarchisation of data.

It is, however, doubtful, if it is possible to implement a sense of historicity at all, because historicity can only be viewed in terms of quality. Whether a system could have a sensitivity for and thus develop a sense of the significance of historical events (*Ereignishaftigkeit*) depends on the possibility of actually living with us. This would also be a question to be discussed in the Artificial Intelligence community. Despite this, it is necessary to at least implement elements of a historical sense, which are quantitative; for example, historical events, which can be dated exactly like the end of WWII or periods in which the meaning of a term is changing or becomes ambivalent.

Generally we can distinguish between three aspects of temporalization. To integrate these aspects into ontologies poses various levels of difficulty:

- a) Temporalization by equipping data with a time index. This procedure is without doubt easy to implement and already has been used in many areas.
- b) Temporalization as a preference of assessment. According to certain situations of use data is hierachised differently and is therefore listed in different time sequences. This aspect of temporalization can be more easily designed for scientific fields and scientific information systems than every-day use, as this field is not made up of users who share a clearly defined terminology.
- c) Temporalization as historic interpretive level. This aspect of temporalization requires a system which can adapt in a way as to change preferences according to change in society. A mere statistical assessment of data would not be enough, rather statistical assessments would have to be aligned permanently with possible application situations and qualitative assessments. Only this act of aligning will make obvious when terms have become outdated in certain areas and which terms in which field prove to be largely immune to change and which ones do not. If a system could develop a sort of historic sense then the fact that such a “sensor” has been developed would carry tremendous meaning for higher-level applications, that is applications which transcend processing topical information.

## References

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- 2) Foucault, Michel: Les mots et les choses. Paris 1966.
- 3) A case could be made for using Ernst Cassirer’s symbol-theoretical approach to problems connected with ontologies, as his approach deals strictly with questions of arranging and the linking of representations respectively.
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