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ONTOLOGICAL AND LOGICAL RELATIONS IN ANIMAL SCIENCE LANGUAGE

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Abstract

Our present work has as first objective an overview of the conceptual terminology following an onomasiological approach which allows us to work with the ''term'' as main linguistic tool in the animal science language. Due to the fact that animal science terminology is a ''weak'' terminology, most of its terms being taken from the general language, acting as terms only in specialized contexts, our second objective will be to make an analysis of animal science terms using not only onomasiology but also conceptual frames. Thus, we shall analyse the notions of domain shown by different theoretical models, such as the domain of knowledge, the domain of application, the domain of origin, etc. Afterwards, we will present logical and ontological relations in the conceptual system of animal science language.

Key words*: conceptual frames, domain, logic, onomasiology, ontology.*

INTRODUCTION

Onomasiology deals with meanings and meanings relations which exist between individual terms. Conceptual frames which are linguistic representations of the expected relations between cause and effect complete the onomasiology picture which helps us analyse the significance relations among terms within the animal science language. Considering an appropriate approach to new terminological approaches, we shall attempt an outline of conceptual systems in the field of animal science.

We follow the axes according to which the classification process centers upon the knowledge domain and the terms distribution is done by means of the existing relations within the domain, such as: logical relations (generic-specific, coordinating), ontological relations (partitive, associative), etc.

Our work is initiated by a presentation of the *domain* notion and of the *domain types* identified by different theoretical models.

MATERIALS AND METHODS

In terminology, the domain represents the base of an imaginary terminological triangle which also includes the concept and the definition. The domain is equivalent to the conceptual field to which a set of terms belongs.

It is already established that the domain indicates the membership of the concept in a conceptual system, while the definition differentiates between concepts within this system. Thus, the domain represents a cognitive system, a conceptual delimitation being the only way to identify or to denominate a cognitive structure (a conceptual structure, a conceptual system) (Bessé, 2000).

The same author organises the domains into three major categories:

- *A domain of knowledge* represents structured knowledge according to a theme. Thus, Bessé considers the following fields of knowledge: mathematics, law, physics, zoology, botany, economics, linguistics, mechanics and philosophy;
- *A domain of activity* represents the mirror of a human activity, whatever its nature, be it a trade, a practice or an industry;
- *A domain of discourse* is the object of 'meta', scientific discourse, which offers us clues to the nature of the field of knowledge or activity.

Animal science would be in this perspective a domain of activity that falls under a more general domain of knowledge and can become a domain of discourse in a perspective like ours.

Another categorization of domains belongs to Maryvonne Holzem (1999):
- *domain of activity:* for example, the domain of animal science. As such, animal science is a whole that includes several domains of activity: animal nutrition, animal physiology, animal welfare, etc.
- *domain of origin:* The domain of origin (of a term) is the domain where the concept corresponding to the term under analysis originates.
For example: *Animal science is the domain of origin for animal husbandry, the main term used in animal science to refer to its main areas of activity.*
The concept corresponding to a term is used. For example, *cheese* refers to a type of food product obtained by coagulating milk. The word is used in general language, but its extension (term) has the food industry as its field of application.
«Il faut noter que le domaine d'application renvoie à la notion de secteur d'activité. On distingue les concepts en les opposant ou en les associant les uns aux autres. Les relations entre les concepts mènent à la création des systèmes de concepts. Pour le système conceptuel, il correspond à l'ontologie des domaines de spécialité. Les rapports hiérarchiques entres concepts sont très importants, car ils permettent de séparer les différents éléments composant un ensemble organisé de termes en ayant recours aux relations » (Holzem, 1999)
Terminology completes its functional table by describing the types of existing relationships in a specific language. A conceptual relationship establishes a notional link between several concepts, allowing the creation of a conceptual tree in a given domain that appear between concepts, for a better understanding of the studied domain but also for structuring its terminological fields. Our descriptive approach will follow the work of Depecker (2000), Otman (1991, 1996), ISO 704 and Silvia Pavel (2009). Therefore, we understand a conceptual system as a set of concepts structured by their mutual relations:
«*Les concepts n'existent pas en tant qu'unités de connaissance isolées mais sont toujours en relation les uns par rapport aux autres. Que l'on en ait formellement conscience ou non, on crée et on affine constamment les relations entre concepts par le biais de processus mentaux. Un ensemble de concepts structurés en fonction des relations qui les lient est considéré comme formant un système de concepts*» (ISO 704)
According to the above-mentioned sources, we will group conceptual relations into:
- Logical relations and ontological relations (Depecker 2002);
- Associative relations and distinctive relations (Otman 1996) or
- Hierarchy relations and associative relations (Silvia Pavel 2009, ISO 704).

LOGICAL RELATIONS

«Les relations logiques sont les relations qui s'établissent entre concepts d'un point de vue formel. On peut citer comme relations logiques la relation d'identité, la relation d'implication, la relation d'inclusion etc.» (Depecker, 2002).
These relations can be generic, specific and coordinating (ibid.: 51). They represent abstraction relations between concepts that have at least one character in common. For example, cow belongs to the category *bovidae*; belonging to this category implies that it has properties. The concept of //bovidae// covers the common properties of cow species that we can recognise. The domain specialist will certainly understand the content and definition of the concept easily, but the non-specialist must understand the meaning of the concept //bovidae// to understand the definition. This relationship has also been called the TYPE-OF relationship (Figure 1).

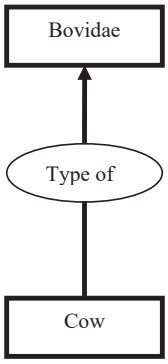


Figure 1. Type- of (gender-species)

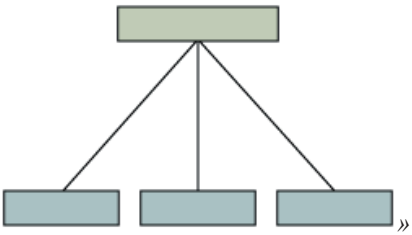
This example illustrates the logical genus-species relation or *"generic relation" (cow is a bovidae species and the intension of //bovidae// is included in the intension of //cow//, a subordinate concept)*

Gender-species relations are very common in terminology. Thus, for example*, mammal - vertebrate - sheep - ovine; mammal - vertebrate - felid - cat, etc.* (the examples follow the sequence of order, *phylum, family* and go up to the last element, which is the term under analysis).

According to ISO 704, a series of concepts that are linked by generic relationships form a vertical sequence, while coordinated concepts with the same level of abstraction form a horizontal sequence.

We consider Silvia Pavel's (2009) and Felber's (1987) view of the types of relationships discussed important.

« *les relations génériques sont représentées par un arbre conceptuel à l'aide de nœuds (rectangles) et de branches (angles aigus)* (Pavel, 2009[1])*:*



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For Felber, the genus-species relationship is framed in logical subordination, the species being subordinate to the genus:

«Lorsqu'une notion possède tous les caractères d'une autre et au moins un caractère en plus on dit que l'une est une espèce d'une autre, le genre. Du point de vue de la supériorité logique, une notion (le genre) possède un ou plusieurs caractères de moins que l'autre (espèce)» (Felber, 1987: 102)

At the same level of generic relations we find the TYPE-OF relation, a partitive relation where the super-ordinate concept represents a whole and the subordinate concepts represent parts of this whole.

[1] http://www.bt-tb.tpsgc-pwgsc.gc.ca/btb-pavel.php?page=chap2-4-4&lang=fra&contla, page consulted on February 21st 2021

«*Le concept super-ordonné d'une relation partitive est appelé concept intégrant et le concept subordonné est appelé concept partitif»* (ISO 704)

ONTOLOGICAL RELATIONS

Depecker (2002) considers ontological relations as relations that are established by virtue of the structuring natural objects in the world. Thus, there are all-part relations between concepts: the skin is a (detachable) part of the cow, and so are the feet, and these parts are not mutually exclusive, but are in a relationship of co-presence, and consequently there are "relations between concepts whose objects they refer to are in a relationship of presence or contiguity". As a result, the PART-OF relationship takes on two different aspects, depending on whether it is logical or ontological in nature.

For constructed objects, it is always Depecker who envisages another type of relation, namely the TYPE-PRODUCT relation: "thus, an airbus is a type of aircraft, the Airbus A-320 being a particular product in the range of Airbus Industries" (ibid.2002: 87)

We can also provide an example, *hard cheese* as defined by the GDT (the curd is pressed and heated; salting is done for several days with dry salt; they are mainly protected by effect. They are mainly protected by effect. The conservation goes from a few months to a few years. They are cheeses for keeping). It is a foodstuff obtained firstly by the coagulation of the milk and secondly by industrial processes of pressing and salting. Hard cheese is therefore a particular type of cheese - dairy product obtained from the curd.

ASSOCIATIVE RELATIONS

According to Chaumier (1988), associative or "neighbourhood" relations are non-hierarchical relations in which concepts are associated by their spatial or temporal neighbourhood, existing in a natural association.

"The main associative relations are of the type:

Producer-product: baker-baguette;

Product-region of origin: wine-Beaujolais;

Action-result: election-electors;

Action-tool: bludgeon-bludgeon;

Container-content: bottle-milk;
Cause-effect: moisture-mould;
Opposites: heat-coldness" (Pavel, 2009 [Ibid.])

Following the model provided by Silvia Pavel, we will try to list some associative relations that belong to our field of investigation:
Producer - product: cow-milk;
Product - region of origin: Roquefort - Roquefort cheese;
Action - result: milking-milk;
Action - tool: milking- milking machine;
Container - contents: water-trough;
Opposites: lean meat-fatty meat.

Many of the relationships provided by Silvia Pavel are found in Sager (1990) under the heading of "complex binary relationships", described using the following primitive relationships: object, cause, effect, place, form, agent, phenomenon, container, property, product, method, instrument, process, unit of measurement. We have tried to illustrate the relationships proposed by Sager, as far as possible, with examples from our field of study:
Cause - effect: oestrus - reproduction;
Matter - product: milk-butter;
Matter - property: milk-fat content;
Matter - state: milk-milk powder;
Process - instrument: milking-machine;
Process-method: milking-mechanical milking;
Process-object: milking-containers;
Process - object: milking -container for milk;
Phenomenon - unit of measurement: heat-degrees Celsius;
Object - counter-object: poison-antidote.

RESULTS AND DISCUSSIONS

The relation TYPE-OF, a hierarchical relation framed in the series of generic relations, qualifies the majority of relations that characterize the conceptual domain of animal science. A generic relation exists between two concepts when the extension of the subordinate concept includes the extension of the superordinate concept, plus at least one additional distinctive character. As for the extension, that of the superordinate concept includes that of the subordinate concept. The superordinate concept is called a generic concept, while the other is called a specific concept. To account for the functioning of the TYPE-OF relationship, we will apply the validity tests proposed by the ISO 2788(1986) standard, and cited by Otman (1986):
- The first test operates under the name of "all and some". Thus, we will have the following

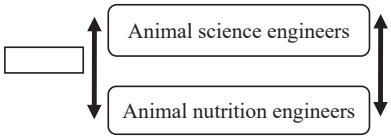

Figure 2. The test "all and some"

This scheme shows us that all animal nutrition engineers are animal science engineers, therefore, animal nutrition engineers are a kind of animal science engineers.
The second test proposed by Ottman is called "concept type", and stipulates that both the hyperonym and the hyponym belong to the same categories. Thus, the concepts cow's milk, buffalo milk, goat's milk represent classes of the concept milk. We will have:
- *Cow's milk is a kind of milk;*
- *Buffalo milk is a kind of milk;*
- *Goat's milk is a kind of milk;*

The relationship TYPE-OF has the characteristic of transitivity: cow's milk is milk while milk can be cow's milk, so the relationships go from generic to specific and from specific to generic. Thus, we can establish that there is contiguity among terms in animal science terminology.

CONCLUSIONS

The results of our analysis are not extensive, however, we can draw the conclusion that the relations existing among the terms in animal science language are quite complex. This way, establishing proper relations can help us in conveying a real conceptual structure of animal science domain. The present analysis, not reaching the dimension of a conceptual map, may help both the specialist and the non-specialist to deal with the concepts proper to animal science field of research.

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