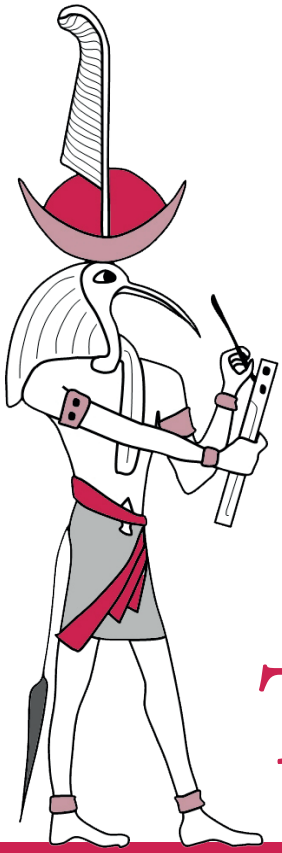
Terminologica



TOTh 2021

Terminologie & Ontologie : Théories et Applications

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Terminologie & Ontologie : Théories et Applications

Actes de la conférence

TOTh 2021

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3 & 4 juin 2021

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Avant-propos

La pandémie de COVID-19 a durablement impacté nos façons de travailler, et en particulier l'organisation d'événements tels que les conférences. Si rien ne peut remplacer la richesse des contacts humains que procure le présentiel, il nous faut accepter d'autres modes de participation et d'échanges. La participation à distance, l'enregistrement des interventions en font partie. Au-delà d'une gestion différente des coûts et du temps, cela offre d'autres perspectives dont une plus grande diffusion des travaux menés et donc une meilleure visibilité.

Nous avons pu revenir en 2021 à la traditionnelle planification de TOTh la 1re semaine de juin établie depuis 2007. La formation et la conférence se sont déroulées conjointement en présentiel et à distance, avec une très forte participation à distance, les restrictions sanitaires étant toujours en vigueur. L'organisation est certes plus compliquée et même si le présentiel devrait, nous l'espérons, revenir en force l'année prochaine, la participation à distance sera dorénavant proposée. L'Université de Savoie et l'équipe Condillac sur lesquelles reposent l'organisation de la conférence et la publication des actes seront plus fortement impliquées.

Avant de présenter les actes de cette année, j'aimerais remercier à nouveau les membres du Comité international de programme 2021 pour leur travail. Fortement mobilisés – les soumissions sont évaluées par au moins trois relecteurs – ils sont garants de la qualité des travaux menés à TOTh. Je rappelle que le Comité de programme est constitué chaque année à partir du Comité scientifique de TOTh en fonction des soumissions reçues. Le Comité scientifique est composé de 75 membres, experts internationalement reconnus du domaine, représentant 24 nationalités différentes.

La Conférence TOTh 2021 s'est ouverte avec la conférence invitée de notre collègue Nicola Guarino, bien connu des « ontologues », qui a dirigé le laboratoire d'ontologie appliquée de Trento rattaché au Conseil National de la Recherche italienne. Son intervention a porté sur « Events and their Names », un sujet aussi difficile qu'il est important. Nous présentons ici un résumé d'une communication que Nicola Guarino développera dans une communication ultérieure.

Notre collègue, François Gaudin, de l'Université de Rouen, a proposé cette année une Disputatio nous invitant à une lecture sociolinguistique de la référence chez Hilary Putnam.

Sur les 13 communications présentées, seules 10 ont été retenues pour publication. Elles ont abordé de nombreux sujets tant théoriques que pratiques portant sur des domaines aussi variés que les humanités numériques, la finance, les modèles de représentation, ou l'harmonisation de termes et de concepts.

Cette année nous avons eu le plaisir de décerner deux prix jeunes chercheurs. Cela est suffisamment exceptionnel pour que nous y consacrions quelques lignes. Instauré en 2011, ce prix n'a été décerné que deux fois, en 2011 et en 2018. Cette année ce sont deux jeunes chercheuses, toutes les deux italiennes, qui ont été récompensées. Cristina Farroni, de l'Università degli studi di Macerata, a présenté une contribution intitulée « Collaborative terminology management in a business environment : a case study in the field of wood paints and coatings ». Federica Vezzani, de l'Università degli studi di Padova, nous a présenté ses travaux en français sur le thème de « La gestion de (méta)données terminologiques « FAIR » : le répertoire de catégories de données de la ressource TriMED ».

Plus de 60 personnes ont suivi de manière assidue les présentations, ce qui correspond à la participation moyenne à la conférence. 21 pays étaient représentés : Afrique du Sud, Albanie, Allemagne, Autriche, Belgique, Chine, Espagne, États-Unis, France, Ghana, Grèce, Hongrie, Irlande, Italie, Lituanie, Luxembourg, Portugal, Roumanie, Royaume-Uni, Sénégal, Suisse.

Je vous invite à découvrir les communications que nous avons retenues à travers ces actes réalisés avec M^me^ Catherine Brun et publiés aux Presses Universitaires Savoie Mont-Blanc. Les actes des années précédentes sont accessibles à partir du site de la conférence (http://toth.condillac.org/) et des Presses Universitaires Savoie Mont Blanc (https://btk.univ-smb.fr/livres/?fwp_collections_revues=terminologica).

Avant de vous souhaiter bonne lecture, j'aimerais terminer en remerciant le Ministère de la Culture, et plus précisément la Délégation Générale à la Langue Française et aux Langues de France, l'Université Savoie Mont-Blanc, l'École Polytech Annecy-Chambéry et l'équipe Condillac pour leur support et leur aide financière à l'organisation de la conférence et à la publication des actes.

Christophe Roche
Président du Comité scientifique

Sommaire

Formalizations of Knowledge and/in Semiotic Models in Terminology Science

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Abstract. The aim of this study is to compare the semiotic models by Roche (2007) and Felber (1993): both deal with the formalization of knowledge, but were based on different theoretical influences, and traditions of terminology as well as in different times. While Felber's approach never was operationalised, Roche's semiotic model is the basis for the multilingual ontoterminology editor Tedi.

Both approaches are introduced, and then their perspective on natural language, concepts and concept relations, the role of logic, and formalized representation are compared. To encompass all these aspects and connect them to a real-world application, Tedi is used as a structure to which Felber's ideas are mapped. The analysis shows that Roche's and Felber's approach differ in their perspective on natural language, but deal both with concepts and concept relations, and use logic for the inheritance of characteristics in hierarchical concept structures. This could be a starting point for further analysis of those approaches and a possible combination.

1. Introduction

The semiotic triangle is one of the basic models in terminology science. It analyses the connections between the elements object, concept and sign. The semiotic triangle is generally expandable in terminology science (Wüster 1959), and in linguistics (Heger 1964; Melnikow 1988) as Wang (2016) shows. It is also applicable to different scenarios and developments in terminology science and ontology, as the work of Roche (2007), Felber (1993) and Sowa (2000) shows.

The perspectives of Roche (2007) and Felber (1993) on the semiotic triangle both include aspects of (logical) formalization and terminology, as well as representation, but in different degrees and forms as these two authors have different backgrounds: Roche in AI, and influences by de Saussure, and Felber by the Vienna school of terminology, and influences by Carnap and Wittgenstein. This paper wants to contribute to the tradition of comparing different schools of terminology, e.g. in Budin *et al*. (2006) and Laurén and Picht (1993), by analysing the common and distinguishing characteristics of the semiotic models of by Roche and Felber.

Roche (2007) offers two models (see Figure 1 and Figure 2), which consist of two semiotic triangles each. Basis for these models is the differentiation between language in use (langue d'usage), epistemological aspects of language (langue d'intellection) and language of representation (langage de représentation). Roche argues that because of this distinction the nature of the constituent parts of the two semiotic triangles in his models is different. The triangle which evolves from language in use (highlighted in blue in Figure 1 and Figure 2) consists of the elements: signifier, signified and praxis, and can be applied to linguistics in general in the first model and more specifically to language for special purposes (LSP) in the second model. For the second triangle in both models (highlighted in red in Figure 1 and Figure 2) strict epistemological aspects and principles are applied, and a formalized language of representation is used.

Felber (1993) takes a different approach: he uses the first of Wüster's (1959) semiotic quadrangles as a basis for a semiotic model of propositions (see Figure 3). In his model, several objects and their relations are abstracted into statements or formulae[1] in predicate logic (logischer Satz), which are built from concepts, and are then connected to a sentence built from signs for con-

1 Here the term *statement* instead of *formula* should be used for better readability.

cepts, which manifests at an object level as a proposition (Aussage) in natural language and has to be standardized to be unambiguous.

Although both approaches include aspects of terminology and formalization, as well as natural or general language, they are structured differently. Furthermore, Roche's model is the basis for the ontoTerminology EDItor Tedi[2], while Felber's model never was operationalized. The aim of this paper is therefore to analyse the intersections of the models by Roche and Felber, and see, if and how Felber's model of the logical sentence could be mapped to Tedi. One of the difficulties in this attempt is the fact that the relevant articles were published in different times and languages, are influenced by different linguistic and philosophical traditions, and therefore use different terminologies.

2. Terminology and logical reasoning – two approaches

As a first step we will describe the models by Roche and Felber in all due detail to be able to compare them.

2.1. Roche: different aspects of language as the basis for two models

According to Roche, language has several relevant aspects and plays several roles when looking at the knowledge of a scientific or technological community. Language in use (langue d'usage), even when it is the language of a specialized community, reveals itself through the scientific or technical discourse of this community, which is based on texts. As the praxis of each field of discourse is central, the speaker, his or her intention as well as the possibility of interpretation play an important role. The extraction of concepts and concept systems from texts is possible, but these concept systems are usually not completely defined, structured or modelled (Roche 2007, 5) because they are a result of this fluid praxis of discourse. This aspect of language makes in Roche's first model (Figure 1) the linguistic semiotic triangle on the left necessary, which connects the signifier, the signified and the praxis of discourse. The signifier seems to evolve from the praxis of discourse and the complex communicative relations inherent to it. It therefore lacks the stability of the concept, which is the result of clearly defined epistemological principles (Roche 2007, 7). These epistemological principles are the basis for the definition of concepts and the structuring of concept systems, as well as the model-

2 Detailed Information on Tedi can be found on http://ontoterminology.com/tedi.

ling of the objects of the world (Roche 2007, 5ff.) and can be based on different theoretical foundations. In terminology science this epistemological aspect of language is based on the analysis of the concept and its characteristics.

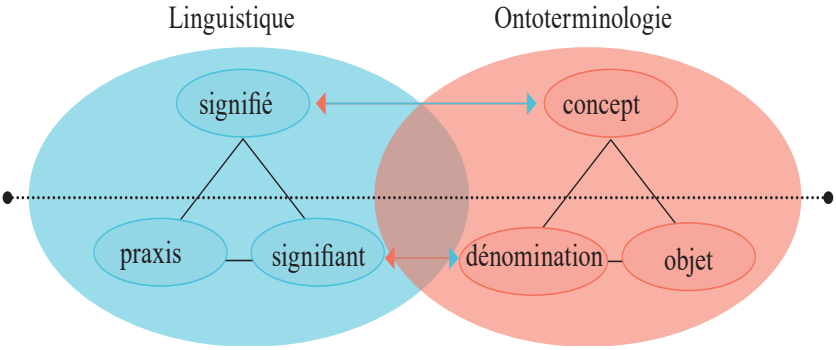

Fig. 1 – *Roche's two semiotic triangles for the realm of terminology (modified by us, and based on Roche 2007, 7)*

When these epistemological principles are combined with a language of representation (langage de représentation), they form the basis for the right triangle, which is used as a semiotic model for what Roche calls ontoterminology.

Ontoterminology is defined as

> «Une approche où l'ontologie joue un rôle fondamental à double titre: pour la construction du système notionnel et pour l'opérationnalisation de la terminologie. L'*ontoterminologie* insiste d'une part sur l'importance des principes épistémologiques qui président à la conceptualisation du domaine – c'est l'ontologie dans sa définition première –, et d'autre part sur la nécessité d'une approche scientifique de la terminologie où l'ingénieur joue un rôle fondamental – c'est l'ontologie dans ses définitions plus récentes». (Roche 2007, 8)

The language of representation is used to represent the concepts and the concepts system in a formalized way: e.g., by using ontology languages. A clear definition of concepts and concept systems on the one hand, and their representation based on axioms and rules, makes it possible to reduce the

ambiguity inherent in the language in use. The representation based on a formal ontology language also makes concepts and concept system shareable and machine-readable (Roche 2007,6)

Roche (Figure 2) modified this first model, developed it further and in his second model describes the realm of ontoterminology, as a specific way of looking at concepts from two perspectives - one referring to the linguistic aspect in LSP and the other concentrating on ontologies, which are both an element of ontoterminology. The ontological aspect is analysed in the left triangle of this model, which consists of the concept, the object and the identifier. This triangle includes clearly defined epistemological principles as the basis for building concepts, and encompasses aspects of formalized and machine-readable structuring and representation of concepts. The triangle on the right includes aspects of language in use as it manifests in LSP within a certain community and through their praxis of discourse. The right triangle here is therefore a specific application of the linguistic triangle in Roche's first model (Figure 1), where the speaker, the intention behind the utterance, the unsaid, as well as the possibility of interpretation are central.

The traditional application of terminology as well as typical linguistic aspects are included in the triangle on LSP, while the degree of formalization and reusability is higher in the triangle referring to ontologies. What is specific for Roche's second model is the combination of strictly formalized ontological aspects as well as linguistic and social aspects as they arise in LSP to form an approach to concepts and concept systems which includes elements necessary in different settings of communication: between only humans, humans and machines and between machines. With this second model Roche shows the possibilities ontologies as well as LSP offer for terminology work.

Ontoterminologie

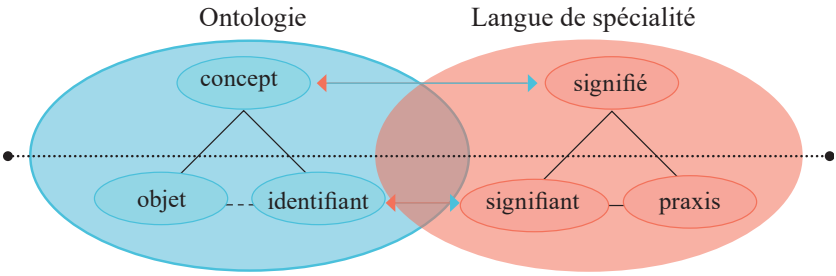

Fig. 2 – *Roche's model for ontoterminology (modified by us, and based on Roche 2007,13)*

2.2. Felber: a semiotic quadrangle for building logical statements

Felber's (1993, 98) model (see Figure 3) is based on Wüster's first semiotic quadrangle (1959). Wüster analyses the connection between objects, concepts, sign concepts and their manifestation in reality. For Felber concepts represent segments of reality, they are elements of thought (Denkgebilde).

Felber uses the structure of Wüster's quadrangle and applies it to analyse the relations between several objects in reality (Sachverhalte – bottom right area) – which are then abstracted into logical statements (logischer Satz – top right area) – a sequence of sign concepts representing them (Satz aus Begriffszeichen – top left area) and their manifestation as propositions in language (bottom left). These propositions are built from signs connected by a natural language syntax (Felber 1993, 81). The upper half of the model belongs to the realm of concepts (Begriffsebene) and the lower to the realm of objects (Gegenstandsebene).

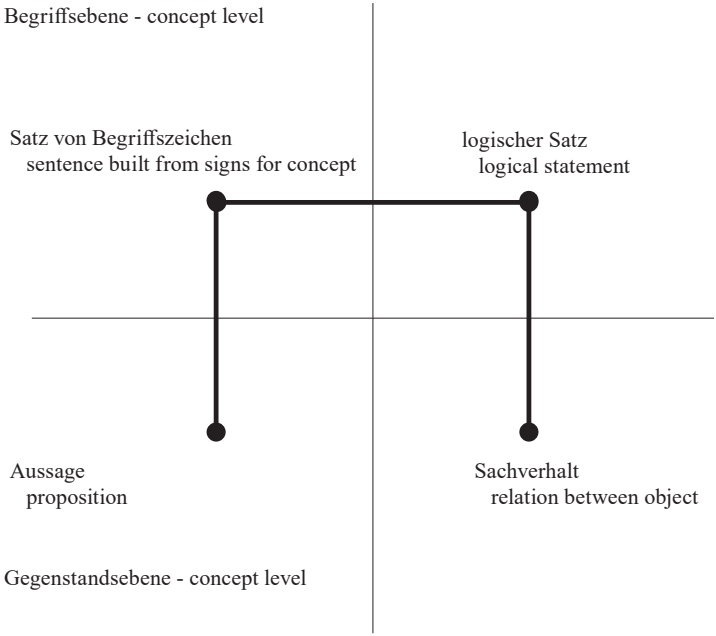

Fig. 3 – *Felber's semiotic quadrangle (modified by us, and based on Felber1993,98)*

This semiotic model is one of the elements, which form the theoretical basis for Felber's Wissenstechnik, a form of knowledge technology, which supports a possible form of logical reasoning, and is based on classical logic (including predicate logic). Felber's knowledge technology has its starting point in the logical statement, which is a unit of knowledge (Wissenseinheit). The logical statement uses predicate logic as a means for the representation, of relations between objects in reality (Sachverhalt) at the conceptual level. <<Gold is a metal>> is a relation between objects. The objects and their relations can be abstracted to a concept level in the form of a logical statement (Felber, 2001, 108). A logical statement can be true or false. Of the ontological reality (bottom right) it is referring to, it can only be said that it exists, while it can be referring to concrete or abstract occurrences (Felber 1993,68). Logical statements are used for logical reasoning, be it done by a human or

as a machine, as Felber states (Felber 1993, 69). The connection between logical statement and proposition must be "adequate" (Felber 1993,99). As the proposition can manifest in different natural languages, different syntactic and grammatical means can be applied. According to Felber this leads to confusion because languages, which are not standardized (Gemeinsprachen) use signs and syntax in such a way that several interpretations of the same signs within a sentence are possible. To avoid this confusion, terminological standardization and standardization of syntax are necessary (Felber 1993, 98f.).

3. Comparison of the models

There are several aspects the models by Roche and Felber refer to: natural language, the world of concepts and concept relations, logic and formalized or standardized language: their approaches to these aspects will now be compared. To analyse the intersections of these models, the few examples of logical sentences and syllogisms Felber provides will be mapped to the structure of Tedi, the multilingual ontoterminology editor, which is based on Roche's distinction between the complementary linguistic and ontological dimension of ontoterminology (Figure 2). Tedi uses this distinction to build multilingual ontoterminologies, where the conceptual side of the terminology is structured and defined as a formal ontology, to which the terms in different languages are linked. Tedi therefore has a concept editor (ontological side) and a term editor (linguistic side). The former defines concepts and structures concept systems in a formal ontology. It is connected to the term editor, where the terms and their natural language definitions in different languages can be found. Felber's theoretical considerations on the other hand, so far have not been applied, and Felber (2001) offers only in a later publication fragments of the system he is envisioning. Nevertheless, these fragments can be used as a starting point for comparing his approach and the manifestation of Roche's in Tedi.

There are four main points that must be addressed:

- What is the perspective on natural languages of the two authors?
- Where can Felber's logical sentence as a form of concept relations be found in Tedi?
- Which role does logic play in both approaches?
- Which form of formalized representation is used in both approaches?

3.1. Natural languages

Roche and Felber both see a difference between general or natural language and standardized language or language of representation (in Roche's case). But they approach it in different ways: Roche argues that natural language in its everyday form, as well as LSP for a scientific or technical community, has a richness in its possibilities of expression, is complementary to standardized languages of representation and the strict epistemological principles they are based on. Natural language has certain characteristics (the importance of the speaker, the intention behind something said, the unsaid) and with this offers a richness of expression and possibilities. This aspect is visible in both of Roche's models and is a possible resource for formalized languages: new concepts develop through communication within a community of discourse and can then be formalized. This community is also able to verify the structure of formalized language and develop it further in this way.

Felber, on the other hand, sees the necessity to standardize natural languages to avoid ambiguity, and does not see it as much as a resource as Roche does. His model concentrates on the standardization of language, which is supposed to make it unambiguous.

3.2. Concepts and concept relations

When comparing Roche's triangle which is concerned with formalization (Figure 1 triangle on ontoterminology, and Figure 2 triangle on ontology), they have a lot in common with Felber's quadrangle, as Figure 4 and Figure 5 show. All three semiotic models refer to a connection between reality (represented by the object in Roche's models and relations between objects in Felber's model), its abstraction into concepts (Roche) and logical statements (Felber) and their representation in a formalized way by a designation/identifier in Roche's triangles and a proposition in a standardized language in Felber's case. The difference between the structure of the models by Roche and by Felber is that Felber includes a fourth element in his quadrangle: the sentence built from sign concepts in the top left area. If this element was excluded, both models would have the same structure. Felber (2011, 115) himself, in a later publication, reduces his semiotic quadrangle to this triangle "for the sake of simplicity".

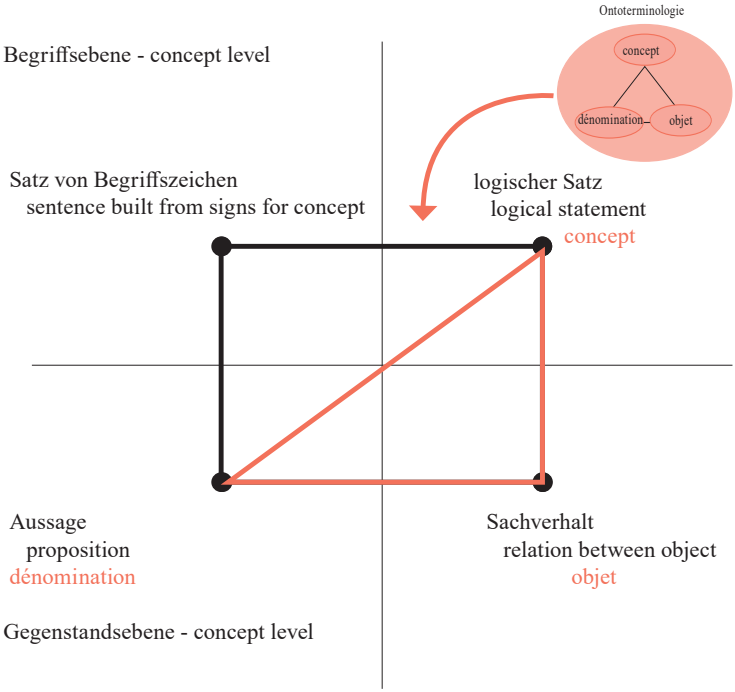

Fig. 4 – *Felber's semiotic quadrangle (1993,98) and Roche's triangle on ontoterminologie combined*

It is obvious that Roche uses his triangle to look at single concepts, but the relation between concepts is a basic aspect of terminology work. Therefore, concept relations can also be found in Tedi. The concept editor in Tedi does not only analyse concepts and their essential and differentiating characteristics. Tedi also structures concept systems using different concept relations. The main relations are generic (is-a) and partitive relations, but it is also possible to use and define other relations. Here a closer look will be taken at the generic relation because there is a parallel to one of Felber's approaches: Concepts and their relations for Felber are the building blocks of his logical sentences. In his publication from 2001 Felber provides an example for a relation between objects (indicated by double brackets) <<Metall ist ein Stoff>> (engl. <<metal is a substance>>), which is abstracted to a logical sentence, describing the (generic) relation between two concepts (indicated by single brackets) <Metall

ist ein Stoff> (engl. <metal is a substance>). In the example ontoterminology for seats by Roche (Figure 6) this form of generic relation can be found on the left side of the concepts editor – where the concept <seat> and its possible subordinate concepts can be found. In this hierarchy the concepts are designated using a concept name (the identifier in Figure 2), which includes the generic concept, and the inherited as well as differentiating characteristics.

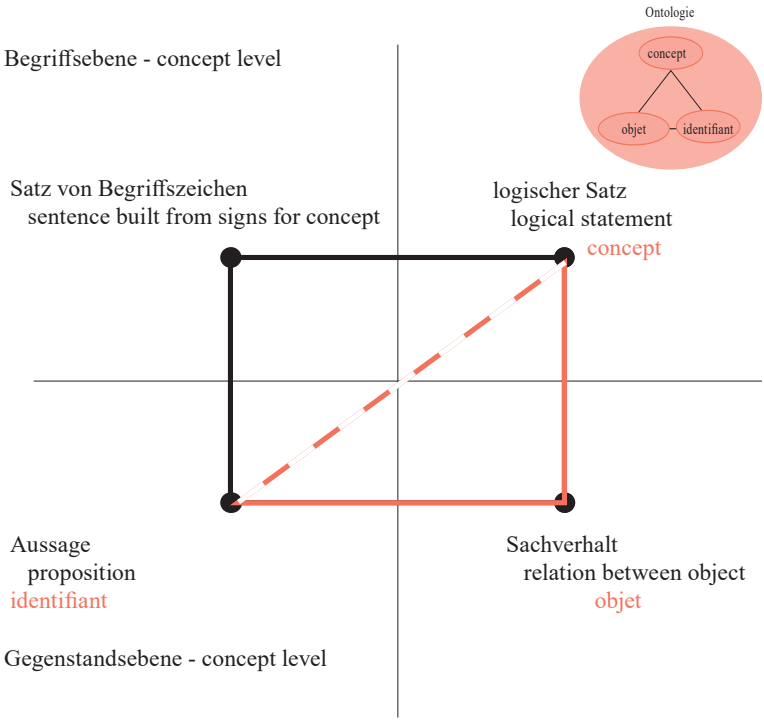

Fig. 5 – *Felber's semiotic quadrangle (1993,98) and Roche's triangle for ontology combined*

The specific concepts of the hierarchy are connected to terms from the term editor (Figure 6): The concept <Seat with feet for one person without arms without back> has the formal definition: <Seat with feet for one person> + /without arms/ + /without back/. <Seat with feet for one person> is here the generic concept to which the differentiating characteristics are added. The

resulting concept is connected via the term editor to the English term *stool*, with its definition in natural language: Seat for one person, with feet, without arm and back. Translated to Felber's approach the hierarchical relation found here would have been formulated as the logical sentence: <A stool is a seat>. Felber's logical sentence can be found in Tedi's concept editor in the relations between the concepts. Felber did not say much about the relations he was envisioning. The example of the generic relation is just one possible relation. Tedi offers also other relations, such as the partitive relation as well as several others ('relatedTo'; 'hasFunction'; 'equivalentTo'; 'madeOf'; 'sequential'; 'causal; 'dependentOf'), and has the possibility to define new relations (Roche 2019, 26).

The formal definition of concepts is necessary for Roche's as well as Felber's approach, because Felber's knowledge technology was based on concepts and their constituting parts (Felber 2001,5). That Roche and Felber share some ideas on the formalization of concepts and concept systems, here again becomes visible (Figure 6, p. 34-35).

3.3. The role of logic

Predicate logic is the basis for Felber's logical sentence and was used widely in computational linguistics when he developed his model. Predicate logic, or at least a subset of it – description logic – was also the basis for some of the first modelling techniques of ontologies (Gómez-Pérez, Fernández-López, and Corcho 2004, 9). Today, ontology languages have in their detailed theoretical basis and elaboration, and also in their application been developed further from Felber's early theoretical considerations. Roche considers ontology languages a possible tool to model terminological concepts and concept structures. Therefore, there exists a connection between Roche's and Felber's approach. It is worth looking at how both authors utilized logic in their respective approaches.

When it comes to logical aspects, Tedi uses axes of analysis to control the structure of the (generic) concept system and the inheritance of characteristics within it. In the seat-ontoterminology some of the axes of analysis would be *with/without feet*; *for one person/for several persons*; *with/ without back; with/ without arms*. These axes of analysis in Tedi are used to determine which characteristics are essential for structuring the concept system. This enables on the one hand to control the inheritance of characteristics when a subordinate concept is added, and on the other hand it is used to analyse

where certain concepts, which already have a subordinate concept, can be placed within the concept system. The concept <seat with feet for one person without arms without back> is a subordinate concept to <seat with feet for one person>. It inherits the characteristics /with feet/ and /for one person/ and has own characteristics: /without arms/ and /without back/. The differentiating characteristics within one axis of analysis are exclusive of each other. Tedi controls this, and suggests only the possible characteristics, when characteristics are added.

Here it becomes obvious that concepts in this ontoterminological approach are part of concept relations, and therefore abstractions od relations between object in reality. This offers a parallel with one of Felber's fragments (2001,108), in which he provides the example how several relations between objects abstracted to logical sentences (consisting of concepts and their relations) could be connected into a chain of logical sentences, and would become a syllogism in logic:

<Gold ist ein Metall>	<gold is a metal >
<Metall ist ein Stoff>	<metal is a chemical substance >
<Gold ist ein Stoff>	<gold is a chemical substance>

This syllogism is built from concepts which are related to each other by a is-a or generic relation and can be translated into a hierarchical concepts structure that can be found in Tedi in the left vertical field of the concept editor. The chemical substance would be the first generic concept, with the other ones as subordinate concepts: <chemical substance> – <metal> – <gold>. In this structure <gold> in Tedi would inherit the characteristics of <metal>, as well as the characteristics of <chemical substance>. This process of inheriting characteristics is necessary for the form of reasoning Felber envisioned. Concepts here are building blocks of propositions and syllogisms. Therefore, the term logic found in Tedi can be considered a part of Felber's vision of the logical sentence, which uses classical logic, including term logic, predicate and propositional logic (Felber 2001, 17). On the other hand, the different relations Tedi offers can be considered as forms of predicate logic, as well as the basis for propositional logic. The use of logic is therefore another aspect that connects the approach by Roche and Felber's vision.

As some intersections of Roche's and Felber's thoughts can also be found in Tedi, Tedi could be considered the realisation of some of Felber's ideas, although time, background and tradition separate these authors.

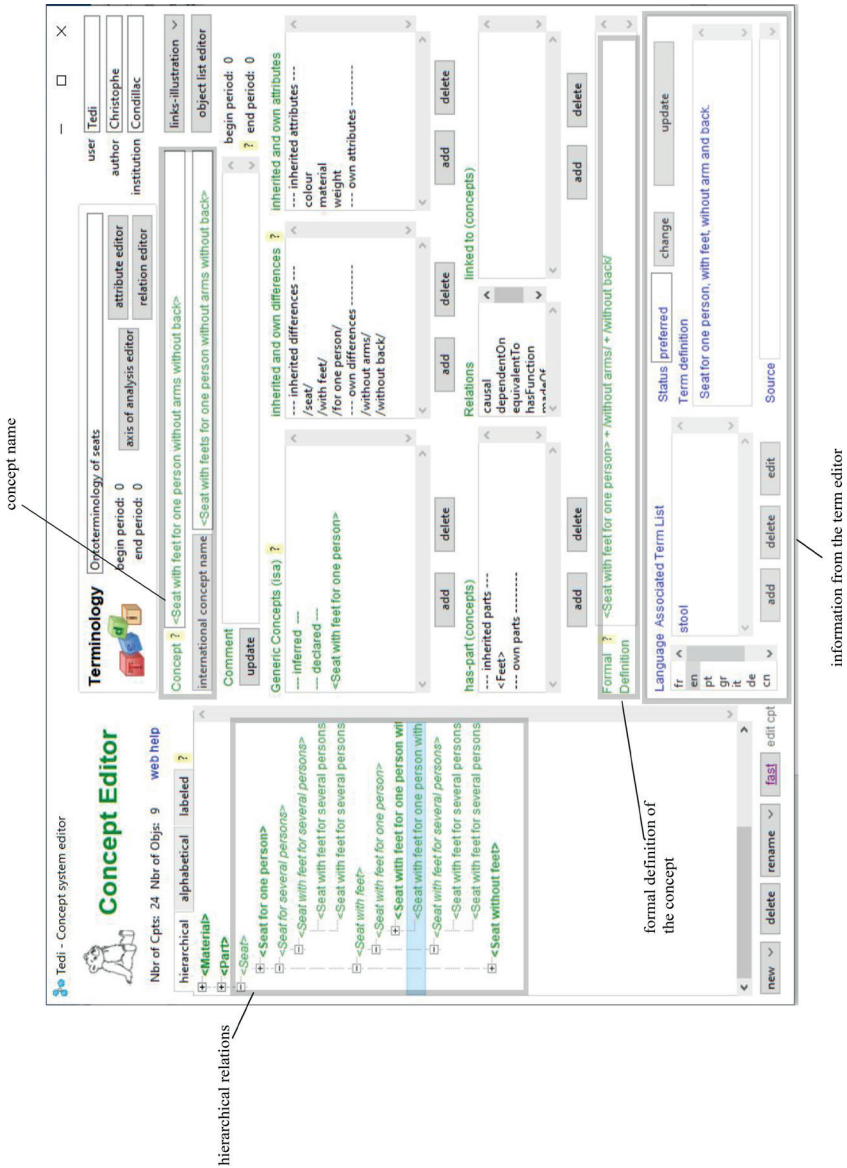

FIG. 6 – *A screenshot from the Seats-ontoterminology by Roche in Tedi*

3.4. Representation in formalized languages

Tedi is able to export and therefore represent the concept systems in CVS, RDF/OWL, HTML and JSON in a formalized way (Roche 2019, 68ff.). Felber on the other hand, never operationalized his ideas and only left comments of what he was envisioning: formalizing LSP by using strict syntactical rules as well as unambiguous terminology and signs within the sentences. This was inspired by the clear syntactical rules and unambiguous use of signs and terminology he saw in mathematical logic and programming languages. (Felber 2001,111).

4. Conclusion

The two models by Roche differ in one important aspect from Felber's model: Roche chooses to include in his perspective on terminology (Figure 1) and ontoterminology (Figure 2) the linguistic dimension, with the intention of the speaker, the unsaid and the praxis of discourse in addition to the formalized aspect of language, which is the result of the application of strict epistemological principles as well as of rules for representation. Felber only analyses the formalized and rule-governed aspect of language in his model for knowledge technology.

A look at the epistemological aspects of the models by both authors showed that they have a lot in common: Both analyse objects or a combination of objects and their relations on the object level, which are then abstracted to a cognitive level as concepts or logical statements built from concepts, and are then represented in a formalized way. The only differences seem to be the structure of what they are analysing, whether they are concerned with single objects and concepts, or several connected objects which are abstracted to logical statements. But this does not mean that their approach is fundamentally different, on the contrary: the analysis of concepts and their relations is a basic element in terminology science and work, and also in Tedi. The hierarchical example relation Felber offers, can (in addition to several other relations) be found in Tedi. Therefore, the analysis of concepts is one building block of Tedi, just as it is a building block of Felber's knowledge technology.

The use of logic is another element that connects the approaches by Roche and Felber: The operationalized model in Tedi uses term logic to ensure the proper inheritance of characteristics between concepts and the correct structure of the concept system. This process seems to be a characteristic of syllogisms in logic, which Felber's approach and Tedi have in common. On the

other hand, the concept relations in Tedi can be considered propositions that could be used in classical logic.

When it comes to the representation of the concepts or logical statements Felber's model stays theoretical, wishing for the standardization of language in a way programming languages are standardized, which might be just what Tedi is leaning towards, as it offers several possibilities of export and more or less formalized representation, such as CVS, RDF/OWL serializations and JSON.

This study is a first attempt to compare the models by Roche and Felber, authors from different times and backgrounds. Future research has to deepen the comparison between Roche's and Felber's approach and analyse other concept relations using the semiotic triangle. Furthermore, the theoretical background of both authors could be analysed to find the different and common theoretical influences.

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Résumé

Le but de cette étude est de comparer les modèles sémiotiques de Roche (2007) et Felber (1993). Tous deux traitent de la formalisation des connaissances, mais ils ont été développés à travers des influences théoriques, des traditions terminologiques et à des époques différentes. Alors que l'approche de Felber n'a jamais été opérationnalisée, le modèle sémiotique de Roche est à la base de l'éditeur d'ontoterminologie multilingue Tedi.

Les deux approches sont introduites puis les aspects du langage naturel, les concepts et la relation conceptuelle, le rôle de la logique et la représentation formalisée sont comparés. Pour englober tous ces aspects et se connecter à une application du monde réel, Tedi est utilisé comme une structure à laquelle les idées de Felber sont mises en correspondance. L'analyse montre que les approches de Roche et Felber diffèrent dans leur perspective sur le langage naturel, mais traitent à la fois des concepts et des relations de concepts, et utilisent la logique pour l'héritage des caractéristiques dans les structures de concepts hiérarchiques. Cela pourrait constituer un point de départ pour une analyse et une coopération plus approfondies.