

Lexicography for the third millennium: Cognitive-oriented specialised dictionaries for learners

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Abstract

Emphasis on the functional approach to lexicography, for example the so-called *Function Theory of Lexicography* proposed by Bergenholtz and Tarp (2002, 2003 & 2004; see Tarp 2008 for a review), has promoted the vision that lexicography is at a crossroads where it is difficult to develop further without a thorough rethink of lexicography in general and of dictionaries in particular (Bergenholtz, Nielsen & Tarp, 2009). As the science of dictionaries, lexicography is no longer a job for amateur and occasional lexicographers; rather, lexicography is an area of social practice and independent science of academic study, with its own theoretical foundations, adaptation to new discoveries, and relationships. This paper adds to the current stay of play regarding learner's dictionaries (Fuertes-Olivera & Arribas-Baño, 2008; Tarp, 2008; Fuertes-Olivera, 2010), and presents the theoretical foundations needed for constructing cognitive-oriented specialised dictionaries. In particular, it focuses on the concept of “systematic introduction” in specialised Internet dictionaries, an outer text component recommended to convey data that can nurture the cognitive needs of Languages for Specific Purposes (LSP) users.

Keywords: specialised lexicography, function theory, learners, cognitive situations, systematic introductions.

Resumen

La lexicografía para el tercer milenio: Añadiendo una orientación cognitiva a los diccionarios pedagógicos especializados

Los enfoques funcionales se enfrentan al desarrollo de productos lexicográficos nuevos partiendo de una mirada crítica sobre el estado actual de la lexicografía

que, según los partidarios de la *Teoría Funcional de la Lexicografía* propuesta por Bergenholtz y Tarp (2002, 2003 y 2004; Tarp 2008 ofrece una revisión de la misma) se encuentra en una verdadera encrucijada (Bergenholtz, Nielsen y Tarp, 2009): la lexicografía necesita constituirse en una ciencia independiente que deje a un lado la idea de que se trata de un trabajo para lexicógrafos ocasionales y no profesionales; más bien debe considerarse una ciencia independiente que va construyendo sus propios planteamientos, adaptaciones y relaciones con otras ciencias. En este artículo nos centramos en los diccionarios pedagógicos especializados, que empiezan a merecer la atención de los investigadores (por ejemplo, Fuertes-Olivera & Arribas-Baño, 2008; Tarp, 2008; Fuertes-Olivera, 2010). En concreto, presentamos los fundamentos teóricos que deben tener los diccionarios especializados de orientación cognitiva, prestando especial atención a la construcción de “introducciones sistemáticas” en los diccionarios especializados de Internet. Las introducciones sistemáticas son componentes externos adecuados para ayudar a los usuarios de los diccionarios especializados ya que funcionan como una especie de manual con los que un usuario no experto (por ejemplo un estudiante de IFE) puede adquirir un conocimiento adecuado de un dominio.

Palabras clave: lexicografía especializada, teoría funcional, aprendices, situaciones cognitivas, introducciones sistemáticas.

1. Lexicography for the third millenium

Since the late 1980s, Bergenholtz and Tarp (2002, 2003, 2004) have defended a transformative view of lexicography and have presented lexicography as an area of social practice and independent science concerned with analysing and building dictionaries which can satisfy the needs of a specific type of user with specific types of problems related to a specific type of user situation (see Tarp 2008, for a review). Consequently, Bergenholtz and Tarp’s Function Theory of Lexicography “shifts the focus from actual dictionary users and dictionary usage situations to potential users and the social situation in which they participate” (Tarp, 2008: 40).

The functional approach has defended that lexicography cannot develop further without a thorough rethink of lexicography in general and of dictionaries in particular. Gouws (2009: 3) summarises this view by claiming that:

The twenty-first century sees dictionaries as products of a scientific practice with a well-developed underlying theory. The needs of dictionary users are

constantly changing and these changing needs should compel lexicographers to continue developing lexicographic theory and improving the quality, relevance and efficiency of dictionaries.

A case in point is the development of pedagogical lexicography (Tarp 2004, 2005 & 2008; Fuertes-Olivera & Arribas-Baño, 2008). It is common practice that lexicographers adopt typologies constructed in the field of Second Language Acquisition without a critical review of their lexicographical merits. For example, research by Tarp (2008 & 2009b) or Andersen and Fuertes-Olivera (2009), among others, has shown that current dictionary classifications do not take into consideration lexicographically relevant criteria such as dictionary functions, data presentation, data accessibility, and learners' needs. Tarp (2008 & 2009b) argues that the traditional distinction among "beginners", "intermediate" and "advanced" learners defended by scholars such as Wingate (2002) is not fully adequate for lexicographical purposes considering that it only pays attention to the amount of foreign-language words learners are supposed to have learned, a criterion which is only partially adequate in lexicography. This criterion may be used in the process of lemma selection, and the use of a definition vocabulary but it leaves out key lexicographic elements such as the dictionary functions, specific users' needs in specific situations, data presentation and data accessibility, etc. For example, in different outer texts, the new editions of the *New Oxford Business English Dictionary for Learners of English* (Parkinson, 2005) and the *Longman Business English Dictionary* (Summers, 2007) state their goal at satisfying the needs of "intermediate to advanced" students. A cursory analysis of **commercial bill**, however, shows key lexicographical differences between them:

commercial bill → BILL OF EXCHANGE

bill of ex'change abbreviation **b/e** or **bill n**
 plural **bills of exchange** [C] BANKING *n*
 a document ordering someone to pay a particular amount on a fixed date, used especially in international trade: *The exporter's bank sends the bill of exchange to its overseas branch in the importer's country. / When the buyer **accepts a bill of exchange** (=agrees to pay it), the exporter may arrange for it to be discounted. / Essing **dishonoured four bills of exchange** (=failed to pay them) drawn by Byrd to the amount of £2.39 million. (...)*

com'mercial bill also 'trade bill [C] a bill of exchange used in the buying and selling of goods: *Most trade bills are discounted once and then held to maturity. (...)*

discounted bill [C] a bill of exchange that has been bought by a bank for less than it will be worth when it becomes due for payment.

trade bill → BILL OF EXCHANGE

Example 1. Excerpt from the *Longman Business English Dictionary*

com'mercial bill = TRADE BILL

'trade bill (also **com'mercial bill**) *noun* [C]

(*Trade*) a BILL OF EXCHANGE that is used to pay for goods.

bill of ex'change *noun* [C] (*abbr* B/E (*BrE* also **bill**))

(*Finance; Trade*) a written order for a person or an organization to pay a particular amount of money to sb/sth when asked or at a particular time, used especially in international trade: *If the buyer accepts the bill of exchange, they will sign their name on it and date it.* (...) → PROMISSORY NOTE

• to **accept/discount/draw/make out/sign** a bill of exchange

Example 2. Excerpt from the *New Oxford Business English Dictionary for Learners of English*

The main differences are the following:

- The two dictionaries offer different pronunciations of the lemma **commercial bill**. The *New Oxford Business* only includes the primary stress, but not the secondary one, although this data is especially useful for foreign learners whose problems with the pronunciation of multiword units are well known in SLA circles. In particular, a learner's dictionary is expected to help students in dealing with unstressed vowels and stress timing as both issues are very problematic for non native speakers.
- The lexicographical treatment of **commercial bill** is very different in both dictionaries: in the *New Oxford Business*, the term is a synonym of **trade bill**, whereas in the *Longman Business*, both **commercial bill** and **trade bill** are run-ons of **bill of exchange**. This different lexicographical treatment has led to different encyclopaedic labels: in the *New Oxford Business*, the term is associated with *Trade*, whereas no encyclopaedic labels are used in the *Longman Business*, which can lead users to wonder whether **commercial bill** is also a **BANKING** term, as **bill of exchange**, or not. As the use of correct and accurate encyclopaedic labels is especially necessary in specialised learner's dictionaries, particularly

in multi-field ones, this different lexicographical treatment of the same term is particularly confusing for learners.

- The different lexicographical treatment has also led to differences in the access process, which is not very straightforward. Firstly, users are forced to perform more than one consultation for finding out relevant data on **commercial bill**. Secondly, users must carry out more cognitive operations than necessary for being able to convert the scattered data into valuable information. For example, the definitions are worded from different perspectives which can make potential users uncertain about what the term **commercial bill** means exactly. For instance, the *New Oxford Business* uses “pay for goods” in its definition of the term, whereas the *Longman Business* employs the “buying and selling of goods”. As “pay” implies money given to someone, learners must perform a second cognitive operation: there is more than a buyer; there is also a seller. Furthermore, neither dictionary mentions the agent (person or company) that pays, buys or sells.
- The inclusion of grammatical data is different. The *New Oxford Business* uses the label “noun” and the code [C], whereas the *Longman Business* only includes the code [C] that makes potential users unsure about the part of speech of the term in question.
- The two dictionaries do not show a homogeneous lexicographical treatment regarding the use of sentence examples, collocations, syntagmatic data, and related words. For example, users of the *New Oxford Business* are informed that a **commercial bill** is a kind of **promissory note**, which can also be “drawn”, “signed”, and “made out”. These data are absent from the *Longman Business*.

The above reflections lend support to our claim that applied linguistics classifications *per se* cannot be used in lexicography. Instead, we propose a lexicographical classification, as shown in Andersen and Fuertes-Olivera (2009), who have analyzed a set of printed business dictionaries aiming at the same user type (learners of Business English), and have defended the inclusion of information on the general orientation of the dictionary, i.e., whether the dictionary is communicative-oriented, cognitive-oriented, or both), together with more specific details, as shown in Table 1.

Dictionary	Caption
Oxford Business	A communicatively oriented dictionary for semi-experts and interested laymen with mostly text production needs.
Longman Business	A communicatively oriented dictionary, with a cognitive touch, for semi-experts and interested laymen with both text production and text reception needs.
Peter Collin Business	A balanced cognitively and communicatively oriented dictionary for semi-experts and experts with mostly text reception needs
Oxford Business and Management	A cognitively oriented dictionary for experts and semi-experts with text reception needs.
Collins Business	A cognitively oriented dictionary for experts and semi-experts with text reception needs.

Table 1. Captions in the blurb proposed in Andersen and Fuertes-Olivera (2009: 236).

A good lexicographical theory is needed for establishing informative dictionary classifications based on the principle that similar data types must be expected to be found in similar dictionary types if these types are based on sound criteria. Furthermore, a good lexicographical theory is necessary for advancing in our understanding of all the lexicographical issues that are already present in the different theoretical and practical lexicographical debates in the beginning of the 21st century. Some of them are the following: the construction of pedagogically-oriented (specialised) dictionaries; the role of corpora in (specialised) lexicography; the need for quick and easy access to the relevant lexicographic data; a better understanding of electronic dictionaries, dictionary functions and users (Bergenholtz, Nielsen & Tarp, 2009; Nielsen & Tarp, 2009; Fuertes-Olivera, 2010).

This paper adds to the current debate by discussing the relationship between language knowledge, language skills and communication (Section 2), with a particular emphasis on the LSP learner's lexicographically relevant needs (Section 3), some of which will be commented on in Sections 4 and 5, which are concerned with cognitive situations and systematic introductions. Our contention is that a proper understanding of the relationship between language knowledge, language skills and communication will lead to the construction of better learner's dictionaries by assuming that this relationship offers clues on the learner's lexicographically relevant needs. For example, the need for "systematic introductions" in cognitive use situations is explained in this paper that also offers some hints of possible solutions implemented in an Internet dictionary: the *Diccionario Inglés-Español de Contabilidad* (Nielsen et al., 2009).

2. The Relationship between knowledge, skills and communication

The use of the term “specialised learners’ dictionary” corresponds to the general use of the broader term “learners’ dictionary” which, in the lexicographic literature, usually refers to dictionaries conceived for language learners, especially learners of a second or foreign language. This approach may seem surprising inasmuch as the term “learner” is frequently used in a much broader sense outside lexicography where it refers to learners of a huge variety of practical and theoretical disciplines. In this respect, learners can be subdivided into those “learning skills” and those “acquiring knowledge” although the modern educational methods, in most cases, combine the learning of skills with a certain acquisition of related knowledge, and vice versa. This distinction between skills and knowledge is important for modern lexicography because it helps to focus on the different roles dictionaries may play in the learning process.

Users always consult a dictionary in order to “learn” something, i.e. to get information that can later be used for a number of purposes. In this very broad sense of the word, it could be argued that all dictionaries in one way or another are learners’ dictionaries. However, in order to avoid diluting the very concept of a learners’ dictionary, a distinction should be made between dictionaries conceived to assist an on-going learning process and dictionaries conceived to satisfy the users’ spontaneous needs with no relation to a specific learning process. Only the former type of dictionary should be considered a learners’ dictionary in the narrow sense of the word. Thus, a learners’ dictionary could be defined as a dictionary compiled with the genuine purpose of assisting users engaged in an on-going learning process.

The above definition is a very broad one and needs to be further specified. As already mentioned, there are various types of learning processes. And apart from that, there are also various types of learners who may find themselves in various types of situations related to each of these. For this reason they may be expected to have different types of needs which, for their part, require different types of lexicographic data in order to be satisfied (for example, a learner of Business English does not need data on the etymology of a term; however, a learner of the History of English will need etymological data). Consequently, the concept of a learners’ dictionary includes a number of different types of dictionaries with different functions

in terms of the satisfaction of the needs of the various types of users (learners) in the various types of situations, respectively.

The learning process can be subdivided into two different types of learning, i.e. the learning of “skills” and the acquirement of “knowledge”. These two fundamental types of learning can be further subdivided into a number of learning processes in terms of what is learned and how it is learned. For instance, the learning or acquirement of knowledge can take place as a “systematic process” related to a specific study program or as a “sporadic process” where the need to add to the existing knowledge only occurs from time to time. However, much more complicated is the learning of skills that may be subdivided into two basic categories, i.e. the learning of “communicative” or “linguistic skills” and the learning of “practical skills”. The first subtype, which is the one that has been most extensively discussed in the lexicographic literature, refers to the learning of a number of skills that enable the person to engage in the different phases in the communication process. The most important of these skills are “text reception skills”, “text production skills” and “translation skills” which can be further subdivided according to the type of text in question and the language, or languages, involved.

As to the “practical skills”, these refer to the learning of various types of manual or intellectual skills, for example brick-laying, the operation of a machine, the placement of a dental filling, the preparation of the annual accounts, etc. As can be seen, the mentioned skills are both those which are related to the traditional “manual” and blue-collar jobs and those related to the practical dimension of various academic disciplines, e.g. stomatology and accounting. They have all two separate and interdependent components, i.e. the ability to interpret the situation by means of observation and the ability to take action when necessary. These two components or subtypes of skills may be called “interpretative skills” and “operative skills”, respectively.

It is important to avoid mixing the two categories of knowledge and skills, respectively, and confusing them with each other as it frequently happens in the lexicographic and other type of theoretical literature. One person can have a perfect theoretical knowledge within a given subject field without possessing the corresponding practical skills, and vice versa. A sports writer may know everything that is worth knowing about a certain discipline, e.g. cycling, without being able to ride a bicycle and even lesser to climb the mountains and participate in one of the big tours, whereas a professional

cyclist may not have the necessary historical and theoretical knowledge in order to say anything intelligent about his own profession. The same holds truth for the relation between linguistic knowledge and linguistic skills. All normal adult people have excellent linguistic skills and are perfectly able of communicating in their mother tongue, but only a minority of them may have theoretical knowledge about this language. On the other hand, it is perfectly possible to have learned knowledge about a given language without being able to speak it.

As already mentioned, knowledge and skills, whether linguistic or practical-operational, are learned in two different ways. As a rule, knowledge is transmitted from one person to another by means of oral or written texts, or is acquired (new knowledge) through observation and reflection based upon the already existing knowledge. In this sense, knowledge can also be transmitted “directly” by dictionaries, i.e. by means of “direct communication” between the dictionary authors and their users, and it is then “only” a question of selecting and preparing the corresponding lexicographic data adapted to the specific type of user and situation in question. Skills, on the other hand, cannot be transmitted directly from one person to another, but can only be developed by means of training and practical exercise, which in the case of linguistic skills means communication. Consequently, skills cannot be learned directly by consulting dictionaries or any other types of texts. However, the skill learning process is usually assisted “indirectly” by teachers, instructors and coaches, or by textbooks, manuals and user guides, that provide oral or written advices and instructions in order to improve the practical exercises and “speed up” the learning process. In this respect, dictionaries may also indirectly assist the learning of skills providing data from which the corresponding instructions or advices can be retrieved.

If the question is the learning of language skills, whether mother-tongue, foreign-language or LSP, “communication is the mediating element” through which the information retrieved from the lexicographic data can be transformed into skills. If a person at a certain language level has difficulty in understanding, formulating or translating a text, the solution may be to consult a reception, production or translation dictionary, since the successful communication resulting from this consultation (which is its “direct” purpose) can “indirectly” reflect on and increase the language skills which are always the basic precondition for any successful communication.

The basis of language skills is command of the vocabulary and grammar of the language in question, including command of its phonetics. When a mother tongue is “learned naturally”, language skills develop thanks to the parallel assimilation of the vocabulary and grammar of the language. The child listens to adults talking, and gradually discovers what all the words mean. Thanks to this process of reception, passive language skills are developed, which is the precondition of understanding. These passive skills turn into active language skills as children learn to express themselves in words and sentences. So the development of language skills is both an active and a passive process in which communication with other people in the form of reception and production plays the vital role. Language skills are a precondition of communication, and in turn communication is a precondition of language skills.

In principle, foreign and special-purpose languages can be learned (and in many cases are learned) in the same way as described above – spontaneously, by “natural learning”. But a dual process may also be involved, with language skills being developed by communication parallel to the conscious study of the vocabulary and grammatical structures of the foreign or special-purpose language concerned – the latter in particular being learned via a system of rules. This transmission of linguistic knowledge can take place by teaching, by the autonomous study of textbooks, grammar books, technology-supported learning material and by consulting dictionaries. The language knowledge acquired in this way is not foreign-language skills. Language knowledge only turns into language skills if it is internalised – something which also happens with “communication as the mediating element”. Based on existing language skills and conscious thought arising from the linguistic knowledge acquired, learners in a communication situation can decode, formulate or translate a text and thereby activate new words and grammatical phenomena, which in turn reflect on and increase their language skills with a view to improving future communication.

To sum up: in the lexicographically perceived language learning process, i.e. the learning of language skills, dictionaries may provide assistance on two levels: “indirectly” by transmitting “knowledge” about the native, foreign or special-purpose language’s vocabulary and grammar in connection with the systematic study of the language in question; and “directly” by providing “information” that can be used to solve specific problems in the actual process of communication – in connection with text reception, text production, and translation.

3. The LSP learner's lexicographically relevant needs

At the highest level of abstraction, lexicographical needs are always “needs for information”. It goes without saying that dictionaries are not the only written sources that provide assistance to people with information needs. Books, textbooks and articles in printed or internet-based newspapers, journals, and magazines are other such sources. However, dictionaries distinguish themselves in various aspects in comparison with the other text sources. Firstly, almost without exception, dictionaries are not designed to be read from one end to the other, but “to be consulted”. This means, as a rule, that the needs which they are designed to satisfy are not global information needs, but “punctual information needs” whether or not these needs are related to global issues. Secondly, the user's information needs in terms of lexicography are never abstract needs, but should always be viewed as concrete needs closely related, not just to a concrete user, but to a concrete user finding himself in a concrete situation, e.g. LSP text reception with all its possible problems in terms of understanding and the corresponding needs to get assistance to solve these problems. Consequently, the user needs in terms of lexicography are always treated as specific types of information needs related to specific types of users finding themselves in specific types of extra-lexicographic social situations.

As a rule, neither textbooks nor the other information sources listed above are primarily designed to provide assistance to people with punctual and situation-dependant information needs. Although they are frequently planned to assist a specific type of users, they seldom take into account the various types of social situations where user needs may arise (for example, a textbook aiming at solving user needs when reading, writing, translating, etc.). Besides, they are in most cases conceived to be read from one end to the other and this, of course, is reflected in their general structure and accessibility. By analogy, the nature of dictionaries as tools for specific purposes and punctual consultation is also reflected in their overall design and accessibility. In fact, one of the basic characteristics of dictionaries is that they provide – or are expected to provide – “quick and easy access” to the data from which the needed information may be retrieved (Bergenholtz & Gouws 2010: 104).

It is important to stress that dictionaries do not contain information as such, but only carefully selected and prepared “lexicographical data” from which the user may retrieve the needed information through a complex mental

process supported by his or her linguistic skills and encyclopaedic knowledge in terms of the language and topic in question (Wiegand, 2002; Tarp, 2007). Consequently, what a user of a specific type needs when consulting a dictionary is quick and easy access to the lexicographical data from which the specific type of information needed may be retrieved.

So, what sort of lexicographical data does a LSP learner need when consulting a dictionary? The answer to this question depends on whether the LSP to be learned is part of his or her native language or a foreign language, and whether he or she learns it in order to engage in normal communication in terms of text production and reception or with a view to performing translation jobs. And it also depends on the linguistic and subject-field-specific characteristics of the learner.

As stated above, dictionaries cannot directly assist the development of LSP skills, but only indirectly helping users with the solution of problems occurring in LSP communication. In order to solve these problems, LSP learners first of all need information on vocabulary (including equivalents) and grammar, as well as some stylistic characteristics (for example, whether a word is formal, informal, slang, etc.). In this respect, the LSP learners' lexicographical needs are very similar to the needs of learners of Languages for General Purposes (LPG) in terms of communication. However, there is one big difference which is frequently ignored. As a rule, no meaningful LSP communication can take place without a minimum of subject-field knowledge. For the subject-field expert this does not usually constitute any problem (although it may do in special cases). However, for the layman (in terms of a specific subject field) the lack of subject-field knowledge may lead to important communication problems that, for instance, could be solved by consultation of dictionaries conceived especially to assist this specific purpose. This means that laymen, which are very heterogeneous, and students will need specialised encyclopaedic data from which they can retrieve the needed subject-field information both when consulting a specialised dictionary in order to get assistance in various communication situations and when consulting it in order to add to their subject-field knowledge independent of a specific communication situation, i.e. in a cognitive situation. This lack of specialised encyclopaedic data in most of the specialised dictionaries published so far is the reason why they can be considered only to be half-way solutions to the users' needs in terms of LSP communication and learning.

4. Cognitive situations

As discussed above, the function theory of lexicography provides a set of statements about lexicographic user needs which may assist the formulation of a future theory of information and data access in lexicographic works and other text types conceived for consultation and retrieval of information. The most important of this statement is that users in general never need information in general. Users need a concrete type of information which depends both on the concrete type of user and on the concrete type of situation in which the need occurs. Research has shown that the situation in which the need occurs is the basic element in defining the type of information required. Until now, the function theory has identified four basic user situations, i.e., communicative, cognitive, operative and interpretative situations. In the communicative, operative and interpretative situations the users' need for information will always be punctual, whereas in the cognitive situation the users may need either punctual information or global (also called systematic) information in order to memorise it as part of a systematic study of a given topic.

A more in-depth understanding of cognitive situations, however, reveals that dictionaries can also be adequate tools for satisfying the needs users have of gaining new knowledge. Tarp (2008), for example, claims that the wish to gain new knowledge can arise in social situations such as a teaching programme and a course of study, when users may wish to learn more about the area of knowledge they are dealing with. In these two social situations the specific dictionary consultation will be connected to a global issue considering that "teaching programmes and studies deal with the systematic acquisition of a specific area of knowledge" (Tarp 2008: 46). Although the classification of cognitive needs is in principle an open one, the function theory focuses on four types of cognitive needs which are relevant for lexicography: the "needs to acquire *encyclopedic knowledge of linguistic* (LGP), *specialised linguistic* (LSP), *general, cultural and subject-specific nature* respectively" (Tarp 2008: 47).

Dictionaries usually aim at satisfying cognitive needs in term of subject-field knowledge by the inclusion of encyclopaedic data, which is concerned with describing factual knowledge and extra-linguistic reality. In specialised dictionaries encyclopaedic data is usually given in encyclopaedic notes in the dictionary articles, encyclopaedic labels addressed to the individual lemma or equivalents, and independent outside matter components, referred to as

“systematic introductions”, “subject-field components”, “encyclopaedic sections”, or “subject field term systems” (Bergenholtz & Nielsen 2006: 284; Fuertes-Olivera, 2009: 161).

The genuine purpose of the independent outside matter component – we are referring to it as “systematic introduction” – is providing an introduction to or a systematic, detailed presentation of the subject-field covered by the dictionary. In Bergenholtz and Tarp (1995: 154), Tarp claims that this encyclopaedic section may be seen “as an ideal way of introducing the user to the subject field treated in the dictionary”. An example of such dictionary text is found in a pair of twin dictionaries: *Ingeniería Genética* and *Gene Technology*, where the following explanation is included:

The **encyclopedic section** (pp. 19-61) has several functions. First, it brings an overview of the systematics which forms the basis of gene technology. This elementary overview, which ends with a subject index, can be read completely independently from the dictionary as a small work in its own right, with the purpose of obtaining basic information on the technical basis of molecular biology and gene technology. In a dictionary context it is intended as an aid for those readers requiring a concise account. The technical terms in bold type list some of the most important terms which are also found as entry words. A function which is equally important is the encyclopedic section as a systematic reference basis from the individual dictionary articles, where the information provided in the entry would be better understood in a number of cases if seen in a broader context. (Kaufmann & Bergenholtz, 1998: 8)

The analysis of both printed dictionaries reveals that lexicographers have included symbols such as **ξ**, sections (**ξ6**), cross references (**ξ14**), and bold letters (**plasma membrane**) to indicate that this outside text is related with the rest of the dictionary structures. The data in the systematic introduction are partly restatements of some of the data in the articles and partly new and supplementary data, as examples (3) and (4) show:

ξ 6. Membranes and Cytoskeleton

A membrane, the **plasma membrane**, surrounds the cell, and eukaryotic cells also contain many internal membranes (Fig.3).

These membranes are about 10 nm thick (1 nm = 10⁻⁹ m) and are composed of a **phospholipids bilayer** (**ξ 14**) associated with many proteins.

(...)

Example 3. Excerpt from the systematic introduction included in the *Gene Technology* dictionary.

plasma membrane *membrana f plasmática* ▲
 embedded in a ~ *insertado en la ~*; fuse with the
 ~ *fundir con la ~*; (...)
 → cell membrane

Example 4. Excerpt from a dictionary article in the *Gene Technology* dictionary.

Examples (3) and (4) show that lexicographers have integrated the word list with the systematic introduction by adopting an “aided integrated systematic introduction” (Bergenholtz & Nielsen, 2006: 292), i.e., a systematic introduction containing structural indicators that help the user navigate the text and find what he is looking for. For example, bold face is used for highlighting the relevant terms included in the word list of the dictionary.

Assuming that such a systematic introduction is adequate for allowing users to gain knowledge about a specific subject field, lexicographers must upgrade these dictionary components by paying attention to types of users, types of user situations, and access routes. Below we will present some general ideas regarding the compiling of systematic introductions in specialised Internet dictionaries. We will focus on some principles connected with the access routes permitted by the Internet.

5. Systematic introductions in specialised Internet dictionaries

A fundamental challenge of lexicography is to characterise and typologise user’s needs in order to establish a basis upon which the corresponding lexicographic solutions can be found and developed. Regarding user’s needs in cognitive situations, lexicographers in the 21st century must develop lexicographical products which also allow users acquire knowledge about a specific area of knowledge, and must understand and address this challenge in the light of new technologies made available for practical lexicography (Tarp, 2009a).

A case in point is the development of systematic introductions in specialised Internet dictionaries. The nature of the Internet makes us assume that lexicographers have at their disposal new forms of presenting systematic introductions which must be adapted to the characteristics of the web. We claim that in an Internet dictionary the often quoted distinction between systematic cognitive situations and sporadic cognitive situations is usually

blurred. A search in a well-devised Internet dictionary will retrieve data which can be used in either one or other cognitive situation at no tangible extra cost (Nielsen, 2008). For example, in the *Diccionario Inglés-Español de Contabilidad* (Nielsen et al. 2009), an English-Spanish Dictionary of Accounting, the search engine offers different search functionalities in the scroll menu; one of them is “contains”, with which users can retrieve all the articles in which the search word is part of the word list. A search of the term **income** with “contains” in the scroll menu retrieves 140 articles. The short definition given in each article as well as the data included in the article allows users to gain some fundamental knowledge about this key accounting concept:

- **Income** is a homonymous concept with three basic or primitive meanings in the subject field: an **income** can be “an increase in equity arising from decreases of liabilities or improvements of assets” (i.e., its primitive meaning), a “monetary amount earned by a person or enterprise” (i.e., “tangible money”), and “a profit” (i.e., the “earnings” of an enterprise for an accounting period).
- These three concepts underlie the existence of many types of income: **accounting income**, **accruals and deferred income**, **accrued income**, **dividend income**, etc. For example, **accounting income** is related with the “profit concept” as an accounting income is “the net profit of an accounting entity for a period as reported in the profit and loss account, before deducting related payments of tax”.
- The term **income** is also used for describing a specific text type: **income statement**. It has a recognised format (i.e., a typical macrostructure) and contains expected data (i.e., a typical microstructure). This text type can also be called by similar terms in English and Spanish (**profit and loss account**; **profit and loss statement**; **cuenta de pérdidas y ganancias**; **cuenta de resultados**; and **estados de resultados**); and it forms specific phraseological units which refer to key accounting concepts (for example, **consolidated income statement**) and specific accounting traditions. For example, in the **consolidated income statement**, “net income is shown as the net income attributable to equity holders of the parent and to minority interests, respectively”. In addition, users are informed that in the **income statement**,

“income from ordinary activities is recognised below operating income or loss, depreciation, amortisation and net financial income and expenses, usually both before and after tax and before any extraordinary items”.

- The existence of difference accounting traditions has led not only to the coining of different terms for the same concepts (for example, **income tax law** and **corporation tax**), but also to conceptual differences that can crop up in accounting texts. For example, the term **income** is used instead of **profit** only in British accounting texts prepared by non-profit organizations.
- **Income** enters into different types of relationships with other concepts. For example, **appropriation of net income** and **distribution of net income** refer to the same conceptual reality.

If we accept that the nature of Internet blurs the distinction between systematic cognitive situations and sporadic cognitive situations, lexicographers can opt for, firstly, upgrading the knowledge data already included in the dictionary by means of facilitating the access route to them, and, secondly, including some extra data for facilitating the gaining of knowledge.

A simple solution will consist in offering a list of the primitive or basic concepts of the field together with links to Internet texts where the concepts are described. A right step in this direction is found in the *Diccionario Inglés-Español de Contabilidad* (Nielsen et al., 2009) where users can search through the search option “contains” and access Internet texts by clicking in the functionality “source” that is present in some articles. For example, in **grant related to income**, the functionality “source” allows users to retrieve the IAS 20 (IAS stands for International Accounting Standards), paragraph 3 where this concept is described. In our view, however, the conceptual information present in the *Diccionario Inglés-Español de Contabilidad* is not a systematic introduction in itself as the above data are scattered along entries without explicit or implicit relations among them.

A more elaborate solution consists in working with the list of basic concepts in order to prepare the different types of relationships existing among them and to cross-refer them to the individual articles where specific data must be included. For achieving this solution, lexicographers will have to classify concepts first, link them to Internet texts where appropriate, prepare an

introductory text which gives a brief overview of the subject field, and organise a system of cross-references for relating them among themselves and with the word list. For an Internet dictionary such as the *Diccionario Inglés-Español de Contabilidad*, the solution here envisaged is slightly different from the one proposed by Bergenholtz and Nielsen (2006), as we believe that Internet dictionaries do not need fully “extended aided integrated systematic introductions” but better search options, links to Internet texts, a more simple subject field classification as well as cross-references among all these four dictionary components. For example, in its scroll menu the *Diccionario Inglés-Español de Contabilidad* includes the search option “is” which retrieves the articles whose lemma is written exactly as the search option. This option is adequate for searching for basic concepts, and for grasping some knowledge of them by reading the lexicographical data included, which can be easily achieved because the number of retrieved articles is really manageable. For example, although there are more than 330 articles with **cost** in the *Diccionario Inglés-Español de Contabilidad*, the search option “is” allows user to retrieve 4, which are enough for offering basic knowledge of the concept.

6. Conclusion

This article has defended that nothing is more practical than a good theory, and that the future of (pedagogical) specialised lexicography as a science rests on forging its own principles and procedures. We cannot take for granted the concepts and theories developed in the field of linguistics as these do not consider relevant lexicographical concepts that are being created for satisfying the genuine purpose of any dictionary: user’s needs in specific use situations, as those found when taking into consideration the relationship between knowledge, skills and communication.

The abovementioned relationship must also adapt to current technologies that are improving access routes. For example, a dictionary such as the *Diccionario Inglés-Español de Contabilidad* can be more useful in cognitive situations if it also includes a list of basic concepts, an explanatory simple text with the aim of stating relationships among them together with more links to adequate Internet texts and an upgraded system of cross-references among the list, the explanatory text, the Internet texts and the individual articles. A possible solution will be the following:

1. Inclusion of a menu with “basic accounting concepts”. This can be placed in the left vertical side of the dictionary homepage.
2. All the basic accounting concepts must be described in a simple introductory text divided in chapters and sections. This text can also be placed in the left vertical menu of the dictionary homepage.
3. The inclusion of an adequate explanation about the functionalities of the search options “is” and “contains”.
4. The possibility of clicking in each basic concept, which will allow users to retrieve a simple explanation of the concept together with its main relationships. For example, for **income** users should be informed that it is “inflows or improvements of assets as well as increases in equity arising from decreases of liabilities”, that it is associated with **expense**, and that “earnings” and “tangible money” (definitions 2 and 3 of **income**) are two related meanings.
5. Where possible, the inclusion of links to appropriate Internet texts.
6. The use of hyperlinks for cross-referencing.

In a word, the future of pedagogical specialised lexicography will be much influenced by offering data and dictionary components (for example, a “systematic introduction”) adequate for nurturing the cognitive needs of LSP users.

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