TERMINOLOGY
SCIENCE
&
RESEARCH

CONTENTS

Foreword

Volume 18 of the Journal Terminology Science and Research contains three of the papers presented at the Terminology Colloquium of the IITF held in connection with the 16th European LSP Symposium in Hamburg, August 2007. The colloquium was held on 28 August under the title New Voices in Terminology and Future Research Directions. The remaining three papers plus comments will be published electronically in Volume 19 (2008), and in addition, all the papers presented at the workshop will be published in a printed version later.

According to the organisers, the aim of the Hamburg colloquium was to give a new generation of terminology scholars an opportunity to present their research and to reflect on the future directions of the field together with senior colleagues; thus they wanted to continue the tradition of seeking diversified views on terminology and of fostering discussion (http://lipas.uwasa.fi/termino/iitf2007/).

Each paper presented by the new generation of terminologists was commented on by one or two more experienced colleagues. This volume contains two papers by young terminologists, viz. Niina Nissilä and Ekatarina Mhaana, together with the comments presented by Marita Kristiansen, Maria Pozzi, and Marie-Claude l'Homme. The third paper is Heribert Picht's summary and state-of-the art given at the end of the symposium.

We are two editors who cooperate in compiling and preparing the journal: Nina Pilke (University of Vaasa) and Birthe Toft (University of Southern Denmark). Please submit articles to the editorial board via one of our e-mail addresses (see below).

Vaasa and Kolding, January 2008

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Heribert Picht

TERMINOLOGY YESTERDAY, TODAY AND TOMORROW

Abstract

After a short historical introduction, an account of the first theoretical foundations is offered followed by a description of the influences of the 'pragmatic turn' on the linguistic and terminological environments. A stronger focus on professional communication represents a further widening of theoretical and practical scope of terminology. Finally, five models represent the historical and a possible future development.

1 INTRODUCTION

As long as mankind has communicated about professional matters and has exchanged knowledge – regardless the age, the domain or the level of proficiency – terminology has played a central role. The Romans had a well-developed terminology for military issues, Dürer created and tried to introduce a terminology for mathematics, Lavoisier and Berthollet for chemistry, Linnaeus for biology, Beckmann for economics etc., etc.; although the term professional communication had not been introduced in those times, they communicated about professional knowledge. Moreover, none of these forerunners of terminology was linguists.

The Wirtschaftslinguistik-movement, which started in the beginning of the last century in the German-speaking area, Holland and some Scandinavian Countries, represents the first encounter between linguistics (Sprachwissenschaft) and a domain; in this case: economics. This movement was rather heterogeneous; several phases can be distinguished:

> A Diachronic Wirstschaftslinguistik
> > 1. Wirtschaftslinguistik oriented towards history
> > 2. "Nationenwissenschaftliche Wirtschaftslinguistik"
> > 3. Economic Wirtschaftslinguistik
> B Synchronic Wirschaftslinguistik
> > Structural and functional Wirtschaftslinguistik

In A1 philologists had to teach economics and their first task was to learn about economics. Their approach to terminology was typically a philological one. One of these researchers, a certain Blum, talked about "Fachsprache" already in 1916. A2 was oriented towards national economy in an early form of internationalisation and communication.

A 3 represented a quite different approach. The economists took the lead and claimed that their language is not an issue of linguistics but only and exclusively of economists. These three approaches make the later dualism between linguists and experts already visible. The basic question was: "Who is competent to handle the language of a domain?" Wüster asked a similar question later. The synchronic approach was structural and functional. It was strongly influenced by the Prag School and especially developed by researchers of this school. Also with this approach the dualism between LGP and LSP remained.

It is interesting to note that the Wirtschaftslinguistik movement had a more modern extension, in the form of the tertiary institutions called (in German) "Handelshochschulen" (literally, trade universities) where translation studies were introduced after WW II LSP.

A quite different approach can be seen in the lexicographical work of Schlomann. He introduced the systematically ordered dictionaries in several languages for translators. Schlomann was engineer and had the competence to order concepts – an idea, which Wüster included in his theory of terminology. By the way, Wüster and Schlomann knew each other.

The terminology movement started nearly simultaneously in Austria and Russia. Drezen, Lotte and Wüster are traditionally considered the "Fathers" of terminology science. All three were engineers and Drezen and Wüster were in addition Esperantists, which implied the idea of international understanding/communication by using an artificial language. This is reflected in their approach to terminology. The dedication to Esperanto implied as well that both of them had a good insight into linguistics.

2 THE PHASE OF FIRST THEORETICAL FOUNDATION (1930 – 1975)

It is remarkable that the Russian terminological movement very soon had good contacts to famous linguist, e.g. Reformatski, whereas the western one lacked a close connection with the mainstream linguistics of the times, perhaps with the exception of Wüster's later contact with Leo Weisgerber and his special approach called "Wörter und Sachen".

Wüster's doctoral thesis "Internationale Sprachnormung in der Technik. Besonders in der Elektrotechnik" (1931) can be considered the first theoretical work on terminology in the West. The counterpart in the East is the works of especially Drezen and Lotte. It is worth remembering that the first manual in terminology was published in Russia in 1952 by Terpigorev, which indicates that terminology was established as a subject of teaching, which, of course, requires a first theoretical consolidation.

In the West, a first coherent presentation of the theory of terminology appeared much later. The lectures given by Wüster in the early 70s were published after his death in 1979 under the title "Einführung in die Allgemeine Terminologielehre und Terminologische Lexikographie". These lectures are a fragment of a more comprehensive work Wüster had planned but could not finish before his death in 1977. However, the considerable bibliography of Wüster contains numerous works of a theoretical character, from which the contours of his theory easily can be deduced. In any case, the four 'columns' of the theory are clearly expressed:

- Object, concept, as cognitive element
- Representational forms, as communicative element
- Concept ordering, as systematising element
- Terminography, as the recording and disseminating element.

In this connection, the first standards on terminological principles have to be mentioned. The first one was DIN 2330 (Entwurf) "Normungstechnik. Begriffsbildung. Regeln" published in 1953 and followed by 6 ISO Recommendations and one ISO Standard in the 60s and the beginning of the 70s.

Although the attitude of linguists towards LSP and terminology was to a certain extent reserved and sometimes even depreciatory, it is a fact that there existed issues and domains, which were outside the scope of the mainstream linguistics of those days and therefore considered of hardly any interest for linguistics:

- LSP and terminology planning e.g. in Iceland, Russia, Czechoslovakia and other countries
- Standardisation in industrialised countries including applied and theoretical terminology
- An increasing need for LSP translation
- Philosophers concerned with the problem of professional communication, e.g. Heisenberg
- Thorough research into classification and knowledge ordering & representation, which required necessarily terminologies
- An increasing number of studies related to LSP and terminology, especially LSP translators
- From the 60s onward, international institutions such as AILA concerned with applied linguistics including LSP and terminology.

3 "THE PRAGMATIC TURN" – AN OPENING (1975 – 1995)

3.1 The linguistic environment

It was obvious that the structuralist approach could not solve all linguistic and communicative problems. Language is not only structure but also function. Therefore, it was not so strange that the focus of interest and research moved towards 'language in function'. This new approach focused on language as medium of communication in society, which implied a radical change of research parameters. Text linguistics and text pragmatics came into being. These basic changes were favourable for applied and theoretical LSP and terminology research. Terms were considered not only strange lexical units, but carriers of professional knowledge and as such, central elements in any knowledge transfer regardless the level of communication.

This change of approach became very clearly visible, e.g. in the writings of Lothar Hoffmann (1976). In his model – later drawn as a graphic model by von Hahn – he

> 1. interrelates the linguistic structure of LSP texts with pragmatic and communicative factors, which implies the inclusion of the language user at different levels of communication – and terminology finds here its natural place as central part of professional communication;
> 2. invalidates the dualistic nature – very often claimed in those days – of LSP and LGP. There is no 'general' LSP (in singular) – LSP has to be used in plural, because each domain has its own LSP. In addition, LSPs at different levels of complexity are no opposition to LGP, but an integrated part of the 'Gesamtsprache' – language in its entirety.

Hoffmann's approach becomes also visible in his definition of LSP:

> "Totality of all linguistic means used within a limited professional area of communication in order to ensure communication between people working in this area."
> Kalverkämper included Hoffman's model without changes into a more comprehensive model in 1992.

3.2 Widening of scope within LSP and terminology

An important change or perhaps better "widening" of the scope of LSP and terminology was the bringing together of terminology and knowledge engineering (first congress in Trier, 1987). Both fields had quite a number of characteristics in common, but did not know very much about each other. That event and the following congresses had consequences for the theoretical approach to both domains. With regard to terminology, knowledge representation in its different forms, for instance, gained more attention in practice and research.

In accordance with the consolidation of applied and theoretical terminology as a field of knowledge, the discussion concerning the issue of terminology as a science in its own right gained momentum. In 1968 in Russia, the first symposium on this subject was held. The conclusion was that terminology should be regarded an independent discipline.

In the West, the discussion was – and still is – much more controversial. There are movements, which claim terminology as a part of linguistics. The question to be asked here is: What kind of linguistics? Others consider terminology an independent science or at least an autonomous discipline within linguistics.

In reality, the question is of a more academic nature and does not affect applied terminology very much. However, it is necessary to clarify the position of terminology within the framework of philosophy of science on the one hand, and its place in the entire 'building' of the sciences, on the other.

Although already known and to a certain extent researched in some countries, language and terminology planning experienced a considerable intensification. Nations and countries such as the Baltic States,

Cataluña, País Vasco and an increasing number of African states, nations and language communities are aware of the fact that only a language able to cover all areas of life is a real measurement for national identity – and, by the way, national identity does not mean nationalism.

4 TERMINOLOGY AND PROFESSIONAL COMMUNICATION – ANOTHER WIDENING OF SCOPE (1995 – 2007)

This period is characterised by an augmented number of so-called new approaches. The term 'so called' will probably give rise to an outcry. Nevertheless, one should be modest. There is no doubt that quite a lot of progress has been made. What are the dimensions of this progress?

- Correction of older stages of the theory
- Deepening of main issues of the already known theory
- Inclusion of terminology in the wider framework of professional communication as a semiotic issue
- Introduction of ontologies as ordering devices
- More thorough research into language and terminology planning
- Explicit introduction of cognition into terminology (cognition was implicit previously)
- Explicit introduction of sociolinguistic issues (existed before, too)
- Defining linguistics in such a liberal way that terminology without problems falls under its scope
- Etc.

In relation to the new approaches, the discussion about the existence of terminological schools gained new momentum. However, the three colloquia organised by the IITF (International Institute for Terminology Research) in 2001, 2003 and 2005 contributed to clarify positions. It became obvious that not everything presented as new insight was new at all. A rearrangement of known facts provided with a new term does not necessarily mark progress.

The titles of the three colloquia were:

1. "Terminology Science at the Crossroad"
2. "Comparison of the theoretical foundations of terminology in Eastern Europe and the Western Countries"
3. "Approaches to terminological Theories. A contrastive Study of the State-of-the-Art"

Those who have participated in these colloquia will easily have noticed the inherent connection between the different subjects. The first one tried to isolate, name and discuss in general problems of terminological theory and in particular the real or imagined differences between approaches. The second colloquium gave our Russian colleagues the opportunity to expose the foundations of recent terminology research in Russia. At the same time, the western colleagues had the chance to get familiar with Russian approaches, which have a long tradition, but are usually not very well known in western countries. A comparison underlined common and differing elements. Equipped with this knowledge, it was possible to arrange the third colloquium, the aim of which was (a) the exposition of known approaches and (b) a subsequent comparison according to an adequate parameter deduced from the different contributions.

No doubt, we have experienced a diversification of approaches. Nevertheless, in my view, the common elements are still so dominant in nearly all approaches that one may speak perhaps more correctly of differences due to particular needs in certain regions which again were conditioned by language policies derived from political changes.

Apart from the discussions of a more academic nature, in this period it became obvious that LSP perhaps is too narrow a framework for discussing terminology as central factor in all knowledge representation and knowledge transfer. LSP is primarily concerned with language. However, professional communication is not only based on language; the whole range of non-verbal knowledge representation remains outside the scope of LSP. This fact implies, on the one hand, that LSP is an important part of professional communication and on the other, that a semiotic approach to knowledge representation and transfer (professional communication) is indispensable, if the whole range of communicative means is to be covered in theory and practice.

5 FIVE MODELS REPRESENTING GRAPHICALLY THE DEVELOPMENT TOWARDS AN INTEGRATED, FUTURE APPROACH TO LINGUISTICS AND PROFESSIONAL COMMUNICATION

In the following five figures, which are rather simplified and take into account only the most outstanding characteristics, I try to visualise the development of linguistics from the first half of the last century to a possible future configuration in which linguistics is absorbed – not eliminated – by professional communication as a part of general communication science.
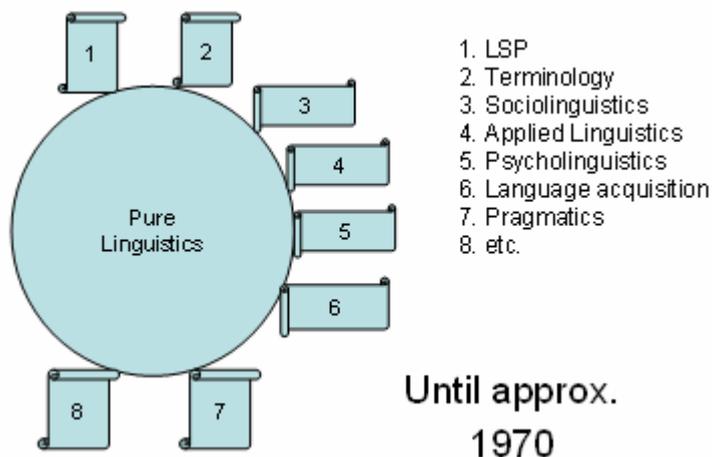
Figure 1.

In fig. 1, the listed fields of knowledge are in one way or another related, but not integrated, into linguistics. These fields came into being because of the external needs neither covered nor researched by traditional linguistics of those days.
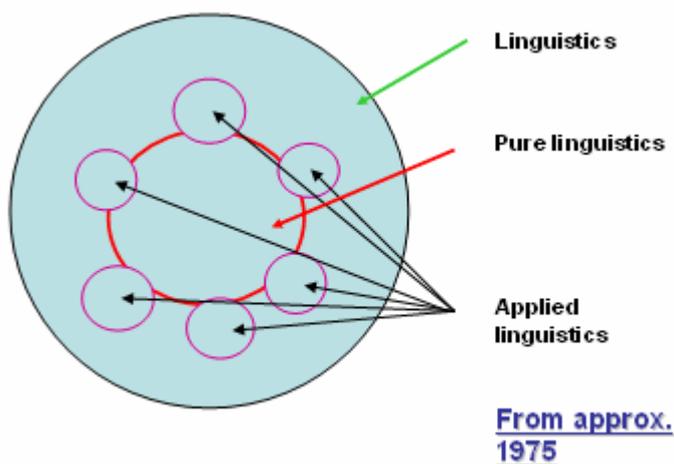
Figure 2.

Fig. 2 shows the widening of scope of linguistics after approx. 1975, where applied linguistics is integrated in the new idea of linguistics.

Liberally defined linguistics
Autonomous linguistic disciplines united by common elements
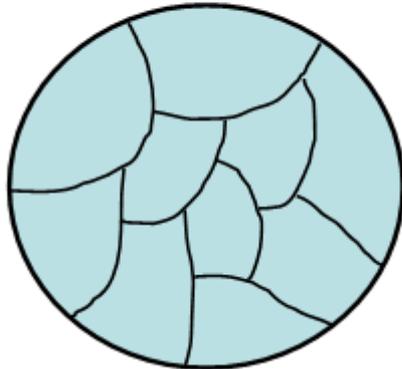
Figure 3.

Fig. 3 shows the configuration of liberally defined linguistics, where all linguistic disciplines have an autonomous, but not independent status. One of the parts of the circle represents terminology.

A possible future configuration
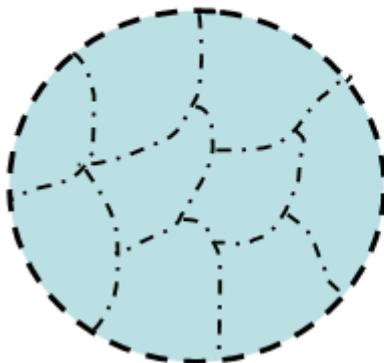
1. Open professional borders
2. Expansion possible
3. 'Osmosis' with other domains
4. Opens for assimilation of elements necessary from other domains in order to solve linguistic- & communication-related problems

Figure 4.

Fig. 4 represents a rather futuristic view; the borders of all disciplines are open for "knowledge osmosis" among domains in order to make complex solutions of communicative nature adequately possible.
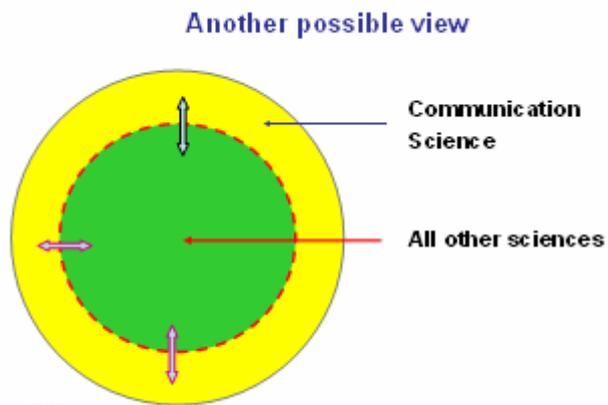
Figure 5.

Turning the whole thing round, one may say that communication science in one way or another is related to all other sciences, which implies that communication science – including professional communication, LSP and terminology – is a metadiscipline without which none of the other disciplines can exist. A discipline without knowledge representation and knowledge transfer is doomed to be mute – or in other words: non-existent.

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STUDYING CONCEPTS OF BUSINESS ECONOMICS WITH TERMINOLOGICAL METHODS

Abstract

I am writing a doctoral thesis about the concepts and terms of financial accounting. My approach is mainly contrastive, qualitative and is based on theories of terminology and sociolinguistics. The main tool in analyzing, systematizing and comparing the concepts is the terminological concept analysis.

One characteristic of the balance sheet as a concept system is, that in one system concepts at the same level of hierarchy may have different levels of abstraction with variable grade of abstraction at the same level of hierarchy. The existence of concepts in the balance sheet is based on agreements prescribed by law and therefore they cannot be observed with our senses. As an example of two types of concepts in my study we may take the concepts of 'tangible assets' and 'goodwill'. The concept 'tangible assets' comprises the value of land and water areas, buildings and structures, machines and equipment etc. The characteristics of the concept 'tangible assets' are based on an agreed value of precise and tangible (concrete) objects. When analyzing the characteristics of the concept of 'goodwill' the task is more difficult because the characteristics are only based on agreements, and therefore exist only as abstract phenomena. In my research, I describe and compare the different types of concepts and make some suggestions on how the concepts referring to abstract objects can be studied, defined and categorized.

The new knowledge within technology and natural sciences is produced by accumulating factual, empirical knowledge about concrete referents. In business economics, the knowledge is based on theories that include concept definitions of the specific field and hypotheses about the connections and regularities within the reality of objects of the field. In other words, the new knowledge is produced both on the level of concept, on the level of language and on the level of theory. This is why the field of business economics is one of the fields that produce theoretical concepts that only have meaning in their own field. Their concepts organize themselves. Therefore, the concepts are difficult or impossible to describe with theories that rely on simple mechanical or dynamical models (Toft 1992: 119f.) In my paper, I will present some observations of the specific concept features of the concepts of balance sheets with reference to the theory of terminology.

1 INTRODUCTION

In my study, I am interested in what kind of concepts and terms that exist in Swedish language balance sheets. The aim of my study is to describe the terms and concepts of balance sheets from several points of view, that is, from the point of view of terminology, from the point of view of sociolinguistics and from the point of view of language planning. The terminological point of view is interesting in my data mainly because of the concept formation in financial accounting. It is the concepts that refer to abstract objects. My aim is also to discuss the reasons behind terminological differences in Swedish balance sheets by studying social, political and historical factors concerning language use in Sweden and Finland and to describe the terms of balance sheets as linguistic units.

Swedish is used as an official language in administration both in Sweden and in Finland, in Sweden as the national language, and in Finland as one of two official languages. The societies in Sweden and Finland are quite similar and the standard written Swedish is common in both countries, however, both varieties of the Swedish language are characterized by some features that are dependent on the country in question. Thus Swedish is a pluricentric language. According to Clyne (1992: 1) the term pluricentric describes "languages with several interacting centres, each providing a national variety with at least some of its own (codified) norms".

There are both differences and similarities between the accounting systems in Sweden and Finland. The differences between the systems lead to differences in the annual reports of the various companies. The balance sheet is according to law a part of the annual report. It is consequently a part of the annual account and its main purpose is both in Sweden and in Finland to show the company's financial position at the end of the financial period. The financial position is defined primarily through information about

where the company's funds are (capital use) and from where the company has received its funding (capital obtaining). (The Penguin Dictionary of economics 2003).

My data consists of concepts and terms from the field of financial accounting. I have chosen 10 Swedish balance sheets from years 1997, 1999 and 2004. There are three companies involved: SCA from Sweden, UPM-Kymmene from Finland and Stora Enso, a merged Finnish-Swedish company. All the balance sheets are in Swedish.

The accounting acts give both in Sweden and in Finland detailed formats on how a balance sheet should be drawn up. (Thomasson et al. 1997: 121, Accounting act and -ordinance 1999: 124) Additionally, both laws point out that another (more detailed) presenting format can be used if necessary for understanding and reflecting the actual situation of the company (ibid.). From the beginning of 2005 all the publicly traded EU-companies have been obliged to follow the IFRS, i.e., the International Financial Reporting Standard in drawing up their financial reports (Official Journal of the European Communities 2002). The IFRS differs from the national laws on accounting on many points. For example it lists the items that are to be included in an annual account and gives very detailed information on how the sums are to be calculated, but does neither give a format nor linguistic recommendations for the presentation. In my data, the balance sheets of 2004 are drawn up according to the IFRS. It is of interest to see if these harmonized balance sheets are also harmonized in their term and concept use.

The method of description and comparison of my data is illustrated in figure 1. The dashed arrow at the bottom of the figure illustrates the time that runs from years 1997 and 1999 to 2004. The five ovals illustrate the data of my study: the data from Finland above the dashed line, the data from Sweden below the dashed line and the data established according to the IAS/IFRS in the middle to the right in the figure. The oval for the data from Sweden year 1999 is drawn with dashed line because the norm (i.e the legislation) for the balance sheets of 1997 and 1999 is the same, whereas the other four ovals are drawn with whole lines, as a sign of different, separate norms. The arrows between the ovals illustrate comparisons that I do both between the data from the two countries and the three years.

2 ONE LANGUAGE, TWO COUNTRIES, THREE YEARS, FOUR NORMS – HOW MANY KINDS OF BALANCE SHEETS?

According to Britt-Louise Gunnarsson (1987) an LSP text stands in relation to its social context within three frames. This can therefore also be used as a model in discussing the reasons for conceptual and terminological differences between balance sheets. Firstly, there is the superior social frame, society at large (in my material from Sweden or Finland). This frame contains the societal factors that affect language use in the balance sheets. In my material the social frame consists of the acts and regulations concerning financial accounting and the language conditions in both countries. Furthermore, the social frame concerns cultural factors, both regarding accounting and regarding the internal cultures in companies and partly also the international influences (i.e., the IFRS). Secondly, a frame affecting the situation in which the text is produced is the one that is common to the specialist area. My material includes two types of specialist areas: accounting and the sectors that the companies represent. Thirdly, there is the context the text is written in. In my study, the context contains the way in which the text is produced in the company. In my data, these frames can be found as categories that explain the individual enterprises' choices of terms and concepts. That is, the enterprises' decisions are based on the present system of accounting (the national or international norm), the enterprises' accounting techniques and financial situation, the enterprises' line of business and the coworkers' manners in matter of financial accounting and reporting.

In my data, the comparisons have shown some tendencies in choice of terms and concepts (see Nissilä 2003). Following the above frame thinking and starting from the largest frame, it seems that the status of the majority language (Swedish in Sweden) homogenizes the balance sheets in my data. In comparison to the Sweden-Swedish balance sheets the balance sheets from Finland seem to be not only affected by Finnish language, but also kind of conservative and influenced by Sweden-Swedish. The second frame, the frame of the specialist area is seen in my data especially when changes occur in the norm. It seems that if the accounting norm is revised, a revision of terms and concepts can be seen in enterprises' balance sheets as well, and in cases where no changes occur, the terms and concepts are mostly the same. The relevant industry can be seen in some specified term choices belonging to the field of forestry.

An interesting result is that the various balance sheets from year 2004 are very different from each other. Earlier, a common norm has seemed to be a unifying factor in matter of term choices in the different enterprises, however, in 2004 the term choices in the various balance sheets in my data are different from each other in spite of the in-detail prescribed concepts of the IFRS. A probable reason is that the IFRS does not give any suggestions or recommendations concerning the linguistic formation of the reports. That way, the enterprises are free to use any terms they find proper. In my data, this has led to a major terminological diversity. However, this can partly be explained by the fact that it is the first time the enterprises officially report their accounts according to the IFRS and that the practices have not yet been established.

There are also differences between the balance sheets that can be explained within two other frames, namely the frame of enterprise-specific variables of accounting and the frame of producing context. It is individuals who have the expertise and make the decisions about how an enterprise will report for its financial situation. The results of my study show that the Swedish terms are chosen for the balance sheets by experts with long working experience, high education and a leading position in the organization. They do not consider finding the proper terms as a problem, although there are several normative sources and other factors they take into consideration in drawing up the annual accounts. In my study, it is first and foremost the companies' tradition ("we have always used these terms") that mostly affect the term choices, not individual preferences in the producing context. The official sources in Sweden and in Finland together with branch-related factors and new terms are considered when changes occur in them. It seems to be the case that the frame of the society and the frame of the specialist area are more important than the frame of context in choosing Swedish terms for balance sheets. Still, in order to answer the question raised in the heading of how many kinds of balance sheets there are in my data, the equation seems to result in, if not ten, at least eight or nine different kinds of balance sheets.

The statement of "the traditional use" of certain terms and designations raises another question, whether there is one more factor affecting the use of some precise terms and designations – namely tacit knowledge (see Polanyi 1978: 87). Tacit knowledge is based on knowledge and experience that the individual experts have gained of their field and which are not formalized or exemplified in the written documentation of the fields.

3 THE THEORETICAL CHALLENGES – SOME OBSERVATIONS, THOUGHTS AND PROPOSALS

The main challenge in comparing the different companies' balance sheets has been to know what to compare with what – to define what a concept, an object and a term is in a balance sheet. In terminological meaning the enterprises can be thought to make their choices of the contents of the balance sheet on three levels: on the level of object, the level of concept and the level of term. (1.) On the level of object it is naturally relevant to include an item in the balance sheet if an amount exists and leave it out if it does not exist in the enterprise. From my point of view this is difficult to research because if there is no object, it will not be given any designation in the balance sheet either. (2.) On the level of concept the enterprises have freedom to present an item by listing one or several of the related concepts, or let one (usually the superordinate concept) represent the item. Furthermore, the item may be included in some other item. (3.) On the level of term different enterprises may choose synonyms or partial synonyms to one and same concept.

3.1 Dichotomic thinking

I have investigated whether it is possible to distinguish between different types of concepts by searching for dichotomies in the concept system of balance sheets (Nissilä 2006a). In my data it became apparent that even linguistic representations, terms and designations for the concepts, are helpful in drawing conclusions about different types of concepts. The majority of the dichotomies in the balance sheet are based on man-made regulations that are specified in the field of business economics and financial accounting. Observing the classification criteria for the concept pairs (dichotomies) is useful in a more comprehensive analysis to formulate key questions about essential concept characteristics. In my material, this comprises the events, actions and actors in the enterprise, as well as different types of tangible and intangible objects that an enterprise has and exchanges (Nissilä 2006a). It is typical of the concept systems of balance sheets that the concepts are arranged on the basis of dichotomisation, the

principle "is 'p'" vs. "is not 'p'" (e.g. 'distributable equity' and 'nondistributable equity') (Cruse 1986). This is a characteristic which helps to identify and analyse the different types of concepts.

My analysis has shown that several of the systematizing criteria in balance sheets are based on different kinds of dichotomies. By studying them more closely, I have been able to both identify the objects of my study and learn about their theoretical and methodological principles (Myking 2007: 281). My study of dichotomies in the balance sheet has given me a simplified idea about what kind of concept relations are to be found in the concept system of a balance sheet. Thus it has helped both in focusing, contrasting and categorizing my object of study (Nissilä 2006a).

3.2 Concept systems of the balance sheet

It is considered essential to understand the system of the actual concepts in order to understand the nature of the single concepts in that system. My next step has therefore been to study the concept systems in and around the 'balance sheet'. The task of analysing the concept system in a balance sheet is facilitated by the fact that it is a ready-to-use, prescribed system. The balance sheet is usually presented on one page, and enterprises follow the same main principles both nationally and internationally in drawing up their financial statements. This has an impact on the contents as well as the formation of the financial statements. Thus, this is another characteristic, which helps especially when it is necessary to find items which are comparable in the balance sheets of different enterprises.

In order to understand the nature of the single concepts of balance sheets, I have studied the balance sheet and its frame of reference as a macro concept system, as well as its different parts as micro concept systems (see Nissilä 2006b). This I have done from three different points of view. The first point of view is the linguistic surface, the sign. Many of the terms in balance sheets are relatively transparent, i.e. they state something about both the intension of the concept and the position of the concept in the concept system. The second point of view is the way the balance sheet is drawn up. The context of the term, i.e. which function the expression of the concept has in the arrangement, plays an important role in balance sheets. The third point of view is the concept level, which reflects the individual financial issues in each enterprise – that is, both different kinds of transactions (dynamic concepts), and property, i.e. the monetary value awarded to different kinds of property (static concepts).

I have studied the concept systems of balance sheets (see Nissilä 2006b), and according to my observations the concept system formed by the concepts in a balance sheet could be treated as a logical (generic) concept system, or as a partitive concept system. As a logical concept system, concepts in an authentic balance sheet from my material can be seen as a product of deduction (see Nuopponen 1994: 134). Enterprises have a prearranged formula for a balance sheet with given concepts as a model, and they need to apply accounting rules in order to adjust their own business to the system and concepts regulated by law. The underlying regulations and the requirement of presenting a 'true and fair view' of accounting standards are on the contrary the products of an inductive concept formation process. According to Nuopponen (1994: 133) in an induction process phenomena of the same kind are abstracted into concepts, which are further abstracted into concepts of the next abstraction levels. Similar phenomena are classified into groups according to their function, origins or other common features.

The possibility to treat the balance sheet as a partitive concept system gives us a point of view of 'balance sheet' as an ontological concept system. The formula for the balance sheet given in accounting acts in Finland and Sweden can be seen as a list of canonical concepts, that is, a list of the concepts required for the system (Nuopponen 1994: 158f) to be called a balance sheet. As a partitive concept system, the balance sheet is a concrete product of the prescriptions.

3.3 Levels of abstraction

The degree of abstraction is what makes concept analysis problematic when analysing concepts in a balance sheet. The concept 'shares and holdings' has an object in an enterprise's balance sheet, that is a representation of the concept or an individual concept 'shares and holdings'. On the level of the language, the concept is designated by the term shares and holdings (see figure 2).

The term shares and holdings does not alone provide much relevant information in a balance sheet, but gets its significance together with the amount entered and the other items in the same balance sheet. That is why the concept 'shares and holdings' can be considered to also have a symbol in the figure, that is, the value of the shares and holdings measured in 'money'. The same concept, the concept of 'shares and holdings' has an object, an establishment invented by the experts in the special field of financial accounting, who have stated that an enterprise can have property in form of shares and holdings. This is how the concept of 'shares and holdings' can be illustrated as a two-fold triangle. The upper triangle refers to the actual situation in an enterprise, that is, to the application of the field's agreements. In the upper triangle the concept is designated on the level of language (by the term). The lower triangle represents the field-specific knowledge of the concept, all the facts, agreements and rules that are produced in order to be able to measure the objects' value 'money'. In business economics, 'money' plays an important role by being the unit of measurement for everything that exists. The existence of the concepts is based on notions produced by texts from the field of financial accounting.

If we very simplified think about the concepts of balance sheet as layers of reality, the concepts of balance sheet can be thought to go through a chain of abstraction processes (see figure 3). The first one occurs when we consciously or unconsciously all the time categorize all kinds of objects of the world. An annual account is a static description of a series of different kinds of processes that have occurred in an enterprise within a period of time. In the concept of 'balance sheet', one part of the objects are these processes, another part are the agents and the static objects that participate in the processes. The regulations of financial accounting, the field-specific knowledge on how to register, value and account for the reality of constitute another layer of reality for an enterprise. It is another abstraction process that gives the mediums how to describe the enterprise's reality from the point of view of financial accounting, i.e, to describe all the processes using 'money' as a unit of measurement. The objects of the concept 'buildings and constructions' are not the tangible objects, but their value. Some of the concepts, for example 'goodwill', can be thought to have only abstract characteristics that are always measured in monetary terms. Other concepts have concrete objects which only get their abstract characteristic of 'value' in financial reports (for example, 'material goods'). In other words, the concepts of the balance sheet are all more or less abstractions.

The regulations create an idea of an ideal financial report. In business economics, the theoretical concepts are therefore often concretized using case studies as examples (Puskala 2003: 76). They are used both in literature as examples, especially in textbooks, and as a method of teaching. Their function is to show how the theories are to be applied in practice. Even the IFRS uses case studies as examples. Another example of this concretising is the observation that in business studies, the different types of securities, promissory notes, vouchers, etc. are valued differently in different types of transactions. In this way, the objects, which otherwise are difficult to comprehend, have been given a kind of tangible object. Picht (2007: 305) calls these types of objects Ersatzgegenstände. Even this way, the regulations become concrete via their applications. According to my interpretation, this is another way of implicating the importance of tacit knowledge in the special field of financial accounting.

4 CONCLUSIONS

In the special field of financial accounting, language plays a major role not only as a medium of interaction, but also as an elementary condition of the existence of the concepts of the field. Finding the financial accounting ways of thinking by researching the context and the cultural perspectives of the balance sheet gives my terminological study an ethnographic impression. My empirical methods have been mainly inductive, with the main focus on investigating the real nature of the concepts and terms. Hundt (1995: 61) believes that due to practical reasons, there is a gap between an expert's understanding of his field and the theoretical description of the same field. A theoretical description aims to give an as complete comprehensive picture of the field as possible, whereas the expert can trust on the fact that the other experts at his field are specialised and, hence, have access to tacit knowledge about the field. This way, the expert only needs a simplified picture of the field as a whole. The complexity of the field is reduced in everyday field-specific communication (Ibid.).

The field-specific communication can even in my study be seen as a scale from the everyday communication to the theoretical description of the field. According to my observations, both the empirical and the theoretical ones, there is a factor of tacit knowledge that could deserve more attention in studying the nature of the concepts. Tacit knowledge could be identified by studying the behaviour of the experts (cf. with methods for identifying attitudes). The results of my study raise the question of

whether the representatives of the different special fields are themselves aware of all the knowledge that will not be mentioned in their written and formal documentation, but which are instead to be observed when studying their actions and methods from an outsider's point of view.

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FIGURES
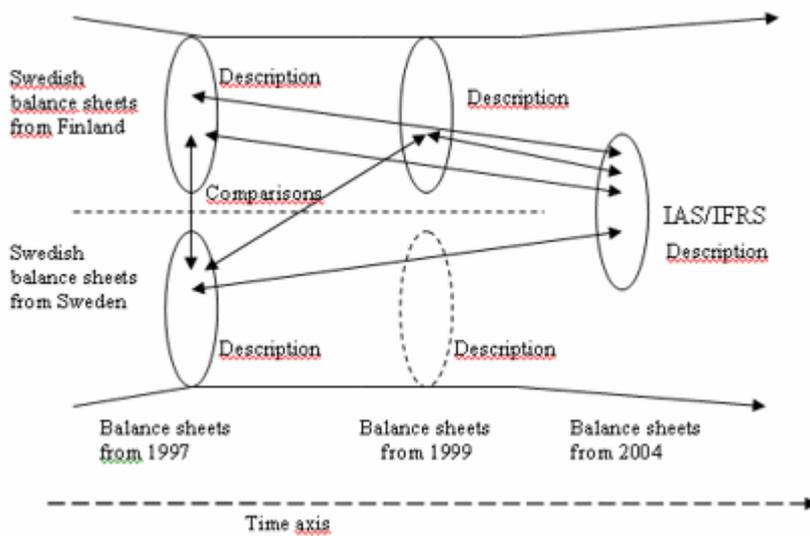
**Figure 1.** Method of description and comparison.
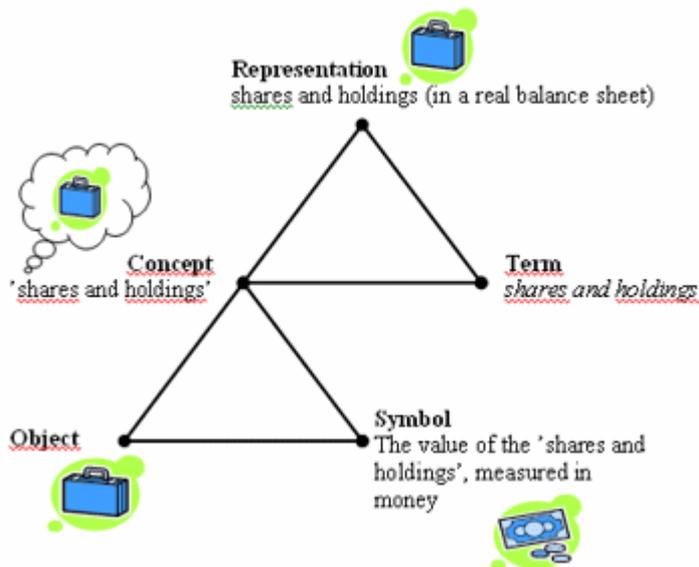
Figure 2. The double concept triangle of the concept 'shares and holdings' (Modified after Sowa 20001.)
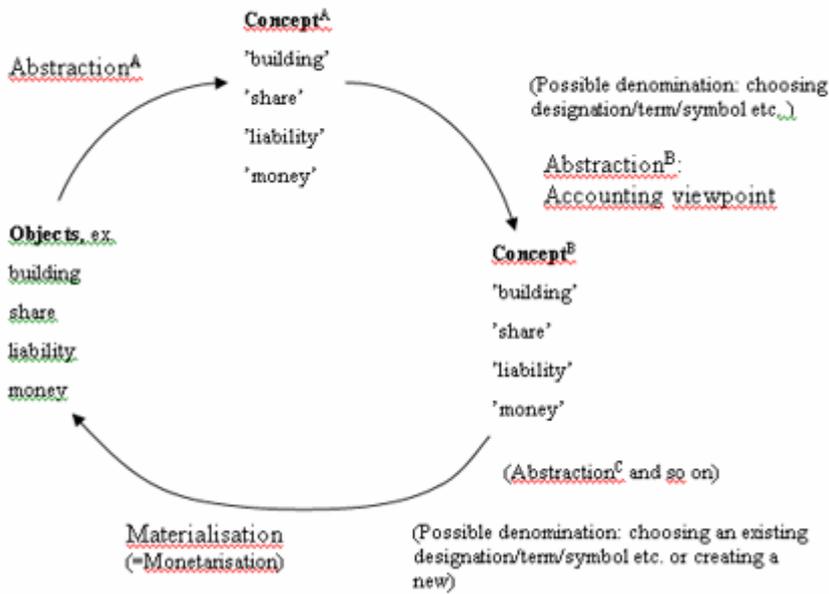
Figure 3. The abstraction processes of the concepts of the balance sheet.

[1]The idea of expanding the triangle model a to two-folded triangle has been introduced by Sowa (2000) and has been discussed in terminological literature by Wright (2006).

COMMENTS

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A COMMENT ON NIINA NISSILÄ'S PAPER "STUDYING CONCEPTS OF BUSINESS ECONOMICS WITH TERMINOLOGICAL METHODS"

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DOMAIN DYNAMICS AND LANGUAGE PLANNING.
A COMMENT ON NIINA NISSILÄ'S PAPER
"STUDYING CONCEPTS OF BUSINESS ECONOMICS WITH TERMINOLOGICAL METHODS"

Abstract

Niina Nissilä's paper on financial accounting concepts presents a many-folded terminological approach. My comments address mainly two aspects that I find particularly relevant to terminology theory and methodology, namely domain dynamics and language planning.

1 INTRODUCTION

In recent years several LSP studies have indirectly focused on the domain of financial accounting, for instance through the analysis of company annual reports. Such analyses have mainly focused on textual analyses of the annual reports such as genre studies. The financial statements, which constitute important parts of the annual reports, have, however, not been subject to LSP studies to the same extent. Niina Nissilä's study of one of the financial statements in the annual reports, namely the balance sheet, is thus offering new interesting knowledge within LSP in general and in terminology theory in particular.

Her paper presents a summary of several studies in which three different points of view are addressed, namely that of terminology, sociolinguistics and language planning, as illustrated in figure 1. These three points of view are applied in order to provide a description of the terms and concepts of the balance sheet.

The various studies are comprehensive and interesting and could have received a full commentary each. The paper discusses for instance the application of sociolinguistic issues in order to compare the selected balance sheets from both Swedish and Finnish companies. However, due to my own background and research interest I will try in my comment to point to some of the aspects which I find particularly relevant. These aspects include the theory and methods of terminology, and language planning. In my comment I will therefore try to see Nissilä's research from the point of view of future needs for theory development and teaching in terminology. I will also comment briefly on terminological analysis as a means of language planning.

2 THEORY DEVELOPMENT AND TEACHING IN TERMINOLOGY

In her analyses, Nissilä has continued to apply the three points-of-view methodology in order to investigate the nature of concepts, objects and terms found in the selected balance sheets from Swedish and Finnish companies. This first phase of a three-stage methodology is followed by a second analysis of possible concept and term variation in the balance sheets. Thirdly, the actual nature of concepts, objects and terms central in balance sheets are investigated, followed by a final phase in which she analyses the nature of the single concepts found in the selected balance sheets. Thus her methodology produces a matrix of analysis which I believe can be reapplied in both terminological analyses and the teaching of terminological methods.

One particularly interesting feature of Nissilä's analysis is the application of dichotomies. In order to describe the concepts, she establishes classification criteria by means of dichotomies which enable her to analyse the concept structures of the balance sheet as such, and the relations that hold among its concepts.

The application of dichotomies is a well-known principle in terminology theory, as discussed in for instance Myking (2003). Much terminology research in recent years has stressed the fact that neither domains nor concepts and terms are necessarily of such a nature that clear-cut descriptions are possible. Examples of such research may be the discussions of vagueness, complexity and interdisciplinarity in for instance Beaugrande (1991, 1997) and Toft (1994, 2001). Nevertheless, I believe that the well-known dichotomies in terminology theory of for instance LSP versus LGP, term versus word, onomasiology versus semasiology should still be central in any introduction to terminology theory because it is much easier to discuss the indefinite when you know what the definite positions are. The fact that such dichotomies are inherent qualities of domains, concepts and concept relations, as illustrated in Nissilä's findings, underlines the didactic relevance of such a dichotomisation approach.

2.1 The concept of domain

Nissilä's analysis of financial accounting objects and of the difficulties in analysing the concepts that refer to these abstract objects and presenting them in concept systems introduces a discussion of how we define the concept of 'domain'. Financial accounting is a typical example of a subject field that could be described as a "domain-in-use" if we consider the domain to be the actual activities of entering items into the books. Such a perspective will imply that individual perceptions will influence the balance sheet produced.

Nissilä's introduction of tacit knowledge is both interesting and relevant in this connection since the scope of her analysis is a user-based activity represented in the specific balance sheets of her corpus. However, another way of analysing the domain may be to see it as a discipline separated from the real objects, i.e., the actual balance sheets and the activities related to keeping the books. Then the concepts, as described in the domain of financial accounting, are likely to be of a more theoretical nature, and the concept systems may convey different concept relations. Such a "domain" concept may not allow the conceptualisation of tacit knowledge to the same extent. Thus an interesting analysis might have been to see how the way we perceive a subject field as a special domain may result in different terminological analyses.

2.2 Domain, concept and term dynamics

The domain of financial accounting has, as Nissilä points out, been subject to various instances of formal regulations resulting in standardisation of concepts and terminology. This is illustrated by the quotation below:

> **Adoption of IFRSs in Europe Effective in 2005**
> In June 2002, the EU adopted an IAS Regulation requiring European listed companies to prepare their consolidated financial statements in accordance with IFRSs starting with financial statements for the financial year 2005 onwards.
>
> **October 2002 Update:** A significant difference between IAS and Swedish GAAP is found in SFASC 27: The Swedish Annual Account Act prescribes that all financial instruments in the legal form of a share shall be accounted for and classified as an equity instrument. Therefore, the paragraphs in IAS 32 prescribing that a financial instrument with a legal form of a share shall be accounted for according to the substance rather than its legal form do not exist in SFASC 27. (http://www.iasplus.com/country/sweden.htm, emphasis added)

As the quotation illustrates, there are several factors affecting both the concepts and the terms in the domain, for instance national and foreign standards for good accounting practices (frequently called GAAP), international accounting standards and national legislation. This, I believe, is a good illustration of the importance of adapting terminological methods to cater for the domain dynamics, concept dynamics and term dynamics that are inevitable in the attempt to harmonise all these regulations and standards.

This also includes the development and application of language technology tools which can handle such dynamism.

3 TERMINOLOGICAL ANALYSIS AS A MEANS OF LANGUAGE PLANNING

As Nissilä has been able to show in her study, the financial accounting concepts have been formed by means of consensus-making and acceptance by international and national bodies (i.e. the EU and Swedish and Finnish law-making bodies). In this connection it may be relevant to point to Drezen's concept of dynamic standardisation (in Averbuh 1994: 66) which may be applied here, and also the discussion in Laurén, Myking and Picht (2006) of free language development versus absolute prescription in their article on domain dynamics.

Nissilä questions the variation of concepts used in the balance sheets and calls for stricter language planning to have more comparable listings in the balance sheets of the various companies, both in Sweden and Finland. Although I agree that more focus on language planning and standardisation are important, I would like to add an additional reason for this variation than the ones Nissilä poses in her paper. The balance sheets are regulated by national acts in which numerous concepts are presented as possible assets and liabilities concepts. The nature of the activities of the companies in question will determine which concepts to include. Thus a finance company needs to include many more finance-related assets concepts in its balance sheets than a typical manufacturing company. This will necessarily also have to influence which terminology is being used. This also relates to the discussion of whether it is the "domain-in-use" or the theoretical discipline that is analysed, and whether to incorporate tacit knowledge of the users in the analysis.

Nevertheless, the relatively high degree of term variation, partly due to domain-specific practice, shows that language planning should play a more important part within the domain. However, the picture is complicated, as illustrated in figure 2, since national accounting practice and conceptual understanding are coloured by the influence from both legislation and international regulations. Terminological cross-border cooperation is therefore vital.

4 CONCLUDING REMARKS

If I am to articulate a vision for future needs within the scope of terminology based on Nissilä's study, I want to stress the need to further develop the methodology for investigating the dynamics of both domains and concepts.

When it comes to the applications of terminology and terminological analyses I also want to underline the potential usefulness of the domain of terminology in developing other domains, such as that of financial accounting. Nissilä's study clearly illustrates this in that it has disclosed several aspects of financial accounting in which inconsistencies exist, and where for instance constant changes made by decision makers will continuously result in conceptual and terminological changes across several cultures, domiciles and language societies.

Furthermore, Nissilä's research illustrates in an excellent manner the importance of taking into consideration the very nature of the domain that is being analysed when the methods and research issues are to be established, something which she has done by developing a thorough methodology where terminology is integrated with sociolinguistics and language planning issues.

Finally, the study gives a timely argument for expanding the scope of the terminologist to other areas than those which have traditionally been subject to standardisation and standardisation, for instance to include areas belonging to finance and business economics. These areas are typically global and thus coloured by concepts formed through international consensus-making and national adaptations. The skills and methods of a terminologist are therefore certainly needed and should be made known to the relevant decision makers.

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FIGURES

Figure 1. A three-stage methodology for terminological analysis – initial phase.
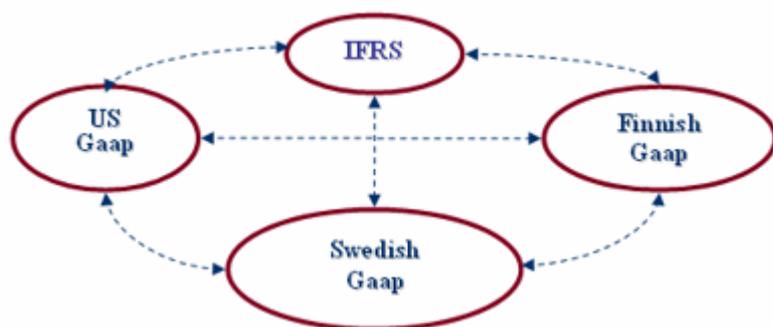
Figure 2. Terminological cooperation – language and concept planning.

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A COMMENT ON NIINA NISSILÄ'S PAPER
"STUDYING CONCEPTS OF BUSINESS ECONOMICS WITH TERMINOLOGICAL METHODS"

Niina Nissilä's paper focuses on the study of the balance sheet as a micro concept system within the field of financial accounting in Swedish from both Sweden and Finland.

In order to achieve the best possible understanding of the balance sheet, she analyses it from a terminological perspective complemented with social, political and historical points of view. The terminological analysis concentrates on the objects -mainly abstract-, concepts and concept relations that exist among them and, finally, the terms used to designate these concepts.

In some ways, this subject field is man-made, in the sense that it was "artificially" created by governments to keep track of the financial situation of every enterprise with at least the objective of calculating the due taxes for a given financial period. This is the reason why it is based on the laws and regulations of each country and, occasionally, of an economic region, as it is the case of the European Union.

Because each country has its own laws regarding financial accounting, there are necessarily some differences in the contents of balance sheets and in the way in which these are drawn up. On the other hand, since balance sheets have the same objective, there are consequently many similarities between them. As Niina rightly points out, every balance sheet is different from almost any other, because of the number of factors affecting them, such as changes in the laws and regulations over a period of time, the enterprise's field of activity and, at another level, the enterprise's choice of concepts and terms used.

This work presents many interesting issues concerning both the terminological analysis and the balance sheet itself which are worth discussing:

> 1. This is a very thorough analysis which shows what actually happens in real life texts, in this case in Swedish from both Sweden and Finland. It therefore corresponds to a descriptive approach to terminology which, in my opinion, is of paramount importance if we are ever to understand –I mean truly and fully understand– the principles governing terminology and how it actually behaves in its natural linguistic environment.

> 2. Undoubtedly, the field of financial accounting is, from the terminological perspective, an interesting one since concept and term variation can easily be detected, analysed and categorised. This allows for new theoretical research and discussions regarding these fundamental issues.

> 3. Traditionally, in terminology, objects have been treated in more or less the same way regardless of their nature. Niina's work explicitly shows the difficulties of analysing concepts corresponding to abstract objects. This may stem from the different ways in which individuals conceptualise according to their own knowledge and life experience as well as other factors such as language and culture and the intrinsic difficulties of corroborating the accuracy and precision of the abstract object and its corresponding concept.

> 4. It would be natural to expect the same or similar degrees of abstraction at the same level of a concept system. But this is not generally so, as it has been shown

in Niina's paper. She found concepts such as 'goodwill' and 'tangible assets' which are of different degrees of abstraction and yet they share the same level in the concept hierarchy. This situation opens the way for research on this type of phenomena.

5. Another interesting point from this analysis is the fact that the concept system developed for each 'balance sheet' differs from almost any other and the intersection is not that evident or clear. In fact, in order to identify equivalences, the characteristics of each concept have to be determined and then contrasted with those of a concept in a different balance sheet to decide whether they actually correspond to each other.

6. Even though balance sheets are designed for the same purpose, which is to show the enterprise's assets, liabilities and equities on a specific date, each resulting balance sheet has its own peculiarities regarding

- **what is included** -> the relevant objects,
- **how it is included** -> several coordinate concepts or only the superordinate concept, and
- **how it is expressed in language** -> one term or two or more synonyms corresponding to only one concept.

7. Concept formation plays a central role in terminology. From this study it is possible to acknowledge the specific features of how concepts are formed in economics and financial accounting and how these features differ from concept formation processes in other fields of knowledge. This can provide fertile ground for future research and classification of the different concept formation processes in different subject fields.

8. Niina's work also explores the interaction between concrete and abstract objects and their corresponding concepts in the field of financial accounting and reports interesting relationships. A contrastive analysis between different fields of knowledge could also further this research.

9. The adaptation of Sowa´s double triangle for the representation of concepts of financial accounting is most fortunate, as it shows in a very simple and explicit manner the relationships between the object, concept, term, symbol and the actual representation. Completeness and consistency are assured by adding a place in the figure for the symbol –the actual value measured in money– and for the representation –of the item in the real balance sheet–. Of course, this particular domain seems very appropriate for this sort of representation. Another topic for further research could be how concepts in different subject fields can be represented using the double triangle.

10. It was to be expected to find terminological differences in the balance sheets drawn up in the two countries. From this study it can also be perceived that Swedish from Sweden is the dominant language, even in Finland. This is probably due to historical, social, political and other cultural factors. But that happens everywhere and certainly in any multi-focal language.

11. One of the most interesting aspects of this research concerns the International Financial Report Standard (IFRS), which is supposed to facilitate the understanding of financial reports of publicly traded companies across Europe. However, in spite of providing very detailed guidelines on how these reports are to be prepared and how each sum is to be accounted, there are no linguistic

recommendations for the presentation. The result shows a considerable increase in term variation which could, in the long run, be fairly problematic for the actual understanding of the different financial reports across the various European countries and languages. If the IFRS is to be successful, immediate measures regarding concept and especially term harmonisation need to be taken.

12. Theoretical and applied terminology has come a long way in the last few years and new research is being carried out throughout the world. New theoretical positions have helped us to have a clearer and more complete overview of terminology in general. On the other hand, terminology is now being applied everyday and everywhere, from the creation of new concepts and terms to the semantic web, the e-business and the Internet. It is a pleasure and a relief to see the younger generation of scholars already immersed in the search for new understanding and new applications for terminology.

13. Last, but not least, I wish to congratulate Niina for the great work she is doing and wish her a successful completion of her PhD.

Ekaterina Mhaanna

PROCESSUAL CONCEPT RELATIONS BY METHODS OF TERMINOLOGY

Abstract

The article is devoted to the method of analysing and defining concept relations in terminology, in particular – to the concepts of terminology underlying the method. In the Ph.D. thesis I focused on the concept relations for terminological analysis of processes – the processual concept relations. The main subject of the thesis was a method of defining these concept relations and definitions of the processual concept relations worked out using the method. The method involves principles and concepts of terminology science together with the concepts described in the Ph.D. thesis.

1 INTRODUCTION

Concept relations are one of the most important tools in terminology work and for this reason one of the most relevant discussion issues within terminology science. Such relations as the generic relation and the part-whole relation are most common in terminological practice. They have therefore been paid more attention in terminology science and more agreement was achieved in the questions concerning these relations. It resulted, for example, in the definitions of these relations in the ISO standards (see e.g. ISO 2000a).

Other types of concept relations are most often referred to as associative relations. ISO (2000b) says: "There are many kinds of associative relations", and gives some examples of such relations. ISO (2000b) includes the definitions of a few associative relations such as, for example, sequential concept relation and its subtype – temporal concept relation. Meanwhile terminological practice comes across numerous examples of concept relations which are not defined in the ISO standards, but are widely discussed within terminology science at the moment. An example of such relations is processual concept relations, for instance, agent-instrument relation or patient-result relation. The description of such concept relations requires further development of the terminology of concept relations and a more profound method for analysing them.

2 Background

The article Defining Semantic Relations for OntoQuery (here called "OntoQuery paper") by Nistrup Madsen et al. (2001) was the starting point for my research. The OntoQuery paper was written at the initial stage of the OntoQuery project (www.ontoquery.dk). A number of concept relations relevant for OntoQuery were suggested and arranged into several part-hierarchies, among which the hierarchies of location relations, activity relations and role relations are the most detailed ones (see Attachment 1). The overall goal of the OntoQuery project was to develop general theories for

- ontological representation of domain knowledge,
- ontological semantics for natural language phrases and
- ontology-based search in text databases.

The concept relations were examined in order to propose what role they should play in the OntoQuery project, both theoretically and with a view to the application in the ontology. As the top of the hierarchy was selected "semantic relation". It was assumed that the relations presented could be used also in terminology work. I consider these relations, however, as terminological concept relations, and analyse them from this point of view.

The OntoQuery paper dealt with the problem of how the semantic relations can be grouped into coherent classes and ordered hierarchically. The authors attempted to define the relations in accordance with their position in the hierarchy. Later on, it was integrated into a more general hierarchy of concept relations for the OntoQuery project (see Nistrup Madsen et al. (2002). The diagrams in the OntoQuery paper (see Attachment 1) and in Nistrup Madsen et al. (2002) were presented as intermediate suggestions open for discussion, which I have continued in my own research work. In my Ph.D. research (Mhaanna (2007) I focus mostly on the part-hierarchy of location relations, activity relations and role relations. The present article concentrates on my proposals concerning activity relations and role relations.

In my Master's dissertation (Mhaanna 2001b) I suggested a method for defining some of the concept relations from Nistrup Madsen et al. (2001) and tested the definitions of concept relations on empirical material. One of my purposes was to investigate how the proposed concept relations could be adjusted to terminological work in practice. New examples for the concept relations were selected from the material. Consistent definitions for concept relations were created by using a standard method in order to avoid misunderstanding and ambiguity in the use of the relations.

The example definitions of concept relations presented in the OntoQuery paper were proposed at the initial stage of the OntoQuery project and were regarded by the authors as a draft subject to further revision, whether it concerns the content or the representation of the definition. For instance, the definition of the activity-agent relation proposed was:

> GENUS: activity relation and agent relation
> FEATURE: one argument refers to an activity and the other refers to an agent

The method of working with concept characteristics has been significantly improved since the OntoQuery project – among other things thanks to the CAOS project1. When analysing the relation definitions presented in the OntoQuery paper (see e.g. the example above) I concluded that it would necessary to define the concepts "activity", "agent", "instrument", "patient", "result" which I called "**relation participants**" in Mhaanna 2001b. To define a particular concept relation, for example the activity-agent relation, we can combine the definitions of the relevant relation participants – in this case the definitions of "patient" and "result". Consequently, in accordance with the basic rules of defining, I suggested that the definitions of concept relations should include the following parts:

- the type of the superordinate relation
- the definition of the first relation participant (for example the definition of "activity")
- the definition of the second relation participant (for example the definition of "agent")

The definitions of the relation participants suggested in Mhaanna 2001b were based on the common intuition about the meaning of the expressions "activity", "agent", "instrument", "patient" and "result". In addition, the definitions were adjusted to match the examples of the relations from the empirical material analysed. In the Ph.D. research I aimed to revise the definitions on a more systematic basis (Mhaanna 2007). Among the subjects brought up in my Ph.D. thesis, I outline the following issues in this article:

- The terminology of concept relations, for example, the suggestion of the definition of the concept "relation participant".
- The method of defining concept relations and the more consistent system of definitions of the processual concept relations.

1Computer Aided Ontology Structuring http://www.id.cbs.dk/~het/idterm/CTO/caos/.

2 Terminology of Concept Relations

As mentioned above, I proposed earlier a method of defining concept relations. To clarify the method and to improve the definitions it was necessary to describe and define the concept "relation participant" as a part of the terminological apparatus of terminology science (in short – terminology of terminology). In order to do this I systematised the existing terminology of terminology and on the basis of that developed relevant concepts.

Three main groups of sources were utilized in creating the common system of definitions of concepts of terminology. These are the ISO standards, the works of B. Nistrup Madsen and her colleagues and the works of A. Nuopponen. For example, I take the definition of "object" from ISO (2000a) as given. The definition says:

> **object** – anything perceivable or conceivable NOTE Objects may be material (e.g. an engine, a sheet of paper, a diamond), immaterial (e.g. conversion ratio, a project plan) or imagined (e.g. a unicorn). (ISO (2000a)

In the following I will present definitions in the form of tables. This presentation form originates from the i-Term term base2 where I recorded the definitions involved in the Ph.D. project. The field "Reference for term" refers to the main source of information while the field "Reference for def." refers to the source for the definition. The Ph.D. thesis, i.e. Mhaanna 2007 is referred to as "The present thesis" in the tables. If a term in a definition text is underlined as a hyperlink, the definition of the underlined term can be found in the term base and can be opened by clicking on the hyperlink when working in the term base.

[2] i-Term term base is developed by DANTERMcentret, www.danterm.dk. Many diagrams are drawn using the i-Model module within i-Term, see, for example, the diagram in Attachment 3.

2.1 Principle of Three Levels in Terminology

To systematise the concepts from different acknowledged sources I apply the **principle of Three Levels in Terminology:**

> Level 1: objects in the world
> Level 2: their abstraction in the form of concepts
> Level 3: concept representations

Subdivision into the tree levels is broadly accepted in terminology science (see for example Nuopponen 1994). I also relied on this principle during the analysis of concepts of terminology and tried to utilise the principle in the definitions I suggested. The concepts of terminology in the system of definitions in my thesis can be subdivided among the tree levels of terminology according to what the concepts refer to, see Table 1:

Table 1 Examples of subdivision of concepts of terminology among the 3 Levels

Level 1 of Terminology (the concept refers to the object in the world)	Level 2 of Terminology (the concept refers to the abstraction in the form of a concept)	Level 3 of Terminology (the concept refers to the representation of the concept)
object	concept	designationvv
property	characteristic	feature specification
ontical system	concept system	concept diagram
ontical relation	concept relation	relation specification

Table 1 presents examples of concepts of terminology at the different levels of which the definitions of "ontical system", "ontical relation" and "concept relation" will be discussed here, while in Mhaanna 2007 all these plus some other relevant concepts are discussed.

2.2 Concept "relation participant"

With the example below as the starting point I illustrate in very simple terms (more systematic analysis of the subject comes later) the idea of "relation participant", here more precisely – "process relation participant".

A hammer can be:

- an instrument in the process of hammering;
- a result in the process of producing hammers;
- a patient in the process of repairing the hammer etc.

The referent of the concept "hammer" becomes instrument or result when it interacts with other concept referents (i.e. with the other objects in the world) in a particular way. As the concept "hammer" is the abstraction of the concept referents – hammers in the real world, **process relation participants** "activity", "agent", "instrument" etc. are the abstractions of the way in which the concept referents interact with the other concept referents in the world. I suggest that to be able to characterise the concept as, for example, "activity", "agent" or "instrument" we should examine the interactions of the concept referent with the other objects involved in the process concerned. After the concept is characterised as a particular process relation participant the relation of this concept to the other concept can be characterised as a **certain processual concept relation**, for example, activity-agent relation, agent-instrument relation etc. I look at the matter in more detail in the following where I present the definitions of the concepts involved in defining the concept "process relation participant" from Level 1 and Level 2 of Terminology.

2.2.1 Level 1 of Terminology

At Level 1 in Terminology we deal with the concepts the referents of which are the objects in the world. When we view an object in the world as a system consisting of the other objects we can call it "ontical system". "Process" is a subtype of ontical system on which I focused in my research. The concept "process" is a topical discussion issue in many research areas (see, for example, Grenon et al. 2003). In Table 2 I present the definition of "process" which is relevant for the system of definitions of concepts of terminology suggested in the thesis.

Table 2 The definition of "ontical system" and "process" as its subordinate concept

English:	ontical system
Reference for term:	Nuopponen (1994)
General definition:	object of the world in which the objects' coexistence or interaction is considered
Reference for def:	The present thesis
English:	process
Reference for term:	Rundell (2002)
General definition:	ontical system where the interactions among the objects are considered
Reference for def:	The present thesis

The definition includes the characteristics which I chose among the multiple characteristics of the concept, and which I considered to be most relevant for the system of definitions.

The relations between the objects in the ontical system can be called 'ontical relations' and the ontical relations in the process 'processual ontical relations'. When examining ontical relations and processual ontical relations we examine the relations between the objects, and pay equal attention to the objects involved in this particular relation and focus on the way they interact within this relation; cf. the definitions in Table 3.

Table 3 The definition of "ontical relation" and "processual ontical relation" as its subconcept

English:	ontical relation
Reference for term:	Nuopponen (1994)
General definition:	relation between objects in the world
Reference for def:	The present thesis
English:	processual ontical relation
Reference for term:	The present thesis
General definition:	ontical relation in a process
Reference for def:	The present thesis

Let us take a look at the following example processes:

(a) Apprentice Svend is using a hammer to hammer the nail into the stool he is to build.
(b) They used a hammer to break the window to be able to get out of the burning vehicle.

In these processes the following processual ontical relations can be identified:

(a) the hammer – apprentice Svend; the nail – the hammer; apprentice Svend – the nail
(b) the hammer – the people in the burning vehicle; the window – the hammer; the people in the burning vehicle – the window

object 1	interact	object 2
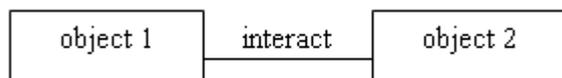
Figure 1

I work with the binary relations. Figure 1 illustrates the method how I suggest a binary ontical relation could be analysed.

2.2.2 Level 2 in Terminology

At Level 2 in Terminology we deal with the concepts referring to the abstractions of the objects of the world from Level 1. The abstraction of a processual ontical relation is "processual concept relation". The definitions of the superordinate concepts "concept relation" and "ontological relation" are discussed in more detail in Mhaanna (2007). In Table 4 I present the definitions which result from the analysis:

Table 4 The definition of "concept relation" and its subordinate concepts

English:	concept relation
Reference for term:	ISO (2000a)
General definition:	abstraction of a relation of an object to the other object NOTE Concept relations are used for describing concepts and structuring concepts in a concept system
Reference for def.:	Mhaanna (2004)
English:	ontological relation
Reference for term:	Nuopponen (1994)
General definition:	concept relation, which is an abstraction of an ontical relation
Reference for def.:	The present thesis
English:	processual concept relation
Reference for term:	The present thesis
General definition:	ontological relation, which is the abstraction of a processual ontical relation
Reference for def.:	The present thesis

The objects from the example processes (a) and (b) above can be abstracted as concepts. For instance:

(a) person[3], hammer, nail
(b) person, hammer, window

The ontical relations from the processes can be abstracted as concept relations, for example:

(a) person-hammer, hammer-nail, nail-person
(b) person-hammer, hammer-window, window-person

At Level 2 of Terminology we deal with the abstractions of the objects from Level 1 of Terminology in the form of concepts and with the abstraction of the ontical relation between them in the form of the concept relation. As in the case with the ontical relation we focus on the concepts involved in the relation and on the concept relation, which is the abstraction of the ontical relation between the concept referents. I.e. we consider the concept relation regardless the process in which the concept referents participate. But how can we tell the difference between the relation person-hammer when considering the process of making the stool and the relation person-hammer when considering the process of someone producing hammers? Or between the relation window-person, when looking at the process of breaking the window; and the relation window-person, when considering the process of jumping through the window? On the other hand the relation nail-person from the example (a) and window-person from the example (b) are somehow similar if considered on the background of the respective processes in spite of the fact that they involve different concepts (nail and window).

To pinpoint these differences and the similarities I suggest an analysis of the **participation** of the objects in the example processes, and thus return to Level 1 in Terminology to clarify the standpoint. The interactions of the objects in the example processes have some **common properties**:

Example 1

a) The hammers in these processes are used by an object to affect another object;
b) Apprentice Svend and the people in the burning vehicle use an object to affect another object in the process;
c) The nail and the window are affected by an object which uses the other object to affect them.
When studying a particular object's interactions with the other objects in a process the focus may be on this object and the way in which it interacts with the rest of the objects. In the examples below the focus is on the hammer's interactions within the two processes:

d) The hammer's participation in the process of hammering is that the hammer is used by apprentice Svend to hammer the nail.
e) The hammer's participation in the process of breaking the window is that the hammer is used by the people in the burning vehicle to break the window.
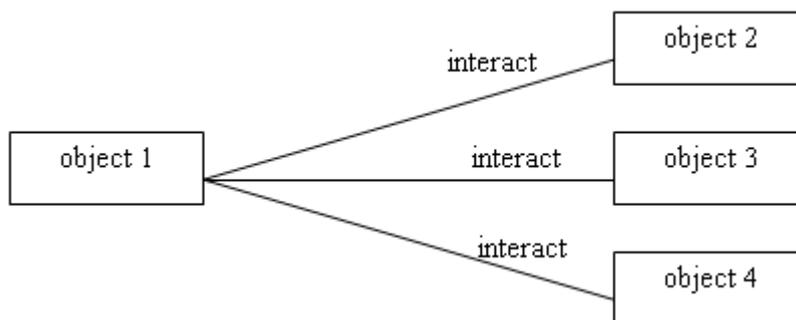
Figure 2

Here the focus is on this particular object (hammer) and the sum of its interactions with the other objects, see Figure 2 (cf. Figure 1).

Viewing the object in this way is reflected in the definition of the concept "participation in the process" and "object's participation" as its superordinate concept, see Table 5:

Table 5 The definitions of "object's participation" and "participation in the process"

English:	object's participation
Reference for term:	The present thesis
General definition:	the way in which the object coexists or interacts with the other objects in an ontical system
Reference for def.:	The present thesis
English:	participation in the process
Reference for term:	The present thesis
General definition:	object's participation in the process
Reference for def.:	The present thesis

The distinction between "processual ontical **relation**" and "**participation** in the process" lies in the focus of the observation of the particular process. When we observe a particular processual ontical relation, e.g. the one between the hammer and apprentice Svend, we are equally interested in both objects (in the example – both the hammer and apprentice Svend) involved in this particular relation and concentrate on the **relation** itself. When we observe a particular object interacting with the other objects in the particular process, we focus on the sum of this object's interactions within the process – the object's **participation** in the process.

The analysis of object's participation reveals properties of the object's interaction within a process as a whole, while the ontical relation between the objects is observed regardless the process as a common framework. At Level 2 in Terminology the properties which are common for the objects' participation in the processes can be abstracted conceptually as the particular **process relation participants**:

> a) The properties which are common for the hammers' participation in the example processes (Example1a) can be abstracted as e.g. "instrument";
> b) The properties which are common for the apprentice Svend and the people in the burning vehicle participation in the processes (Example1b) can be abstracted as a e.g. "agent";
> c) The properties which are common for the participation of the nail and the window in the processes (Example1c) can be abstracted as e.g. "patient".

In Table 6 definitions for the concepts "relation participant" and "process relation participant" as its subordinate concept are presented:

Table 6 The definition of "relation participant" and "process relation participant"

English:	relation participant
Reference for term:	Mhaanna (2001b)
General definition:	abstraction of the object's participation NOTE Relation participants are used for clarifying concept relations
Reference for def.:	The present thesis
English:	process relation participant
Reference for term:	The present thesis
General definition:	relation participant, which is the abstraction of the object's participation in the process
Reference for def.:	The present thesis

[3]Both apprentice Svend and the people in the burning vehicle are abstracted as "person".

4.4 Definitions of Process Relation Participants

As suggested above, participation of an object in the process can be abstracted as a process relation participant. The participation of the objects in the processes can have some common properties which can be generalised and abstracted to form the characteristics of the process relation participants, such as activity, agent, instrument, patient, and result. Because the object interacts with the other objects in the process, the object's participation is the sum of its interactions with the other objects (e,g, activity, instrument, patient, result). For example, the object whose participation is abstracted as agent performs the activity object using the instrument object, affecting the patient object and causing the result object. The figure 3 illustrates this graphically:
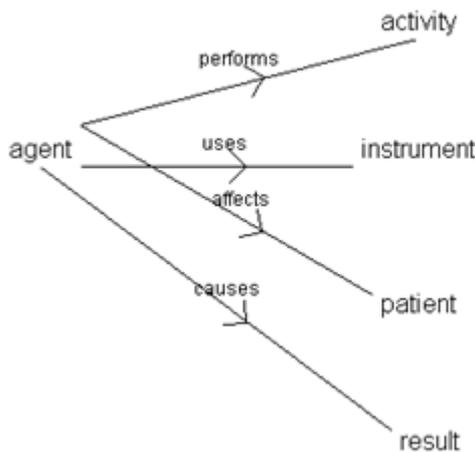
Figure 3

When revising the definitions of the process relation participants from Mhaanna 2001b I included the characteristics referring to these properties into the definitions. I argue that the interaction with an activity object can be abstracted as the main characteristic of a process relation participant, while the interactions with the other objects in the process can be abstracted as additional characteristics. In the tables I mark the main characteristic in the field "General definition" and the additional characteristics in the field "Technical definition". In Table 7 I reproduce the definition of "agent" and "result", while the definitions of the other relation participants suggested in Mhaanna 2007 are presented in Attachment 2.

Table 7 The definition of "agent" and "result"

English:	**agent**
Reference for term:	Mhaanna (2001b)
General definition:	role participant, the object of which performs the activity object
Reference for def.:	The present thesis
Technical definition:	Additional characteristics: 1) the agent object can "use" the instrument object 2) the agent object can affect the patient object 3) the agent object can cause the result object

English:	**result**
Reference for term:	Mhaanna (2001b)
General definition:	passive role participant the object of which is led to by the activity object
Reference for def.:	The present thesis
Technical definition:	Additional characteristics: 1) the result object can be caused by the agent object 2) the result object can be led to by means of the instrument object 3) the result object can be led to by affecting the patient object

The superordinate concepts in the definitions of the process relation participants are defined in Mhaanna 2007 and the relation participants are arranged into the hierarchy (see Attachment 3). This hierarchy of the relation participants is the result of the profound revision of the hierarchy in Mhaanna 2001b.

4.5 Definitions of Processual Concept Relations

The definitions of the process relation participants can be used in the definitions of the processual concept relations. The modifications of the method evolve from the closer investigation of the concept "process relation participant" and the concepts related to it at the different Levels in Terminology.

Basically I maintain that the definition of a concept relation should include the superordinate concept (to ensure the inheritance of the characteristics). The superordinate concept in the definitions proposed in Mhaanna (2007) is "processual concept relation".

The delimiting characteristic in the definition of a processual concept relation is supposed to refer to the interaction between the objects whose participation in the process is abstracted as the relation participants. For example, the delimiting characteristic in the definition of the agent-result relation refers to the interaction between an agent object and result objects. This characteristic delimits the concept "agent-result relation" from, for example, the concept "patient-result relation", the delimiting characteristic of which refers to the interaction between the patient object and the result object. I choose the characteristics to be involved in the definitions of the processual concept relations. In Table 8 I reproduce the definitions of the agent-result relation and the patient-result relation, while the definitions of some other processual concept relations suggested in Mhaanna (2007) are gathered in Attachment 4.

Table 8 The definition of patient-result relation and agent-result relation

English:	**patient-result relation**
Reference for term:	Nistrup Madsen et al. (2001)
Technical definition:	processual concept relation between the result, the object of which can be led to by affecting the patient object, and the patient
Reference for def.:	The present thesis

English:	**agent-result relation**
Reference for term:	Nistrup Madsen et al. (2001)
Technical definition:	processual concept relation between the agent, the object of which can cause the result object, and the result
Reference for def.:	The present thesis

CONCLUSION

The present article sketches some of the main points discussed in my Ph.D. study. One of the main objectives was to point out the aspects relevant for the analysis of the processual concept relations from OntoQuery (Nistrup Madsen et al. 2001) and to work out their definitions using a consistent method. To fulfil the assignment, I analyse the concepts of terminology relevant for the concept "concept relation". I employ the principle of 3 Levels in Terminology to analyse both existing concepts of terminology (such as "object" or "concept"), as well as those introduced in Mhaanna 2007 (for example "process relation participant" or "participation in the process"). Defining the concepts I take into account the rules for intensional definition4. As the result, a common system of definitions of concepts of terminology was established in Mhaanna 2007. Within this system the concept of "process relation participant" is further clarified and defined. The concept is used in the revision of the definitions of the concrete process relation participants ("agent", "activity", "instrument", "patient" and "result") from Mhaanna 2001b, see Section 4.4 of the article. According to the method suggested in Mhaanna 2001b and further developed in Mhaanna 2007 the definitions of the process relation participants are combined into the definitions of the processual concept relations (such as agent-patient relation, instrument result relation etc.), see Section 4.5 of the article. The vision could be that the method of defining the concept relations by use of the relation participant characteristics can become a standard procedure in the work with concept relations in terminology of terminology.

In Mhaanna 2007 I tested and exemplified how the processual concept relations from OntoQuery can be used in terminology work and identify these concept relations in the information about vitamins on the background of the suggested definitions of these relations. To conduct the terminological investigation of the domain of vitamins, the processual concept systems based on the OntoQuery relations are used as a method of the analysis of information about processes. Other relevant issues for terminological process analysis which were discussed and developed in the thesis are granularity levels (on the background of the works of B. Smith and his co-authors). Also concept relations presented in the works of J. F. Sowa were discussed.

[4]Sager 1990; Nistrup Madsen 1999; ISO 2000a. Sager 1990; Nistrup Madsen 1999; ISO 2000a.

ATTACHMENTS

Attachment 1. The hierarchy of the relations location, activity and role from Nistrup Madsen et al. (2001)
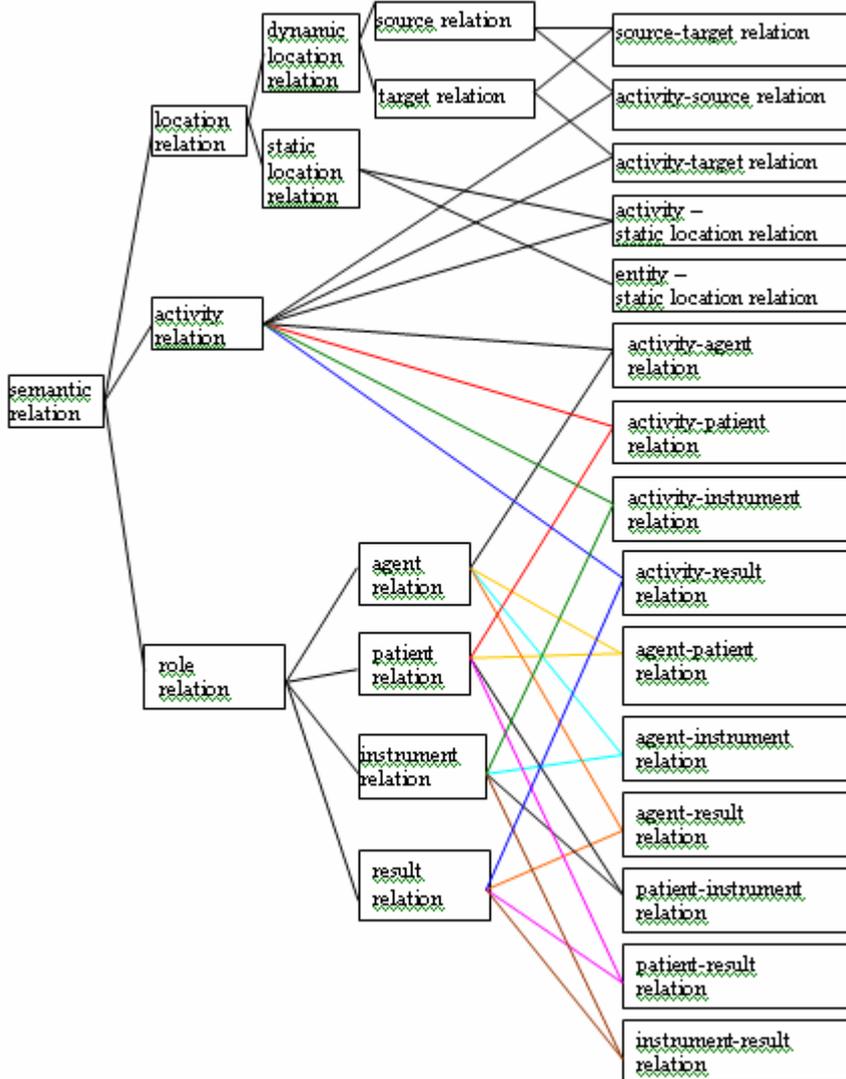
Attachment 2. Definitions of some relation participants from Mhaanna 2007

Subject:	Relation participants
English:	**activity**
Reference for term:	Mhamma (2001b)
General definition:	process relation participant the object of which is carried out during the process
Reference for def.:	The present thesis
Technical definition:	Additional characteristics: 1) the activity object can be performed by the agent object 2) the activity object can be performed by means of the instrument object 3) the activity object can target the patient object 4) the activity object can lead to the result object
English:	**agent**
Reference for term:	Mhamma (2001b)
General definition:	role participant, the object of which performs the activity object
Reference for def.:	The present thesis
Technical definition:	Additional characteristics: 1) the agent object can "use" the instrument object 2) the agent object can affect the patient object 3) the agent object can cause the result object
English:	**instrument**
Reference for term:	Mhamma (2001b)
General definition:	passive role participant, by means of the object of which the activity object is performed
Reference for def.:	The present thesis
Technical definition:	Additional characteristics: 1) the instrument object can be "used" by the agent object 2) by means of the instrument object the patient object can be affected 3) by means of the instrument object the result object can be lead to
English:	**passive role participant**
Reference for term:	The present thesis
General definition:	role participant referring to the object's passive participation in the process
Reference for def.:	The present thesis
English:	**patient**
Reference for term:	Mhamma (2001b)
General definition:	passive role participant the object of which is the target for the activity object
Reference for def.:	The present thesis
Technical definition:	Additional characteristics: 1) the patient object can be affected by the agent object 2) the patient object can be affected by means of the instrument object 3) affecting the patient object can lead to the result object
English:	**process relation participant**
Reference for term:	The present thesis
Example:	activity agent
General definition:	relation participant, which is the abstraction of the object's participation in the process
Reference for def.:	The present thesis
English:	**relation participant**
Reference for term:	Mhamma (2001b)
Example:	agent patient part whole
General definition:	abstraction of the object's participation NOTE Relation participants are used for clarifying concept relations
Reference for def.:	The present thesis
English:	**result**
Reference for term:	Mhamma (2001b)
General definition:	passive role participant the object of which is led to by the activity object
Reference for def.:	The present thesis
Technical definition:	Additional characteristics: 1) the result object can be caused by the agent object 2) the result object can be led to by means of the instrument object 3) the result object can be led to by affecting the patient object

English:	**role participant**
Reference for term:	The present thesis
General definition:	process relation participant which is the abstraction of the object's active or passive participation in the process

Attachment 3. Hierarchy of the relation participants from Mhaanna 2007
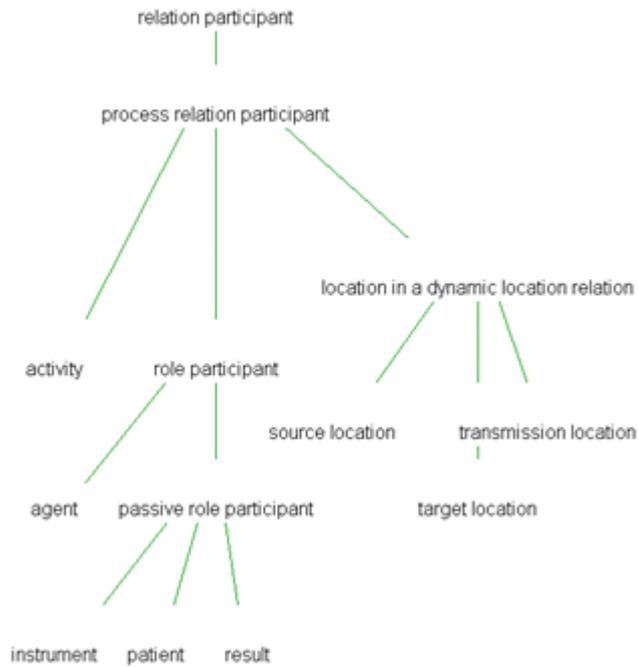
Attachment 4. Definitions of some of the processual concept relations from Mhaanna 2007

Subject:	OntoQuery concept relations
English:	**activity relation**
Reference for term:	Nistrup Madsen et al. (2001)
General definition:	processual concept relation between activity and another process relation participant
Reference for def.:	The present thesis
English:	**activity-patient relation**
Reference for term:	Nistrup Madsen et al. (2001)
General definition:	processual concept relation between the activity and the patient
Technical definition:	processual concept relation between the patient, the object of which is the target for the activity object, and the activity
Reference for def.:	The present thesis
English:	**activity-result relation**
Reference for term:	Nistrup Madsen et al. (2001)
General definition:	processual concept relation between the activity and the result
Technical definition:	processual concept relation between the activity, the object of which can lead to the result object, and the result
Reference for def.:	The present thesis
English:	**agent relation**
Reference for term:	Nistrup Madsen et al. (2001)
General definition:	processual concept relation between agent and another process relation participant
Reference for def.:	The present thesis
English:	**agent-activity relation**
Reference for term:	Nistrup Madsen et al. (2001)
General definition:	processual concept relation between the agent and the activity
Technical definition:	processual concept relation between the activity, the object of which is performed by the agent object, and the agent
Reference for def.:	The present thesis
English:	**agent-instrument relation**
Reference for term:	Nistrup Madsen et al. (2001)
General definition:	processual concept relation between the agent and the instrument
Technical definition:	processual concept relation between the agent, the object of which performs the activity object by means of the instrument object, and the instrument OR processual concept relation between the agent, the object of which can "use" the instrument object, and the instrument
Reference for def.:	The present thesis
English:	**agent-patient relation**
Reference for term:	Nistrup Madsen et al. (2001)
Example:	sun light - carotene
General definition:	processual concept relation between the agent and the patient
Technical definition:	processual concept relation between the agent, the object of which affects the patient object, and the patient
Reference for def.:	The present thesis
English:	**agent-result relation**
Reference for term:	Nistrup Madsen et al. (2001)
General definition:	processual concept relation between the agent and the result
Technical definition:	processual concept relation between the agent, the object of which can cause the result object, and the result
Reference for def.:	The present thesis
English:	**instrument relation**
Reference for term:	Nistrup Madsen et al. (2001)
General definition:	processual concept relation between instrument and another process relation participant
Reference for def.:	The present thesis
English:	**instrument-activity relation**
Reference for term:	Nistrup Madsen et al. (2001)
General definition:	processual concept relation between the instrument and the activity
Technical definition:	processual concept relation between the activity, the object of which can be performed by means of the instrument object, and the instrument

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COMMENT

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A COMMENT ON EKATERINA MHAANNA'S PAPER "PROCESSUAL CONCEPT RELATIONS BY METHODS OF TERMINOLOGY"

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DEFINING CONCEPTS: STARTING FROM CONCEPTS THEMSELVES OR FROM EMPIRICAL DATA. A COMMENT ON EKATERINA MHAANNA'S ARTICLE ENTITLED: "PROCESSUAL CONCEPT RELATIONS BY METHODS OF TERMINOLOGY"

1 INTRODUCTION[1]

The article by Ekaterina Mhaanna presents part of the author's thesis devoted to the modelling of relations between concepts. As the author rightly points out, the issue of relations is central in terminology (as it is in many other disciplines dealing with relational data). The author focuses on complex and non-hierarchical relations – such as those involving an entity and a process – defines them, and proposes a model for representing them formally. This work aims to contribute to a better understanding of the set of relations in which concepts appear (and eventually lead to descriptions of the relations between terms that denote these concepts).

The relations considered are particularly relevant, since it can be assumed that they can be found in several different fields of knowledge. Surprisingly, they have not been dealt with extensively in terminology, contrary to other well documented relations, such as hyperonymy-hyponymy, meronymy-holonymy, and cause-effect. Process relations have been taken into account by Feliu (2004) who has analyzed their application in the field the human genome. They have also been characterized in other theoretical frameworks (e.g., in lexical semantics, Fillmore 1968; FrameNet), although for a different purpose (describe lexical units in terms of argument structures).

The author's concern for implementing formal definitions of these relations in existing hierarchies of relations (based on work by Nistrup Madsen et al. 2001) is particularly relevant, especially when considering that ontologies or other forms of knowledge representations are being designed in various different fields. There is an acute need for formal definitions of concepts and of the relations in which they can be found.

The author is very careful and advises readers that models previously designed are open to discussion and that some of their components can be revised. In fact, it would probably suffice to say that conceptual models are always the reflection of a given point of view on data or on knowledge. My comment will illustrate another perspective which is again only the reflection of a specific point of view on terminological data.

STARTING FROM CONCEPTS OR STARTING FROM DATA?

Process relations are different from other central relations considered up to now in terminology in the following ways:

- They involve two units that belong to two different classes (often, an entity and an activity);
- They are non-hierarchical;
- The activity can be realized linguistically by a noun, but also by a verb.

The approach taken by the author consists in defining the relation and the concepts it involves very rigorously. The subsequent aim is to investigate corpora to analyze how these concepts and relations are realized in text.[2] I will take a different approach and raise a few questions on the potential findings it can provide. The general idea is to try to find out if data leads us to a list of relevant relations instead of starting the other way around.[3]

My perspective is based on the following:

- Looking at the issue of concepts (perhaps, I should say senses) and relations using as a starting point texts and the data they contain; i.e., linguistic forms of senses are the starting point of this analysis;
- The observation of interactions of linguistic forms with others lead to the delimitation of their senses; they will also lead us to a set of relations that can differ from one unit to another.

In other words, my perspective is corpus-based and relies on structural lexical semantics. To illustrate its application, I used an example borrowed from the field of computing.[4]

a) Linguistic forms as a starting point

If the starting point of our analysis are linguistic forms found in specialized corpora, a selection can be made in order to retain forms that are relevant for a given terminology project (that can be the design of a specialized dictionary, the enrichment of a term bank, the population of an ontology, etc.). In text, different linguistic forms can be used to designate specialized entities. For example, the following linguistic expressions can refer to "a peripheral used for producing text of images on paper from data contained in the computer": *printer, printing peripheral, device used for printing.*[5]

Terminologists (or other specialists concerned with the collection of terms) can decide to take into account only part of these linguistic forms. They can set aside printing peripheral if they consider that it can be interpreted as a generic form when taken out of context. They can also set aside the phrase device used for printing which can be considered as a defining paraphrase. Other analysts could determine that all these forms are relevant for they can be used to access information about senses in texts (e.g., as in computational terminology where term variants have been characterized in order to devise techniques to handle them automatically (Daille et al. 1996)).

b) Interaction of linguistic forms

A corpus will reveal a number of paradigmatic relations, such as those listed in Table 1. Some of these relations can be found in text using linguistic markers. A lot of work has been carried out in this area during the past decade (Ahmad & Fulford 1992; Meyer 2001, among others).[6]

Table 1. Units interacting with printer (paradigmatic relations)

peripheral	Hyperonym (generic term)
laser printer, network printer, color printer, portable printer	Hyponyms (expressed by printer + a noun or an adjective)
scanner, modem, monitor	Co-hyponyms: (based on shared collocates)
printhead	Meronym
user	Agent
data, files	Patient
hard copy	Result
paper (placed in the printer); toner (in a laser	Other paradigmatic relations

printer), etc.	

A corpus will also lead us towards syntagmatic relations, such as those listed in Table 2.

Table 2. Units interacting with printer (syntagmatic relations)

(expressed by a noun) printing; (expressed by verbs) (someone prints something with a printer) print	Typical activities done by the agent
connect (to connect the printer to a computer), configure a printer, turn on a printer	Other activities done by the agent
the printer prints something, the printer crashes	Activities done by the printer itself

REPRESENTING RELATIONS BETWEEN LEXICAL UNITS

The paradigmatic and syntagmatic relations listed in the previous section can be represented using formal apparatuses, some of which are increasingly used in terminology work. For most paradigmatic relations (hyperonymy, meronymy), ontology editors offer mechanisms to represent them and take into account most of their specificities. However, other tools must be used to represent syntagmatic relations.

Syntagmatic relations (i.e., collocations) require a description of the syntactic structures in which the key word (in this case, printer) participates (for example, to distinguish the two structures in which it appears when it interacts with the verb print), the argument structure of the unit (in order to know which arguments are involved in the meaning of a collocate) and the meaning the collocate.7 The example below shows how the two senses of print can be represented in terms of their combination with printer.

> Define a printer as: A peripheral used by a USER to produce a hard copy of DATA stored in the computer.
>
>> the USER acts on DATA with the printer : the user prints1b data with the $\sim$ the printer acts on DATA: the $\sim$ prints$_{1a}$ data

CONCLUDING REMARKS

In this very short comment, I have tried to show how the issue of relations can be examined from the perspective of empirical data rather that from the abstract concepts some of these units denote. This account should not be interpreted as a form of criticism of the work presented in Mhaanna's paper. It simply aims to show that, according to the perspective chosen to look at a problem, data can reveal different facets.

In order to account for what has been said above about the analysis of "printer" and the heterogeneity of the data as it is found in running text, I allowed myself to add a new level to the 3 levels representation reproduced in Mhaanna's article. The original representation accounts for the relations between the objects of the world, the abstraction and generalization of these objects in terms of concepts, and the representation of concepts in terms of linguistic forms. It would be more appropriate to say that this new level is a specification of level 3, hence a subdivision of this level.

Table 3. An addition to the 3 levels representation in terminology (based on the Table provided in Mhaanna, in this volume)

Level 1	Level 2	Level 3	Level 3a
The concept refers to the object in the world	The concept refers to the abstraction in the form of a concept	The concept refers to the representation of the concept	Linguistic units used in running text to express knowledge
Object	Concept	Designation	terminological units (base form and variants)
Property	Characteristic	feature specification	the meaning of units is the result of their interaction with other units
ontical system	concept system	concept diagram	terminological units share paradigmatic and syntagmatic relations with other units
ontical relation	concept relation	relation specification	Each relation can be specified with a formal apparatus

I also believe that the two perspectives illustrated in Mhaanna's article and in this comment are useful for terminology work but on different levels. Corpus-based studies such as the one I illustrated cannot simply take as a starting point the data as it presents itself in text. They need to be supported by a theoretical framework (be it conceptual of semantic). Terminologists, when looking at linguistic data in text, must define the object they are analyzing in the most precise manner. Similarly, relations must be characterized before being investigated in text.

On the other hand, abstract models such as that defined in Mhaanna's article become entirely useful once they have been validated on a significant amount of data. And this data, in terminology, remains, what can be found in specialized texts.

This short comment simply shows, once again, that terminological data, terminological concepts, and terminology work cannot be considered from a single point of view to account for their complexity. This has already been pointed out by many scholars and is once more demonstrated here.

[1] I would like to thank Ekaterina Mhaanna for sending me a revised version of her article. I will also take this opportunity to mention that I have not consulted the thesis of the author and that my comment is based exclusively on the material available in the article.

[2] This part of the work, however, is not reported in the article.

[3] Of course, this analysis is not as thorough as that of the author's or as that of the work cited by the author. The examples provided below are simply given to illustrate my point of view and can serve as a basis for discussion.

[4] The example is based on work carried out at the Observatoire de linguistique Sens-Texte (OLST). We are currently developing the English version of a dictionary on computing and the Internet. Thanks are extended to Louis-Philippe Dargis who has contributed to the compiling of the corpus and the analysis of terms.

[5]The example given here does not involve a polysemic unit. In this case, the analysis will have to proceed to some form of disambiguation (e.g., page: "a Web page," "a division of the memory," or "a division of a document").

[6]The paper by Sergio Barrios (in vol 19, 2008) also lists a number of linguistic markers in a corpus of law in Portuguese.

[7]This model is based on lexical functions (Mel'cuk et al. 1995).

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