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Terminology

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Introduction

Terminology is the study of specialized concepts and their linguistic designations or terms. These specialized knowledge units are the result of the development of cognitive processes and communication among experts of a special language community (Sager 1997, 25). Terminology work focuses on the description of domain-specific knowledge structures and how they are transmitted in different communicative contexts. It also involves the organization and recording of the meaning and usage of terms in terminological resources such as term bases, dictionaries and glossaries, which can be used for text decoding as well as for text generation.

From a theoretical as well as an applied perspective, Terminology is closely linked to specialized translation since the adequacy of the terminology used in a text, as well as its suitability for the knowledge level of text receivers, is one of the factors that determine translation quality. In this sense, terminology is often regarded as a translation problem that must be addressed and solved during the translation process. This means that translators of specialized texts must also be closet terminologists and be capable of performing terminological management as a means of knowledge acquisition. Precisely for this reason, they should also have extensive training in the use of translation technologies, computer tools and resources (Alcina 2008; Candel-Mora 2011). Specialized translators must thus know how to make use of all available resources to successfully deal with terminological problems during the analysis and processing of the source text as well as during the production and revision of the target text.

Terminology work for translation purposes is known as *translation-oriented terminology* (TOT) (Muráth 2010, 49; Thélen 2015). Its usefulness is generally acknowledged because of the computerization of the translation process and the increasingly large number of specialized texts that need to be rapidly translated (Vargas-Sierra 2011). According to ISO 12616: 2002, the objective of TOT is to facilitate translation by enabling translators to do the following: (1) to record and systematize terminology; (2) to use terminology consistently over time; and (3) to deal more efficiently with multiple languages. The problems encountered in TOT activities frequently stem from translators' lack of familiarity with the terminological units, with term meaning in discourse, and with the possible correspondences of a term in the target language (Rodríguez-Camacho 2002, 319–20; Cabré et al. 2002, 168–69). Furthermore, the lack of reliable terminological resources obliges translators to apply information management skills to resolve translation problems and even to create their own resources. In the course of their work, experienced translators develop strategies to effectively perform the following tasks:

- Identification and understanding of specialized concepts in discourse;
- Evaluation, consultation, and creation of information resources;
- Specification of interlinguistic correspondences between terms in a specialized knowledge field;
- Data management for reuse in future translations.

Broadly speaking, there are two types of TOT work: (1) *ad hoc* terminology work and (2) pro-active terminology work (Lusicky and Wissik 2015). *Ad hoc* terminology work is performed case by case and involves collecting, understanding and processing a limited number of terms extracted from the source text during the translation process. In contrast, pro-active terminology work is performed previous to translation. It is also text-based in that translators assess future translation needs and then collect and describe domain-specific concepts that may appear in

future translations. Consequently, translation-oriented terminology work is process-based and should be linked to the sequence of activities performed by translators. The workflow in translation-oriented terminology work consists of the following activities (Chiocchetti et al. 2013):

- Needs assessment and resource collection
- Term extraction and term selection
- Terminological research [concept and term description in the source and target languages, contrastive analysis, and documentation]
- Revision
- Elaboration of terminological entries
- Quality assurance
- Maintenance
- Dissemination

Although these activities can be performed in sequence, they may also occur in loops during the translation and revision process. Within the context of a translator's personal database, certain steps (e.g. quality assurance, maintenance, dissemination) might be considered more or less relevant, or be skipped altogether. TOT activities have been the object of terminology research, particularly since they are closely linked to the concept of translation competence (PACTE 2014, 2015; Bolaños-Medina and Monterde-Rey 2010).

In fact, the ability to carry out terminological work during the translation process has been regarded as an integral part of translation competence (Faber 2003; EMT 2009; Montero-Martínez and Faber 2009). Terminological competence in translation refers to the ability of the translator to quickly access the knowledge represented by terms as well as to find the best

correspondence for the specialized concept in the target language. It is an acquired skill since translators are not terminologists, but rather language mediators that facilitate interlinguistic communication.

Translators must thus develop strategies to understand and represent terms and their multilingual correspondences in context. They should also know how to evaluate and use knowledge resources with a view to producing optimal translations. The specific characteristics of the translation process are what determine the type of terminological competence required.

This chapter presents theoretical and practical work in TOT in the Spanish-speaking world. The overview of recent research in the field highlights specific topics that are linked to phases of the translation process and which reflect current tendencies in terminology research.

Historical perspective: Terminology theory

There are two theories of terminology that have had a significant impact on the way terminology is described, analyzed and represented in contexts of multilingual communication. The first is the Communicative Theory of Terminology proposed by María Teresa Cabré at the University Pompeu Fabra (Barcelona), and the second is Frame-based Terminology proposed by Pamela Faber at the University of Granada. Both theories are complementary ways of envisaging specialized knowledge concepts and relations as well as their terminological designations and their activation in specialized texts.

Communicative Theory of Terminology

The historical panorama of Terminology in Spain begins with Cabré (1993, 1999a, 1999b, 2000), who formulated the Communicative Theory of Terminology (CTT). The CTT is a descriptive approach that studies terms and their variants as they appear in texts, and envisages the multiple dimensions of specialized knowledge units, as well as their representation and analysis.

Within the CTT, terminological units are regarded as "sets of conditions" (Cabré 2003, 184) derived from a certain knowledge area, conceptual structure, meaning, lexical and syntactic structure, and valence, as well as the communicative context of specialized discourse. Cabré (2003) proposes the Theory of the Doors, a metaphor representing the possible ways of accessing, analyzing and understanding terminological units. She compares a terminological unit to a polyhedron, a figure with three dimensions: a cognitive dimension, a linguistic dimension and a communicative dimension. Each dimension is a separate door through which terminological units can be accessed. According to Cabré, the CTT approaches specialized knowledge units through the language door. One of its most significant aspects is that terminological units are analyzed within a text by activating a domain-specific knowledge structure or context in which knowledge is transferred between users of the same or different knowledge levels. This evidently facilitates its application to specialized translation.

CTT Terminology and Translation

According to Cabré (2004), both Translation and Terminology stem from practical activities performed in response to information and communicative needs. Both activities are similar in that they are interdisciplinary, and are also convergence points for linguistic, cognitive and communication sciences (Cabré 2000). Nevertheless, they differ because Terminology is not in itself a speech act, but rather an instrument used in specialized communication. Despite the fact that translation primarily focuses on the communication process, terminology is vital for the translator because it activates the knowledge structure conveyed by a specialized text and is a means to achieve the interlinguistic transfer of terminological units and the knowledge that they encode (Cabré 2004; Velasquez 2002, 447).

According to Cabré (2010), translation work can entail four degrees of terminology involvement. The first level is passive and involves the consultation of resources by the translator to find a solution. At the second level, translators use their lexicological knowledge to propose a neologism in the target language to fill the gap. At the third level, translators act as *ad*

hoc terminologists by locating the problem in the conceptual structure of the field and filling the terminological gap with a new term, based on patterns of term formation. Finally, at the fourth level, translators resolve problems by extracting information from their own databases, which contain terms from prior translations.

CTT terminology resources

The CTT is an influential theory of terminology, which has had an impact on terminology analysis and management throughout the world. The practical application of the CTT is Terminus (terminus.iula.upf.edu), a web application for terminology management, which primarily targets terminologists and terminographers, who can use it to create and manage terminology projects. It is a computational reflection of the CTT terminological work sequence. (Cabré, Montané, and Nazar 2013). For translation purposes, it could be useful for specialized translators who wish to extensively document their experience with texts in a certain field to create a personal resource.

Frame-based terminology

Like the CTT, Frame-based Terminology (FBT) (Faber, León-Araúz, and Prieto-Velasco 2009; Faber 2011, 2012, 2015) is also a descriptive and text-driven approach and thus admits term variants as well as polysemy. However, it is more cognitively oriented since there is a greater emphasis on conceptual structure and semantic relations for enhanced knowledge acquisition during the translation process. FBT postulates a non-language-specific knowledge structure, which can be used to link terms to the same specialized concept. This theory focuses on: (1) conceptual organization; (2) the multidimensional nature of terminological units; and (3) the extraction of semantic and syntactic information through the use of multilingual corpora.

More specifically, FBT applies the notion of *frame* (Fillmore 1985), defined as a knowledge structure that relates entities associated with a particular culturally embedded scene,

situation or event. These frames, which the translator must reproduce in the target language text, are based on a set of micro-theories: (1) a semantic micro-theory focusing on term meaning; (2) a syntactic micro-theory to analyse term structure and collocations in specialized discourse; and (3) a pragmatic micro-theory that explains cultural and contextual parameters of specialized communication (Faber 2015). Each micro-theory is related to the information in term entries, the relations between specialized knowledge units, and the concepts that they designate.

FBT maintains that knowledge of conceptualization processes, as well as the organization of semantic information in the brain, should underlie theoretical assumptions concerning the access, retrieval and acquisition of specialized knowledge as well as the design of specialized knowledge resources (Faber 2011; Faber and León-Aráuz 2014; Faber, León-Araúz, and Reimerink 2014). A crucial issue is thus how specialized concepts should be represented so as to provide translators with an understanding of their meaning as well as sufficient knowledge of their location within a specialized domain. The information in data categories are interrelated and enhanced with the visualization of conceptual networks in which concepts are linked by hierarchical and non-hierarchical relations. Linguistic and graphical descriptions of specialized entities play a major role in knowledge representation, especially when both converge to highlight the multidimensional nature of concepts as well as the conceptual relationships.

Many of the theoretical premises in FBT are useful for specialized translators who must engage in pro-active terminology work. Even though corpus analysis and the analysis of contextual data are key factors in elaborating translations, most translators still tend to rely on bilingual specialized dictionaries in the hope that they will find the right correspondence. However, since most terminographic resources lag far behind technical advances, it is often more effective to search for and query corpus information regarding term meaning and usage in a personal database.

FBT specialized knowledge resources

The practical application of FBT is EcoLexicon (ecolexicon.ugr.es), a freely accessible multimodal terminological knowledge base on environmental science (Faber, León-Araúz, and Reimerink 2014). EcoLexicon represents the conceptual structure of the specialized domain of the environment in the form of a visual thesaurus in which environmental concepts are configured in semantic networks. It includes terms in six languages as well as conceptual, linguistic and administrative information for each entry. It specifically targets translators who wish to expand their knowledge of the environment for the purpose of text comprehension or generation.

Research topics and methodology

This section describes research in the Spanish-speaking world that explores theory-based terminology management within the context of the translation process. Following the sequence of the translation process, it highlights aspects such as needs assessment and resource collection, term identification and extraction, concept and term description, the elaboration of term entries, and quality assurance.

Needs assessment and resource collection

In TOT, needs assessment and resource collection are closely related since one depends on the other. The translator has to be aware of how to access and use available resources. According to Pastor and Alcina (2010), translators are not trained to take full advantage of the search capabilities of electronic resources, and thus are often unaware of which resource is most useful at each moment of the translation process. As observed by Durán-Muñoz (2010, 2012), translators tend to prefer bilingual resources to monolingual ones, and are also most likely to consult bilingual specialized dictionaries or search engines such as Google. In regard to data fields in term entries, her results showed that definitions, equivalents, domain specification,

contextual examples and phraseological information were regarded as most informative and useful for translation purposes.

This type of needs analysis is related to the Function Theory of Lexicography (FTL) (Bergenholtz and Tarp 2003; Tarp 2008). In Spain, this theory was applied to Terminography in Fuertes and Tarp (2014) in which the authors present the basic premises of the FTL and analyze and assess a selection of online dictionaries and term bases. The main contribution of this book is of a practical nature, as reflected in its emphasis on user needs and the technological advances that may aid in fulfilling them and in improving specialized dictionaries.

It is very true that knowledge resources are often created with little consideration for the targeted user group. This is underlined in Buendía-Castro and Faber (2014) who analyzed a set of Spanish and English monolingual collocation dictionaries. These resources were found to differ significantly in regards to the following types of information: (1) types of collocation encoded; (2) kinds of collocational information offered; and (3) place for collocations in the micro or macrostructure of the dictionary. To meet translation and text generation needs, it was concluded that there should be various ways of accessing collocations to enhance information retrieval as well as a classification of collocations within an entry and usage notes.

Term identification and extraction

When translators read and process a specialized text, the semantic and syntactic complexity generally resides in the terms and terminological phrasemes. It is thus necessary to be able to identify the terms in the text and examine them in context. In the translation process, term identification is previous to term extraction. Both involve selecting terms from the source-language text not only to analyze and translate them, but also to manage and build a terminology for a specific domain. Most translators either do this work manually or use term-extraction applications with their respective advantages and drawbacks (Estopá 2009). As highlighted by Vargas-Sierra (2011, 47), terminology is now a corpus-based activity, which allows the

extraction of specialized knowledge with the help of semiautomatic term extractors. Examples of popular open-source term extractors are TermoStat, Taas, and LexTerm.

The validation of the list of the terms extracted inevitably hinges on user perception of *termhood* or the degree to which a stable lexical unit is related to some domain-specific concepts (Kageura and Umino 1996). Although this definition refers to a property that can ideally be measured and quantified, or at least detected, there is no necessary and sufficient condition that determines whether a single or multi-word unit is a term in a domain. Evidently, if the user has sufficient knowledge of the domain to be aware of its most relevant domain-specific concepts, then it is easier to map terms onto them. This is one reason why translators tend to specialize in certain domains.

As observed by Cabré and Estopà (2003), professional ends and objectives condition the identification of specialized knowledge units. These authors found that the lexical units identified as terms by field experts did not necessarily coincide with the terms selected by translators, who tended to identify the units that they perceived as the most likely sources of translation problems. The perception of termhood is thus very subjective, and depends on the perceiver's needs and priorities. Within the translation process, it is based on the translator's level of domain-specific knowledge and on his/her professional experience in the field.

The FBT has a flexible vision of termhood that extends to phrasemes or multi-word expressions. Buendía-Castro and Faber (2015) examined the inclusion of phraseological information in a set of English-Spanish bilingual legal dictionaries in order to evaluate their potential usefulness for translators. Although this type of information is crucial in specialized legal translation, it was found that very little phraseological information was included in most of the dictionaries. A noteworthy exception was Alcaráz, Hughes, and Campos (2012), which was found to be the bilingual legal dictionary that best responded to translation needs. A legal dictionary for translators should provide various ways of accessing phraseological units as well as a classification of phraseological information within each entry for a more effective retrieval of information. Finally, the dictionary should include a short description of the unit so that users

are better able to understand its meaning and usage in different contexts as well as its contextualized correspondences in the target language and culture. Montero-Martínez and Buendía-Castro (2017) propose a semantic classification of verbal collocations with a view to enhancing the acquisition and codification of specialized knowledge in the translation process.

Concept and term description

Translators must also be able to link the terms extracted from a text to a concept or concepts in the real world and also know how to use them in texts. According to the ISO 12616 standard on Translation-Oriented Terminography, translators need to store a much broader set of data (e.g. phraseology, contexts, text segments, etc.) than are traditionally stored in term bases. Terms can be classified as main entry terms, synonyms, variants, phraseological units, etc. Data categories for term-related information include grammar, usage and equivalence, whereas concept-related descriptions include definition, explanation, context and figure.

Aspects of these categories, which are important in translation, have been the focus of research. Concept descriptions can take the form of definitions (San Martín 2016), explanations in the form of contexts (Faber and León-Araúz 2016), concept maps (Faber 2011; León-Araúz, Faber, and Montero-Martínez 2012) and/or graphical images (Prieto-Velasco 2009; Prieto-Velasco and Faber 2012; Reimerink, León-Araúz, and Faber 2016). These are all modalities of knowledge representation that allow translators to establish full or partial correspondences between terms in different languages. If no equivalence can be established, they must implement another strategy such as citation of the non-translated term, paraphrasing, the creation of neologisms or a combination of these (De Groot 2006).

In relation to concept and term description, topics of interest for TOT include conceptual organization and representation, semantic analysis, term variation and its parameters, and the creation and translation of neologisms.

Concept modelling and organization

Although translators acknowledge the importance of domain specification (essential information) and semantic relations (desirable information) (Durán-Muñoz 2012), representations of concept structure are not usually a part of TOT. Even in pro-active terminology work, a translator's personal term base is generally organized semasiologically (term-based) instead of onomasiologically (concept-based), though sometimes, it can be a mixture of the two (Bowker 2015). Even in large knowledge resources, conceptual representations are rarely included despite the fact that they can help the translator to quickly obtain knowledge of the specialized field (Faber et al. 2006).

Although a concept system is conventionally envisaged as a structured set of concepts organized into classes and sub-classes in the form of a tree diagram (see Cabré 1999b, 135), the reality of conceptual organization is somewhat more complicated than a simple hierarchy (Faber 2011). As reflected in term bases such as EcoLexicon (ecolexicon.ugr.es), conceptual representations that graphically convey the semantic relations of a concept in the same way as a visual thesaurus are a useful and effective means of knowledge acquisition for translators (García-Aragón, Buendía-Castro, and López-Rodríguez 2014; López-Rodriguez, Buendía-Castro, and García-Aragón 2012; López-Rodriguez, Prieto-Velasco, and Tercedor-Sánchez 2013).

In this regard, Frame-based Terminology envisages the configuration of specialized domains on the basis of definitional templates and creates situated representations for specialized knowledge concepts. These networks are based on an underlying domain event as well as a closed inventory of both hierarchical and non-hierarchical semantic relations. The conceptual relations as well as a concept's combinatorial potential are extracted by means of corpus analysis (León-Araúz, Faber, and Montero-Martínez 2012) and knowledge patterns (Tercedor-Sánchez and López-Rodríguez 2008; López-Rodríguez 2009; León-Araúz, Reimerink, and Faber 2009; Reimerink, García-Quesada, and Montero-Martínez 2012; San Martín 2014).

Semantic analysis

The semantics of terminological units is an important topic in specialized translation because meaning is what the translator must extract from the source-language text and encode in the target language. Since the semantic load of a specialized text is concentrated in its terms rather than its syntax, the translation process involves an explicit (or implicit) semantic analysis of terms and their collocations. Descriptive terminology approaches, such as the CTT and FBT, envisage the semantic analysis of terms and their linguistic facets (Faber and L'Homme 2014) and highlight the fact that terms must be observed in their usage contexts. This analysis focuses on larger segments of discourse and also targets parts of speech other than nouns, such as adjectives or verbs (Buendía-Castro, Sánchez-Cárdenas, and León-Araúz 2014).

For example, in the comprehension and structure of specialized discourse across languages, verbs play an important role since a considerable part of our knowledge is composed of events and states, many of which are linguistically represented by verbs. In this regard, according to Lorente (2000), the predominance of a certain group of verbs in a text determines, to a great extent, the nature of the text and its contents. She also states that even though verbs are not *per se* terminological units, they can acquire specialized value in context. She proposes the following typology of verbs for specialized discourse: (1) performative verbs (verbs linked to text functions such as discussing, stating, etc.); (2) verbs of logical relations (verbs acting as connectors); (3) phraseological verbs (verbs in collocations and fixed phrases that lexicalize actions and processes); and (4) quasi-terminological verbs (verbs that encode processes typical of a specialized field) (Lorente 2002, 2007). In this regard, Alonso-Campo and Renau-Arauque (2013) present a method to detect specialized uses of verbs based on Corpus Pattern Analysis (CPA). Their results showed that specialized uses of verbs were often reflected in specific patterns. Lexical specialization was also found to have degrees of context dependence that formed a continuum.

Since verbs are cognitive nodes that articulate and structure a text, they set the scene for the terms that are the fillers of their slots. In fact the semantic features of specialized knowledge units interact with and constrain the meaning of the verb to reduce polysemy and restrict it to one

sense (Sánchez-Cárdenas and Buendía-Castro 2012). In this line, Buendía-Castro (2013) describes a method of selecting correspondences between verb phraseological units in English and Spanish. The underlying idea is that verbs in specialized texts and their arguments can be classified and organized in a set of conceptual semantic categories typical of a given specialized domain. Verb meaning is thus constrained by the meaning of the terms that occupy the argument slots (Buendía-Castro, Sánchez-Cárdenas, and León-Araúz 2014). When verbs from the same lexical domain tend to combine with terms within the same conceptual categories, this makes it easier to predict and translate text segments.

Terminological variation

An important source of problems encountered by translators of specialized texts is terminological variation. When dealing with multiple correspondences for the same specialized concept, it is usually necessary to 'think outside the box' to find the term that best fits the text and discourse context. Quite frequently, translators must opt for a variant instead of the correspondence found in the specialized dictionary. When various options are listed in the dictionary, it is very rare for any information about collocational restrictions to be included. For this reason, translators must possess the criteria to make the best choice.

Denominative variation arises when a concept has various linguistic designations. Since there is rarely total correspondence between denominative variants in different languages, it is crucial to know why they exist and which variational parameter each responds to. Terminological variation is well worth studying because it provides insights into the dynamicity of conceptualization and also into different types of communicative context. Not surprisingly, term variation is a research focus in the CTT (Freixa 2002, 2006; Fernández-Silva, Freixa, and Cabré 2011) as well as the FBT (Tercedor-Sánchez 2011; Tercedor-Sánchez, López-Rodríguez, and Prieto-Velasco 2014; León-Aráuz and Faber 2014; León-Araúz 2015).

In both the CTT and FBT, research highlights the fact that concept systems as well as categorization are dynamic and subject to change. Dynamicity underlies the idea of the

emergence of terms through ongoing intrinsic processes, which largely depend on context (Faber 2011). Although certain types of variation are often used with little impact on communication, such as morphological variants, orthographic variants, ellipted variants, etc. (Freixa 2014), terminological variation can also have an impact on meaning. Freixa (2006) classifies the causes for variation in the following categories: (1) dialectal, based on origin; (2) functional, based on register; (3) discursive, based on style; (4) interlinguistic, based on the contact between languages; and (5) cognitive, based on different conceptualizations.

Of these types of variation, most research has focused on cognitive variation, which involves a change in semantics, since it embodies a particular vision of the concept. In this sense, dynamism can be found in the naming of the same concept from different perspectives for reasons ranging from differences in subject field to level of perception or cognition (Fernández-Silva, Freixa, and Cabré 2011, 53).

More specifically, within the CTT, Freixa (2002, 2006), Freixa, Fernández-Silva, and Cabré (2008) and Fernández-Silva, Freixa, and Cabré (2009, 2011) explore the motivations underlying denominative variation in specialized texts. Denominative variants are not only formally different, but also semantically different in that they highlight a different facet of the meaning of a concept (Freixa 2002). In this sense, Fernández-Silva, Freixa, and Cabré (2011) describe this phenomenon as the linguistic reflection of conceptual multidimensionality, the phenomenon in which concepts can be classified according to different points of view or facets (Bowker 1997; Rogers 2004; León-Araúz 2009). This has important consequences in regard to how domains are modelled, and is particularly evident in multi-word terms whose form reflects their motivation, stemming from contextual factors that are specific to a certain communicative situation (Fernández-Silva, Freixa, and Cabré 2009).

Multidimensionality and the terminological variation thus generated are also important topics in FBT. This is highlighted in VariMed (varimed.ugr.es), a medical termbase in which denominative variation in medical communication is analyzed as a source of lexical creativity arising from the dynamism inherent in situated conceptualization (Tercedor-Sánchez, López-

Rodríguez, and Prieto-Velasco 2014; Tercedor-Sánchez and Prieto-Velasco 2013). Multidimensionality is one of the main causes of terminological variation since the focus on a specific conceptual dimension is reflected in the linguistic designation. In VariMed as well as EcoLexicon, cognitive variation is analyzed and classified in terms of Pustejovksy's (1995) *qualia* (Prieto-Velasco and Tercedor-Sánchez 2014).

To explain contextual variation in terminology, Tercedor-Sánchez (2011) reviews psycholinguistic research based on the ways-of-seeing (WOS) proposal (Croft and Cruse 2004, 137). She explains how a situated dynamic perspective can trigger the action of concept properties that have a perceptual or functional basis. In Terminology, these WOSs are codified in syntagmatic and compound terminological units that reflect terminological variation. According to Tercedor-Sánchez and López-Rodríguez (2012, 252–3), medical concepts can be lexicalized in various ways depending on the facet of the concept being highlighted. The facet selected can reflect a certain specialized domain or a priority of the text sender.

Neologism

Cabré (1999a) distinguishes between general language neologisms and terminological neologisms. These are terms or terminological phrasemes that have been newly coined in a language because of the need for a designation. The rapid evolution of science and technology generates new concepts and new terms to designate them. In fact, it is impossible either to create specialized knowledge or to communicate new research advances in specialized fields without new terms (Cabré, Estopà, and Vargas 2012, 2).

For translation purposes, recently created terms can be problematic because they rarely appear in specialized dictionaries and term banks and usually lack equivalences in the target language. In fact, the translation of neologisms has even been described as the biggest problem for non-literary and professional translators (Newmark 1988). They are often faced with situations in which there is no term in the target language to name a new concept designated by a newly coined term in the source language. As a result, they must decide whether to make an

explanatory or descriptive translation by using generic terms from a definition derived from the term's context or simply by calquing or adapting the source-language term. Exceptionally, in order to fill a lexical gap in the specialized domain, translators might even decide to propose a new term. This is a case of secondary term formation and involves creating an equivalent in the target language for a specialized knowledge unit in the source language. However, the new term should also conform to the word-formation rules in the target language system. This is demonstrated in Fernández-Domínguez (2016), who makes a contrastive analysis of the morphological and semantic characteristics of English and Spanish terms from the olive oil industry.

The translation strategy sometimes depends on the capacity of the target language to accept and assimilate foreign words. Although almost half of English consists of words borrowed from other languages, languages such as Spanish or French may be more reticent about absorbing words from other languages and cultures. This tendency, however, is at odds with the rapid influx of technical and scientific terms in the modern world (Montero-Martínez, Fuertes-Olivera, and García de Quesada 2001).

The fact that English is currently the predominant language for specialized knowledge transfer evidently conditions the creation of new lexical units in other languages. This means that terminology and terminological neology in Spanish (as well as in other romance languages) should be studied to assess their *terminological dependency* on English (Humbley and García-Palacios 2012). For this purpose, Sánchez-Ibáñez and García-Palacios (2014) measured the terminological dependency of Spanish on English in terms related to Alzheimer's disease, based on the semantic characterization of a set of neologisms in this domain. They found that the importation of units from English involved a set of linguistic asymmetries that affected the conceptual configuration of the specialized domain. The results showed a significant, though not exact correlation between the uniformity of certain semantic features and the degree of terminological dependency detected in their Spanish equivalents. Similar results were also

obtained in Sanz-Vicente (2012), who studied secondary term formation as reflected in the Spanish translation of English noun compounds in the domain of remote sensing.

As highlighted by Cabré, Estopà, and Vargas (2012), neology has become an important research focus in recent years. This is evident in the number of publications on the topic, as well as the creation of the Observatori Neología (OBNEO) for Catalan and Spanish. Work on neology not only facilitates specialized translation, but also usefully contributes to activities such as dictionary updating, terminology binding, information and knowledge management, and the dissemination of scientific knowledge.

Elaboration and design of terminological entries

A term entry in a translator's personal termbase consists of data fields that represent what he/she needs to know about the term. Entries can be as concise or detailed as necessary. Broadly speaking, there are three groups of possible data categories: (1) term and term-related; (2) concept-related; and (3) administrative. However, for translation purposes, the most basic categories are term type, subject field, definition, context examples, multilingual correspondences and multimodal information.

Definitions

A terminographic definition is the linguistic description of a specialized concept and is based on conceptual analysis. As such, it is a statement that ideally allows users to access the meaning of a concept. A definition fixes the reference of a term to a concept, albeit by linguistic means only. At the same time it creates and declares relationships to other concepts within a knowledge structure. In Terminology, a good definition should situate and classify a concept within a certain conceptual system by stating the characteristics that identify the concept. In translation contexts, definitions of specialized concepts are useful to the extent that they facilitate knowledge

acquisition and permit translators to attain the necessary threshold of domain-specific knowledge.

From the perspective of the CTT, Cabré (1993, 209) proposes the following types of definitions, which differ in content as well as in the object described: (1) linguistic definition that defines a lexical unit; (2) ontological definition that defines a real-world entity; and (3) terminological definition that defines a concept within the conceptual system of a specialized domain. Although definitions of specialized knowledge units aspire to the third type, the definitions in terminological resources are often not in consonance with standards for the formulation of definitions (UNE 1–066 *Principios y métodos* and UNE 1–070 *Vocabulario de la terminología*) (Azarian and Tebé 2011). This situation would be improved if definitional information were derived from texts and corpus analysis, in which term meaning is analyzed in context.

FBT emphasizes that definitions should have both macro- and microstructural coherence. In other words, not only should the information contained in the definition be adequately formulated, but it should also be coherent with the information contained in the definitions of similar concepts within the system. Definitions can be regarded as mini-knowledge representations, which require a definitional frame or template for each category (Faber and Tercedor-Sánchez 2001; Faber et al. 2007). Similarly to the CTT, FBT also advocates the use of corpus analysis to derive conceptual information for definitions. More specifically, *knowledge patterns* (Barrière 2004) are used to search the corpus in order to identify semantic relations between concepts and include them in definitions (León-Aráuz, Reimerink, and Faber 2009). Similarly, Acosta and Sierra (2011) and Acosta, Sierra, and Aguilar (2015) show how definitional contexts in Spanish can also be automatically extracted through the definition of hyponymy-hyperonymy relations.

Given that context is crucial in the choice of definitional information, since a concept may be categorized differently depending on the context, FBT advocates the creation of flexible definitions in order to better account for multidimensionality (León-Araúz and San Martín 2012).

A single definition is not sufficient to describe multidimensional concepts that participate in various conceptual frames (San Martín and León-Araúz 2013). However, *recontextualized* definitions for concepts adapt to contextual variation and better respond to user needs. Contextual variation, based on the analysis of *contextonyms*, can be characterized in terms of modulation, perspectivization and subconceptualization (San Martín 2016).

Contextual information

As previously mentioned, one of the most valuable types of data in translation is information related to context. In the sequence of TOT work, it is suggested that contexts be included in term entries. However, the type is left deliberately vague since there is no universally accepted definition for context (Faber and León-Araúz 2016).

In the CTT, the importance of term contexts has always been acknowledged in term records (Cabré et al. 2004), for purposes of text understanding and encoding (e.g. Estopà et al. 2006), and for automatic information retrieval (Araya and Vivaldi 2004). Alarcón, Bach, and Sierra (2007) present a methodology for the automatic extraction of definitional contexts involving: (1) the extraction of definition patterns; (2) filtering of non-relevant contexts; and (3) identification of constitutive elements such as terms, definition patterns and pragmatic patterns.

Context is also central to FBT since specialized knowledge units are only understood with reference to their underlying conceptual frame, whose elements are selected based on context (Reimerink, García-Quesada, and Montero-Martínez 2012). FBT divides contexts into local or global. Local contexts are usually limited to the words within the term itself, to a small number of words in the immediate vicinity of a term, or to words connected by syntactic dependencies to the term. In contrast, global contexts can encompass the whole text or go beyond the text and refer to the communicative situation (i.e., formal vs. informal), to the conceptual networks reflected in it, or to the culture in which the text is interpreted. Both local and global contexts can be subdivided, based on whether they are syntactic, semantic or pragmatic (Faber and León-Araúz 2016).

Graphical information

Linguistic information is not the only means of describing concepts. Images are also useful for this purpose, particularly in certain domains, such as engineering, architecture and medicine. The inclusion of types of visual representation enhances textual comprehension and complements the linguistic information provided in other data fields (Faber et al. 2007; Prieto-Velasco and López-Rodríguez 2009; Reimerink, León-Araúz, and Faber 2016). Although the traditional classification of images is based on their morphology (photographs, drawings, videos, diagrams, etc.) (Monterde 2002), a more useful way of categorizing them is in terms of their relationship with the real-world entity represented, based on criteria of iconicity, abstraction and dynamism (Prieto-Velasco 2009; Prieto-Velasco and Faber 2012).

FBT advocates a multimodal description of specialized concepts in which the information contained in definitions meshes with the visual information in images for better understanding. Types of image thus can vary, depending on the level of specialization of the text, and their characteristics should correspond to the most salient features of the concept (Reimerink, León-Araúz, and Faber 2016). Accordingly, the images to be included in a term entry should be appropriate for the concept and the user.

Quality assurance: standardization and harmonization

Translation quality is an issue with a wide scope that encompasses all stages of the translation process. Standard quality assurance tasks in the post-translation stage include revising and spell checking. In specialized translation, revising also involves assessing textual coherence, which includes verifying to what degree the meaning of the terms in the target-language text corresponds to the meaning of those in the source-language text. In this sense, translation memories also have features for terminology verification, and the translator can decide which checks to run (Vargas-Sierra 2011, 59). However, to obtain satisfactory results, it is necessary for

the translator to have performed *ad hoc* as well as pro-active terminology management throughout the translation process.

Translators should also be familiar with good practices as set out in standards. Alcina (2015) discusses the ISO standards currently applied in translation and terminology. The ones most directly related to TOT are ISO 26162: 2012 (Systems to manage terminology, knowledge and content – Design, implementation and maintenance of terminology management systems) and ISO 12616:2002 (Translation-oriented Terminography).

Closely related to standardization is the concept of harmonization. Unlike standardization, harmonization provides different variants and recommends (without imposing) their use to reduce ambiguity. Durán-Muñoz (2014) focuses on cross-domain harmonization, a kind of intralingual harmonization that involves different specialized domains. This is particularly relevant in legal domains.

Future directions

Terminology has become an increasingly important part of the specialized translation process. This chapter has presented a panorama of translation-oriented terminology as reflected in recent research carried out within the Spanish-speaking world. Future directions should focus on different ways that translators can access, understand and interact with terminology, terminology management systems and knowledge resources in their work. Although this type of process-oriented research is complex, it is the only way to create a more detailed catalogue of terminology-related problems and translator needs, which could lead to improvements in available tools and resources. Research is also needed on the cognitive parameters that drive terminological awareness as well as the perception of interlinguistic correspondences between terms in different languages. Further study should also focus on the processes of primary and secondary term formation and terminogenesis in different specialized knowledge contexts of language dominance.

In regard to product-oriented research, the syntax and semantics of specialized knowledge units in specialized texts should be explored in greater depth since the limits between a terminological phraseme and a collocation are far from clear. Knowledge of how terms are represented in knowledge resources compared to how they behave in texts is crucial because meaning can vary, depending on the context in which a term appears. Translation-oriented terminology should thus include further studies on corpus analysis for concept derivation and specification, given the vital importance of this type of information in translation.

Within a broader scope of translation-oriented studies, there is a need for work dealing with terminology from the perspective of the interpreting process. Theoretically based studies, inclusive of the recent advances in Terminology theory and practice, should be carried out. It would also be interesting to explore the extent to which translators and interpreters process and manage terminology in similar or different ways, and whether these professionals share the same terminological tools and strategies.

Finally, results from process-oriented and product-oriented studies should lead to experimental research on teaching models and strategies in the context of translation training programs. Undergraduate and postgraduate students need to master terminological and terminology-related skills to respond to the challenges of a rapidly changing market, both in terms of the diversification and specialization of contents and technology-related professional practices.

Recommended reading

For an understanding of Terminology theory in the Spanish-speaking world, it is necessary to read Cabré (1999a, 1999b) for a description of Communicative Terminology Theory and Faber (2012) for a description of Frame-based Terminology. The following studies are indicative of research paths in Terminology that are in need of further development.

Cabré, María Teresa, Rosa Estopà, and Chelo Vargas. 2012. “Neology in Specialized Communication.” *Terminology* 18: 1.

This special volume of *Terminology* includes recent research on the many facets of neology. The articles in this volume focus on language change and the reasons behind such change. They underline how advances in knowledge are expressed through terms. Such neologisms represent the constant changes of a society and are a clear indication of the vitality of a language.

Faber, Pamela, and Pilar León-Araúz. 2016. “Specialized Knowledge Representation and the Parameterization of Context.” *Frontiers in Psychology* 7 (00196). doi:10.3389/fpsyg.2016.00196.

In specialized texts, the meaning of terminological units depends on context. This article shows how context can be parameterized in a taxonomy, primarily based on scope (local and global), which is further divided into syntactic, semantic and pragmatic facets. These facets cover the specification of different types of terminological information, such as predicate-argument structure, collocations, semantic relations, term variants, grammatical and lexical cohesion, communicative situations, subject fields and cultures.

Fernández-Domínguez, Jesús. 2016. “A Morphosemantic Investigation of Term Formation Processes in English and Spanish.” *Languages in Contrast* 16 (1): 54–83.

There is a scarcity of studies on term formation and terminogenesis, especially from a contrastive perspective, which are based on a coherent methodology that can also account for term semantics. This article uses corpus analysis techniques to study derivational features of terminogenesic processes as well as the semantic characteristics of terms belonging to the olive oil industry with a view to relating the form and meaning of these specialized knowledge units in English and Spanish.

Fernández-Silva, Sabela, Judit Freixa, and María Teresa Cabré. 2011. “A Proposed Method for Analysing the Dynamics of Cognition through Term Variation.”

This article presents a methodology that effectively describes the conceptually motivated patterns of term variation detected in a corpus of specialized texts. This method analyzes the conceptual information reflected in the form of the specialized knowledge units and provides a framework that systematically accounts for the flexibility of concepts and conceptual structures.

Vargas-Sierra, Chelo. 2011. “Translation-Oriented Terminology Management and ICTs: Present and Future.” In *Interdisciplinarity and Languages: Current Issues in Research, Teaching, Professional Applications and ICT*, edited by Francisca Suau Jiménez and Barry Pennock, 45–64. Bern: Peter Lang.

Specialized translators must be able to effectively acquire specialized knowledge, solve terminological problems, and manage term-related information. This chapter addresses different aspects of terminology management and its computerized workbench, all with regard to translation-oriented terminology tasks and ICTs. It describes and classifies the types of translation practices related to terminology management, including the software that can be used in a particular task.

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References

Acosta, Olga, Gerardo Sierra, and César Aguilar. 2011. "Extraction of Definitional Contexts using Lexical Relations." *International Journal of Computer Applications* 34 (6): 46–53.

———. 2015. "Extracting Definitional Contexts in Spanish Through the Identification of Hyponymy-Hyperonymy Relations." In *Modern Computational Models of Semantic Discovery in Natural Language*, edited by Jan Zizka and František Daren, 48–72. Hershey: IGI Global.

Alarcón, Rodrigo, Carme Bach, and Gerardo Sierra. 2007. "Extracción de contextos definitorios en corpus especializados: hacia la elaboración de una herramienta de ayuda terminográfica." *Revista Española de Lingüística* 37: 247–77.

Alcaraz-Varo, Enrique, Brian Hughes, and Miguel Ángel Campos. 2012. *Diccionario de términos jurídicos. A Dictionary of Legal Terms: inglés-espanol, Spanish-English*, 11th ed. Barcelona: Ariel.

Alcina, Amparo. 2008. "Translation Technologies. Scope, Tools, and Resources." *Target* 20 (1): 79–102.

———. 2015. "Estándares y formatos de intercambio en terminología." *Revista Tradumática* 13: 571–83.

Alonso-Campo, Araceli, and Irene Renau-Araque. 2013. "Corpus Pattern Analysis in Determining Specialised Uses of Verbal Lexical Units." *Terminalia* 7: 26–33.

Araya, Raúl, and Jordi Vivaldi. 2004. "Mercedes: A Term-in-Context Highlighter." In *Proceedings of the Fourth International Conference on Language Resources and Evaluation (LREC 2004)*, 445–8. Lisbon: European Languages Resources Association.

Azarian, Jenny, and Carles Tebé. 2011. "La metodología de elaboración de definiciones terminológicas en vocabularios normalizados: análisis en normas UNE." *Debate Terminológico* 7: 2–23.

Barrière, Caroline. 2004. "Building a Concept Hierarchy from Corpus Analysis." *Terminology* 10 (2): 241–64.

Bergenholtz, Henning, and Sven Tarp. 2003. "Two Opposing Theories: On H.E. Wiegand's Recent Discovery of Lexicographic Functions." *Hermes. Journal of Linguistics* 31: 171–96.

Bolaños-Medina, Alicia, and Ana Marúa Monterde-Rey. 2010. "Sistema de competencias terminológicas mínimas para la integración de la docencia de la traducción científica y técnica y de la terminología." In *Estudios de traducción: Perspectivas. Zinaida Lvóvskaya, in memoriam*, edited by Sonia Bravo Utrera and Rosario García López, 131–46. Berlin: Peter Lang.

Bowker, Lynne. 1997. "Multidimensional Classification of Concepts and Terms." In *Handbook of Terminology Management*, edited by Sue Ellen Wright and Gerard Budin, 131–43. Amsterdam/Philadelphia: John Benjamins.

———. 2015. "Terminology and Translation." In *Handbook of Terminology*, edited by Hendrik J. Kockaert and Frieda Steurs, 304–23. Amsterdam/Philadelphia: John Benjamins.

Buendía-Castro, Miriam. 2013. "Phraseology in Specialized Language and its Representation in Environmental Knowledge Resources." PhD diss., University of Granada.

Buendía-Castro, Miriam, and Pamela Faber. 2014. "Collocation Dictionaries: A Comparative Analysis." *MonTI. Monografías de traducción e interpretación* 6: 203–35.

———. 2015. "Phraseological Units in English-Spanish Legal Dictionaries: A Comparative Study." *Fachsprache: International Journal of Specialized Communication* XXXVII (3–4): 161–75.

Buendía-Castro, Miriam, Beatriz Sánchez-Cárdenas, and Pilar León-Araúz. 2014. "The Role of Conceptual Categories for Argument Structure Prediction." In *Communication, Cognition and Cybernetics. Selected Papers from the 31st International Conference of the Spanish Association of Applied Linguistics (AESLA)*, 879–903. La Laguna: University of La Laguna.

Cabré, María Teresa. 1993. *La terminología. Teoría, métodos, aplicaciones*. Barcelona: Antártida.

———. 1999a. *La terminología: Representación y comunicación. Elementos para una teoría de base comunicativa y otros artículos*. Barcelona: Institut Universitari de Lingüística Aplicada.

———. 1999b. *Terminology: Theory, Methods and Applications.* Amsterdam/Philadelphia: John Benjamins.

———. 2000. "Terminologie et linguistique: La théorie des portes." *Terminologies Nouvelles* 21: 10–15.

———. 2003. "Theories of Terminology. Their Description, Prescription and Explanation." *Terminology* 9 (2): 163–200.

———. 2004. "La terminología en la traducción especializada." In *Manual de documentación y terminología para la traducción especializada*, edited by Consuelo Gonzalo García and Valentín García Yebra, 89–122. Madrid: Arco.

———. 2010. "Terminology and Translation." In *Handbook of Translation Studies*, edited by Luc van Doorslaer and Yves Gambier, 356–65. Amsterdam/ Philadelphia: John Benjamins.

Cabré, María Teresa, María Amor Montané, and Rogelio Nazar. 2013. "TERMINUS, the Terminologist´s Workstation: An Integral System for the Production of Glossaries." In *La formation en terminologie*, edited by Carmen-Stefania Stoean, Nina Ivanciu, Ruxandra Constantinescu-Stefanel, and Antoaneta Lorentz, 443–54. Bucharest: Editura.

Cabré, María Teresa, Carme Bach, Rosa Estopà, Judit Feliu, Gemma Martínez, and Jordi Vivaldi. 2004. "The GENOMA-KB Project: Towards the Integration of Concepts, Terms, Textual Corpora and Entities." In *Proceedings of the Fourth International Conference on Language Resources and Evaluation (LREC 2004)*, 87–90. Lisbon: European Languages Resources Association.

Cabré, María Teresa, and Rosa Estopá. 2003. “On the Units of Specialized Meaning Used in Professional Communication.” *Terminology Science & Research* 14: 15–27.

Cabré, María Teresa, Rosa Estopá, Judit Freixa, Merce Lorente, and Carles Tebé. 2002. “Les necessitats terminològiques del traductor científic.” In *Translating Science. Proceedings 2nd International Conference on Specialized Translation, February 28–March 2, 2002*, edited by José Chabás, Rolf Gaser, and Joëlle Rey, 165–74. Barcelona: University Pompeu Fabra.

Cabré, María Teresa, Rosa Estopà, and Chelo Vargas. 2012. “Neology in Specialized Communication.” *Terminology* 18 (1): 1–8.

Candel-Mora, Miguel Ángel. 2011. “Computer-Assisted Translation and Terminology Management: Tools and Resources.” In *Interdisciplinarity and Languages: Current Issues in Research, Teaching, Professional Applications and ICT*, edited by Francisca Suau, and Barry Pennock, 145–60. Bern: Peter Lang.

———. 2014. “Adaptación de la tecnología para la gestión terminológica desde la perspectiva de la traducción.” In *TIC, trabajo colaborativo e interacción en Terminología y Traducción*, edited by Chelo Vargas-Sierra, 47–56. Granada: Comares.

Chiocchetti, Elena, Barbara Heinisch-Obermoser, Georg Löckinger, Vesna Lušicky, Natascia Ralli, Isabella Stanizzi, and Tanja Wissik. 2013. *Guidelines for Collaborative Legal/Administrative Terminology Work*. Bolzano/Bozen: EURAC. www.sep.gov.mk/data/file/Preveduvanje/Procedural_Manual_on_Terminology_final_version.pdf.

Croft, William, and Alan D. Cruse. 2004. *Cognitive Linguistics*. Cambridge: Cambridge University Press.

De Groot, Gerard-René. 2006. “Legal Translation.” http://digitalarchive.maastrichtuniversity.nl/fedora/get/guid:35a1b7c4-f6b9-4e5a-a152-5354fd274893/ASSET1.

Durán-Muñoz, Isabel. 2010. "Specialized Lexicographical Resources: A Survey of Translators' Needs." In *eLexicography in the 21st Century: New Challenges, New Applications. Proceedings of ELEX2009. Cahiers du Cental*, vol. 7, edited by Sylviane Granger and Magali Paquot, 55–66. Louvain-La-Neuve: Presses Universitaires de Louvain.

———. 2012. "Meeting Translators' Needs: Translation-Oriented Terminological Management and Applications." *Journal of Specialized Translation* 18: 77–92.

———. 2014. "Cross-domain Harmonization. A Case Study with Adventure Activities in Legal and Tourism Domains in Spain." In *Dynamics and Terminology*, edited by Rita. Temmerman and Marc Van Campenhoudt, 61–78. Amsterdam/Philadelphia: John Benjamins.

Estopà, Rosa. 2009. "Los extractores de terminología: logros y escollos." In *Terminología y sociedad del conocimiento*, edited by Amparo Alcina, Esperanza Valero, and Elena Rambla, 117–46. Bern: Peter Lang.

Estopà, Rosa, Jaume Martí, Diego Burgos, Sabela Fernández-Silva, César Jara, María Amor Montané et al. 2006. "La identificación de unidades terminológicas en contexto: de la teoría a la práctica." In *Terminología y derecho: complejidad de la comunicación multilingüe: V Actividades de IULATERM de Verano (4–14 de julio de 2005)*, edited by María Teresa Cabré, Carme Bach, and Jaume Martí. Barcelona: IULA.

European Master's in Translation – EMT. 2009. "Competences for Professional Translators, Experts in Multilingual and Multimedia Communication." DGT. European Commission. http://ec.europa.eu/dgs/translation/programmes/emt/key_documents/emt_competences_translators_en.pdf.

Faber, Pamela. 2003. "Terminological Competence and Enhanced Knowledge Acquisition." *Research in Language* 1: 95–116.

———. 2011. "The Dynamics of Specialized Knowledge Representation: Simulational Reconstruction or the Perception-Action Interface." *Terminology* 17 (1): 9–29.

———, ed. 2012. *A Cognitive Linguistics View of Terminology and Specialized Language.* Berlin/New York: De Gruyter.

———. 2015. "Frames as a Framework for Terminology." In *Handbook of Terminology*, edited by Hendrik J. Kockaert and Frieda Steurs, 14–33. Amsterdam/Philadelphia: John Benjamins.

Faber, Pamela, and Pilar León-Aráuz. 2014. "From Cognition to Culture-Bound Terminology." In *Dynamics and Terminology*, edited by Rita Temmerman and Marc Van Campenhoudt, 135–58. Amsterdam/Philadelphia: John Benjamins.

———. 2016. "Specialized Knowledge Representation and the Parameterization of Context." *Frontiers in Psychology* 7 (00196). doi:10.3389/fpsyg.2016.00196.

Faber, Pamela, Pilar León-Araúz, and Juan Antonio Prieto-Velasco. 2009. "Semantic Relations, Dynamicity, and Terminological Knowledge Bases." *Current Issues in Language Studies* 1 (1): 1–23.

Faber, Pamela, Pilar León-Araúz, Juan Antonio Prieto-Velasco, and Arianne Reimerink. 2007. "Linking Images and Words: The Description of Specialized Concepts." *International Journal of Lexicography* 20 (1): 39–65.

Faber, Pamela, Pilar León-Araúz, and Arianne Reimerink. 2014. "Representing Environmental Knowledge in EcoLexicon." In *Languages for Specific Purposes in the Digital Era*, edited by Elena Bárcena, Timothy Read, and Jorge Arus, 267–301. Berlin: Springer.

Faber, Pamela, and Marie Claude L'Homme. 2014. "Lexical Semantic Approaches to Terminology. An Introduction." *Terminology* 20 (2): 143–50.

Faber, Pamela, Silvia Montero-Martínez, María Rosa Castro-Prieto, José Senso-Ruiz, Juan Antonio Prieto-Velasco, Pilar León-Arauz et al. 2006. "Process-Oriented Terminology Management in the Domain of Coastal Engineering." *Terminology* 12 (2): 189–213.

Faber, Pamela, and Maribel Tercedor-Sánchez. 2001. "Codifying Conceptual Information in Descriptive Terminology Management." *Meta: Translators' Journal* 46 (1): 192–204.

Faber, Pamela, Juan Verdejo, Pilar León-Araúz, Arianne Reimerink, and Gloria Guzmán. 2014. "Neural Substrates of Specialized Knowledge Representation: An fMRI Study." *Revue française de linguistique appliquée* 19 (1): 15–32.

Fernández-Domínguez, Jesús. 2016. "A Morphosemantic Investigation of Term Formation Processes in English and Spanish." *Languages in Contrast* 16 (1): 54–83.

Fernández-Silva, Judit Freixa, and María Teresa Cabré. 2009. "The Multiple Motivation in the Denomination of Concepts." In *Terminology Science & Research* 20. Vienna: International Network for Terminology.

Fernández-Silva, Sabela, Judit Freixa, and María Teresa Cabré. 2011. "A Proposed Method for Analysing the Dynamics of Cognition Through Term Variation." *Terminology* 17 (1): 49–73.

Fillmore, Charles. 1985. "Frames and the Semantics of Understanding." *Quaderni di Semantica* 6: 22–254.

Freixa, Judit. 2002. "Reflexiones acerca de las causas de la variación denominativa en terminología." In *Panorama actual de la terminología*, edited by Gloria Guerrero Ramos and Manuel Fernando Pérez, 107–15. Granada: Comares.

———. 2006. "Causes of Denominative Variation in Terminology. A Typology Proposal." *Terminology* 12 (1): 51–77.

———. 2014. "La variación denominativa en terminología: tipos y causas." In *As ciências do léxico: lexicologia, lexicografia, terminología*, edited by Aparecida Negri Isquerdo and Giselle O. Mantovani Dal Corno, 311–29. Campo Grande: UFMS.

Freixa, Judit, Sabela Fernández-Silva, and María Teresa Cabré. 2008. La multiplicité des chemins dénominatifs. *Meta: Translators' Journal* 53 (4): 731–47.

Fuertes-Olivera, Pedro A., and Sven Tarp. 2014. *Theory and Practice of Specialised Online Dictionaries: Lexicography versus Terminography.* Berlin/New York: De Gruyter.

García-Aragón, Alejandro, Miriam Buendía-Castro, and Clara Inés López-Rodríguez. 2014. "Evaluación de una base de conocimiento terminológica sobre el medio ambiente en el

aula de la traducción especializada." In *TIC, trabajo colaborativo e interacción en Terminología y Traducción*, edited by Chelo Vargas-Sierra, 447–87. Granada: Comares.

Humbley, John, and Joaquin García-Palacios. 2012. "Neology and Terminological Dependency." *Terminology* 18 (1): 59–85.

Kageura, Kyo, and Bin Umino. 1996. "Methods of Automatic Term Recognition." *Terminology* 3: 259–89.

León-Araúz, Pilar. 2009. "Representación multidimensional del conocimiento especializado: el uso de marcos desde la macroestructura hasta la microestructura." PhD diss., University of Granada.

———. 2015. "Term Variation in the Psychiatric Domain. Transparency and Multidimensionality." In *Word Formation and Transparency in Medical English*, edited by Pius ten Hacken and Renata Panocová, 33–54. Newcastle-upon-Tyne: Cambridge Scholars.

León-Araúz, Pilar, and Pamela Faber. 2014. "Context and Terminology in the Multilingual Semantic Web." In *Towards the Multilingual Semantic Web*, edited by Paul Buitelaar and Philipp Cimiano, 31–47. Berlin: Springer.

León-Aráuz, Pilar, Pamela Faber, and Silvia Montero-Martínez. 2012. "Specialized Language Semantics." In *A Cognitive Linguistics View of Terminology and Specialized Language*, edited by Pamela Faber, 95–175. Berlin: De Gruyter.

León-Aráuz, Pilar, Arianne Reimerink, and Pamela Faber. 2009. "Knowledge Extraction on Multidimensional Concepts: Corpus Pattern Analysis (CPA) and Concordances." In *8ème Conférence Internationale Terminologie et Intelligence Artificielle*. Toulouse. http://ceur-ws.org/Vol-578/paper24.pdf.

León-Aráuz, Pilar, and Antonio San Martín. 2012. "Multidimensional Categorization in Terminological Definitions." In P*roceedings of the 15th EURALEX International Congress*, edited by Ruth V. Fjeld and Julie M. Torjusen, 578–84. Oslo: EURALEX.

López-Rodríguez, Clara Inés. 2009. "Extracción y representación de conocimiento a partir de corpus." In *Terminología y sociedad del conocimiento*, edited by Esperanza Valero and Amparo Alcina, 341–74. Bern: Peter Lang.

López-Rodríguez, Clara Inés, Miriam Buendía-Castro, and Alejandro García-Aragón. 2012. "User Needs to the Test: Evaluating a Terminological Knowledge Base on the Environment by Trainee Translators." *Jostrans. The Journal of Specialized Translation* 18: 57–76.

López-Rodríguez, Clara Inés, Juan Antonio Prieto-Velasco, and Maribel Tercedor-Sánchez. 2013. "Multimodal Representation of Specialized Knowledge in Ontology-based Terminological Databases. The Case of EcoLexicon." *The Journal of Specialized Translation* 20: 49–67.

Lorente, Mercé. 2000. "Tipología verbal y textos especializados." In *Cuestiones conceptuales y metodológicas de la lingüística*, edited by Miguel González and Montserrat Souto, 143–53. Santiago de Compostela: University of Santiago de Compostela.

———. 2002. "Verbos y discurso especializado." *Estudios de Lingüística Española* 16. http://elies.rediris.es/elies16/Lorente.html.

———. 2007. "Les unitats verbals dels textos especialitzats. Redefinició d'una proposta de classificació." In *Estudis de lingüístics i de lingüística aplicada en honor de Mª Teresa Cabré Castellví*, vol. 2, edited by Mercé Lorente, Rosa Estopà, Judit Freixa, Jaume Martí, and Carles Tebé, 365–80. Barcelona: IULA.

Lušicky, Vesna, and Tanja Wissik. 2015. *Procedural Manual on Terminology. Translation-Oriented Terminology Work*. cordis.europa.eu/docs/projects/cnect/7/270917/080/deliverables/001D33Guidelinesforcollaborativelegaladministrativeterminologywork.pdf.

Monterde-Rey, Ana María. 2002. *Ejercicios de introducción a la terminology para traductores e intérpretes.* Las Palmas: University of Las Palmas de Gran Canaria.

Montero-Martínez, Silvia, and Miriam Buendía-Castro. 2017. "Clasificación semántica de colocaciones verbales para la adquisición y codificación de conocimiento experto: el caso de los riesgos naturales." *Revista Española de Lingüística Aplicada (RESLA)* 30 (1): 240–72.

Montero-Martínez, Silvia, and Pamela Faber. 2009. "Terminological Competence in Translation." *Terminology* 15 (1): 88–104.

Montero-Martínez, Silvia, Pedro Fuertes-Olivera, and Mercedes García de Quesada. 2001. "The Translator as 'Language Planner': Syntactic calquing in an English-Spanish Translation of Chemical Engineering." *Meta* 46 (4): 687–98.

Muráth, Judith. 2010. "Translation-oriented Terminology Work in Hungary." In *Terminology in Everyday Life*, edited by Marcel Thelen and Frieda Steurs, 47–59. Amsterdam/Philadelphia: John Benjamins.

Newmark, Peter. 1988. *A Textbook of Translation*. New York: Prentice-Hall.

PACTE. 2014. "First Results of PACTE Group's Experimental Research on Translation Competence Acquisition. The Acquisition of Declarative Knowledge of Translation." *MonTI. Monografías de traducción e interpretación* 1: 85–115.

———. 2015. "Results of PACTE's Experimental Research on the Acquisition of Translation Competence. The Acquisition of Declarative and Procedural Knowledge in Translation. The Dynamic Translation Index." *Translation Spaces* 4 (1): 29–53.

Pastor, Veronica, and Amparo Alcina. 2010. "Search Techniques in Electronic Dictionaries. A Classification for Translators." *International Journal of Lexicography* 23 (3): 333–57.

Prieto-Velasco, Juan Antonio. 2009. *Traducción e imagen: la información visual en textos especializados*. Granada: Tragacanto.

Prieto-Velasco, Juan Antonio, and Pamela Faber. 2012. "Graphical Information." In *A Cognitive Linguistics View of Terminology and Specialized Language*, edited by Pamela Faber, 225–48. Berlin: De Gruyter.

Prieto-Velasco, Juan Antonio, and Clara Inés López-Rodríguez. 2009. "Managing Graphic Information in Terminological Knowledge Bases." *Terminology* 15 (2): 179–213.

Prieto-Velasco, Juan Antonio, and Maribel Tercedor-Sánchez. 2014. "La naturaleza situada de los conceptos médicos: por una representación multimodal del dolor." In *TIC, trabajo colaborativo e interacción en Terminología y Traducción*, edited by Chelo Vargas-Sierra, 575–90. Granada: Comares.

Pustejovksy, James. 1995. *The Generative Lexicon.* Cambridge: MIT Press.

Reimerink, Arianne, Mercedes García de Quesada, and Silvia Montero-Martínez. 2012. "Contextual Selection for Term Entries." In *A Cognitive Linguistics View of Terminology and Specialized Language*, edited by Pamela Faber, 208–23. Berlin: De Gruyter.

Reimerink, Arianne, Pilar León-Araúz, and Pamela Faber. 2016. "Image Selection and Annotation for an Environmental Knowledge Base." *Language Resources and Evaluation*, 1 − 32. doi:10.1007/s10579-016-9345-8.

Rodríguez-Camacho, Emma. 2002. "La Terminología en la formación de un traductor especializado." In *Panorama Actual de la Terminología*, edited by Gloria Guerrero and Manuel Fernando Pérez, 307–26. Granada: Comares.

Rogers, Margaret. 2004. "Multidimensionality in Concept Systems. A Bilingual Textual Perspective." *Terminology* 10 (2): 215–40.

Sager, Juan. 1997. "Term Formation." In *Handbook of Terminology Management*, edited by S. E. Wright and G. Budin, 25–41. Amsterdam/Philadelphia: John Benjamins.

San Martín, Antonio. 2014. "KWIC Corpora as a Source of Specialized Definitional Information. A Pilot Study." *Actes Du CEC-TAL'2013*, edited by Wajdi Zaghouani. www.qatar.cmu.edu/~wajdiz/cec-tal/san-martin_CECTAL.pdf.

———. 2016. "La representación de la variación contextual mediante definiciones terminológicas flexibles." PhD diss., University of Granada.

San Martín, Antonio, and Pilar León-Araúz. 2013. "Flexible Terminological Definitions and Conceptual Frames." In *Proceedings of the International Workshop on Definitions in Ontologies (DO 2013)*, edited by Selja Seppälä and Alan Ruttenberg. http://ceur-ws.org/Vol-1061/.

Sánchez-Cárdenas, Beatriz, and Miriam Buendía-Castro. 2012. "Inclusion of Verbal Syntagmatic Patterns in Specialized Dictionaries: The Case of EcoLexicon." In *Proceedings of the 15th EURALEX International Congress*, edited by Ruth V. Fjeld and Julie M. Torjusen, 554–62. Oslo: EURALEX.

Sánchez-Ibáñez, Miguel, and Joaquin García-Palacios. 2014. "Semantic Characterization of Terms as a Trace of Terminological Dependency." *Terminology* 20 (2): 171–97.

Sanz-Vicente, Lara. 2012. "Approaching Secondary Term Formation Through the Analysis of Multiword Units. An English-Spanish Contrastive Study." *Terminology* 18 (1): 105–27.

Tarp, Sven. 2008. *Lexicography in the Borderland between Knowledge and Non-Knowledge. General Lexicographical Theory with Particular Focus on Learner's Lexicography*. Tübingen: Max Niemeyer.

Tercedor-Sánchez, Maribel. 2011. "The Cognitive Dynamics of Terminological Variation." *Terminology* 17 (2): 181–97.

Tercedor-Sánchez, Maribel, and Clara Inés López-Rodríguez. 2008. "Integrating Corpus Data in Dynamic Knowledge Bases The Puertoterm Project." *Terminology* 14 (2): 159–82.

———. 2012. "Access to Health in an Intercultural Setting: The Role of Corpora and Images in Grasping Term Variation." *Linguistica Antverpiensia, New Series – Themes in Translation Studies* (11): 247–68.

Tercedor-Sánchez, Maribel, Clara Inés López-Rodríguez, and Juan Antonio Prieto-Velasco. 2014. "También los pacientes hacen terminología: retos del proyecto VariMed." *Panace@: Revista de Medicina, Lenguaje y Traducción* 25 (39): 95–103.

Tercedor-Sánchez, Maribel, and Juan Antonio Prieto-Velasco. 2013. "Las barreras en la comunicación médico-paciente: el proyecto VARIMED." *Translating Culture; Traduire*

la Culture; Traducir la Cultura: De barreras culturales en la traducción científica y técnica, edited by Ana Belén Martínez López, Isabel Jiménez Gutiérrez, and María Isabel Martínez Robledo, 593–606. Granada: Comares.

Thélen, Marcel. 2015. "The Interaction Between Terminology and Translation or Where Terminology and Translation Meet." *Trans-kom* 8 (2): 347–81.

Vargas-Sierra, Chelo. 2011. "Translation-Oriented Terminology Management and ICTs: Present and Future." In *Interdisciplinarity and Languages: Current Issues in Research, Teaching, Professional Applications and ICT*, edited by F. Suau Jiménez and B. Pennock, 45–64. Bern: Peter Lang.

Velasquez, Gonzalo. 2002. "La traducción y la terminología en la comunicación bilingüe mediada." *Meta* 47 (3): 444–59.