Experts and Specialised Lexicography: perspectives and needs[1]

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Resum

Experts i lexicografia especialitzada: perspectives i necessitats

Aquest estudi ha estat elaborat a partir de dos propòsits. El primer objectiu és entendre i preveure les necessitats lexicogràfiques dels experts en situacions comunicatives concretes. El segon objectiu és avaluar diccionaris especialitzats des del punt de vista dels experts, tenint en compte el seu nivell de coneixements i la manca de diccionaris elaborats específicament per als experts. Aquest article s'estructura en dues parts principals: a la primera part presentem les contribucions teòriques sobre les necessitats dels especialistes des del punt de vista de la teoria funcional de la lexicografia (Bergenholtz, Tarp, Nielsen, i Kauffman) i també de la teoria comunicativa de la terminologia (Cabré); i a la segona part hem estudiat empíricament les expectatives que tenen els experts quan usen diccionaris especialitzats.

L'experiment que hem desenvolupat ha consistit a passar un qüestionari en què els experts han triat la informació que més necessiten en relació amb les tasques professionals que duen a terme o bé han classificat diccionaris especialitzats existents.

Paraules clau: *teoria comunicativa de la terminologia; ús de diccionaris; experts; lexicografia especialitzada*

Abstract

This study was performed with two main purposes in mind. The first was to understand and predict the lexicographical needs of experts in communicative situations, while the second was to evaluate specialised dictionaries from experts' point of view, considering their knowledge proficiency and the lack of dictionaries aimed primarily at experts. This paper consists of two main parts. The first presents the theoretical background on experts´ needs based on the functional theory of lexicography (Bergenholtz, Tarp, Nielsen and Kauffman) as well as the communicative theory of terminology (Cabré), while the second looks at experts' expectations about specialised dictionaries based on empirical research.

We conducted evaluation experiments where experts were asked to complete a questionnaire either for selecting the most needed information related to their professional tasks or for rating existing specialised dictionaries.

Keywords: *communicative theory of terminology; dictionary use; experts; specialised lexicography*

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1 Introduction

1.1 The Need for Research on Experts

Specialised lexicography has become a highly attractive field of study recently, although lexicography as an activity has a long history. There are some recent valuable works devoted to theoretically distinguishing user groups of specialised dictionaries and their specific needs (Bergenholtz & Nielsen, 2006; Welker, 2010; Fuertes-Olivera & Tarp, 2011; Bergenholtz & Tarp, 2002, 2003, 2004; Nielsen & Tarp, 2009; etc.). Besides, a lot of empirical research has been done to elicit information about different types of users as well as designing dictionaries based on the functional theory of lexicography; good examples of these approaches are evaluations of existing dictionaries and designing a new generation of specialised dictionaries (Antia, 2001; Bergenholtz & Bothma, 2011; Karpova & Kartashkova, 2010; Fuertes-Olivera & Nielsen, 2011; Bergenholtz & Nielsen, 2006; etc.). However, it is an unfortunate reality that many existing specialised dictionaries are still largely based on traditional lexicography methodologies, with little consideration about user types and their real needs. Moreover, the majority of existing specialised dictionaries are primarily aimed at semi-experts and non-experts (a glance at introductions and prefaces of dictionaries demonstrates this point).

Amongst the users of dictionaries, experts' needs have hardly ever been seriously taken into consideration and there is a lack of concrete and useful information about these users, who present a number of specific features and needs regarding these resources. Over the last decade a lot of empirical research has been carried out based on the functional theory of lexicography to find out what appropriate content for potential users is, but more seems to have been limited to language acquisition and translation. These inadequate resources often pose problems for experts.

It is an indisputable fact that experts spend a considerable amount of time and effort on consulting specialised dictionaries and other reference resources, where unfortunately they might not have the opportunity to find any resource aimed primarily at them. This is the reason why lexicographical resources have considerable importance for them and should meet their requirements as far as possible. In our opinion, it may be the case that most lexicographical resources do not fulfil experts' quality and quantity expectations.

This paper is an attempt to contribute to modern lexicographical studies, and terminography in particular, which take a functional approach to dictionary use. This paper firstly discusses the theoretical background of specialised lexicography and terminography with a description of different points of view, and secondly presents a survey carried out recently to improve the development of LSP lexicography regarding experts' needs and expectations about dictionaries. More specifically, we present the results of a questionnaire distributed to a random sample of experts from different fields of studies regarding the types of dictionaries used, frequency of use and consultation, types of information they look for, etc. As regards its potential 'empirical' significance it is felt that it may provide a useful starting point for those researchers interested in experts and for those terminographers who study the professional needs of experts.

1.2 Aims

It seems that none of the existing research has contributed significantly to presenting a profile of experts as dictionary users; accordingly, preliminary studies such as this research will result in an overview rather than a detailed snapshot. However, we believe that even at this preliminary stage there are some aspects which need to be clarified for more detailed further studies. The fact that experts have been excluded from current studies leads us to seek the reasons why this is the case and which may be due to the characteristics of user typology. It might be that experts are assumed to have extensive knowledge about their subject matter and mostly have been considered as informants; consequently, there was less concern about their information needs.

The main aim of this study is to draw a general profile of experts as dictionary users and gather information about their usage habits. However, to reach this point we need to review the types of users as discussed in the functional theory of lexicography that helps us also to recognise the use situations in which experts as dictionary users are involved.

2 Terminography vs. LSP Lexicography

Since the differences between terminography and LSP lexicography (specialised lexicography) have always been the most disputed and controversial topic amongst linguists, first we start from this point to provide a basic consensus about these terms which are used frequently in research about lexicography.

Interest in specialised lexicography as a domain of study was practically started in 1992-1993 by Cabré who mapped out the lines of terminography as part of terminology studies. Later, around 1995 Bergenholtz and Tarp also began to develop the theories of lexicography in terms of specialised dictionaries by introducing a lexicographical approach to the study of terminology, namely LSP lexicography. The literature on the subject (broadly about lexicography) shows two main approaches to the study of dictionaries: functional[2] and communicative[3]. In the functional approach, based on the functional theory of lexicography, dictionaries are studied as the objects of lexicography which should meet the needs of target users, including

specialised and general dictionaries. In the communicative approach, based on the communicative theory of terminology, terminography is defined as one of the terminology applications in which specialised dictionaries are final products of the process of terminology. These two approaches have been a subject of debate between lexicographers and terminographers for many years. Although considerable efforts have been made to define LSP lexicography and terminography, the borders are still blurred. Issues about whether terminography is a part of lexicography or whether terminographers should or should not follow the theoretical bases of lexicography still exist in much recent research. We consider this is due to ambiguities which have emerged from the comparison between *lexicography* and *terminography*.

Research by Bergenholtz and Tarp over the last decade and the modern functional theory of lexicography proposed by them have changed the traditional view of dictionaries, in which a dictionary has gone from being a reference work (including a list of words and explanations of meanings in one or more than one language) to become the object of lexicography, focusing on functions and the genuine purpose of dictionaries (Bergenholtz & Tarp, 2002). Bergenholtz and Nielsen introduced LSP lexicography as a branch of lexicography which would be synonymous with terminography in terms of concerning the specific needs of potential user groups in specific types of situation. They argue that although LSP lexicography and terminography follow different methodologies, their final object is specialised dictionaries (Bergenholtz, 2003; Bergenholtz & Nielsen, 2006). However, they state that LSP lexicography with its functional theory of lexicography does not perceive specialised dictionaries merely as "utility products", and differentiate terminography from LSP lexicography in their fundamental aspects and believe that "terminography could benefit from this part of lexicography and should draw the necessary conclusions in general and in connection with specific projects" (Bergenholtz & Nielsen, 2006: 282, 283).

It is worth noting that Cabré defines terminography as a part of terminology which deals with specialised dictionaries as its final product based on the communicative theory of terminology (Cabré, 1999a). In other words, terminography in each stage of the procedure of producing dictionaries involves communicative interactions between terminographers and end users considering their needs and use situations, rather than having a concrete and abstract view. Cabré defines terminography as an "ongoing process", focusing on standardisation and harmonising the concepts in their specific conceptual structures rather than collecting terms. According to Cabré, terminology for direct users is defined in their need to communicate terminological units as clear and unambiguous denominated items and thus deals with "conceptualising subject matters". Hence terminography involves compiling, arranging and collecting related data for these specialised units in order to follow specific purposes (1999a).

It seems that debates between lexicographers and terminographers are due to different perspectives, though they talk about a single object when discussing a "specialised dictionary". The idea is not that terminographers should follow the fundamental aspects, nor the methodology, of the functional theory of lexicography. We believe that terminography and LSP lexicography are the same in theory and practice. In this regard, below is a brief study about "users" and "use situations" from the LSP lexicography and terminography points of view, defending this idea that there is no gap between LSP lexicography and terminography.

3 Functional Theory of Lexicography

3.1 Types of Users and Use Situations

Talking about lexicographical or terminographical resources is not possible unless we specify types of user and use situations. As Bergenholtz and Tarp point out, users' needs are related to types of use situations; therefore, the main requirements of users are related to those specific situations in which they need to consult a dictionary (2010:30). Target users' needs not only affect the information content given by dictionaries but also the transmission forms and media. Users can generally be categorised into three groups due to their level of knowledge and efficiency of either specialised or linguistic proficiency. According to Nielsen (1990:131) and Bergenholtz and Kauffman (1997: 98-99), these three groups are experts, semi-experts, and laypeople/non-experts who can be defined in terms of the level of their current knowledge and thus the level of needed knowledge:

1. Non-experts: potential dictionary users who have no knowledge about the basic theories of a specific field of study which corresponds with general understanding by the part of the population that has been through higher education;
2. Semi-experts: a heterogeneous group, but compared to non-experts with a higher level of knowledge about a specific field such as experts from other related subject fields, translators, journalists in scientific fields, etc.;
3. Experts: users with the highest level of knowledge who have no reception problem within their own fields.

There is also another classification by types of user by Sager (1990: 197-199) based on the types of information users retrieve from term banks: a) subject specialists; b) professional communication intermediaries such as technical writers, translators and interpreters; c) specialist lexicographers and terminologists; d) information and documentation specialists; e) lan-

guage planners; f) professional language users such as publishers, language teachers, applied linguists; and g) general users of the language.

These classifications essentially entail different forms and contents for specialised dictionaries due to their competences. However, these types of user are not very solid but rather give us a general and typical view about potential users for drawing out their appropriate profiles. "The purpose of a user profile is to identify the major characteristics and lexicographic needs of the intended users, taking into account their factual and linguistic competences in an international context" (Nielsen, 2006).

According to the functional theory of lexicography, users consult dictionaries in two different use situations: cognitive[4] and communicative[5] situations. These situations identify the real needs of users considering their level of knowledge, and consequently they define the functions of dictionaries and help lexicographers to decide what types of information should be included in dictionaries.

In *La terminología: Representación y comunicación* (1999b) Cabré avers that specialised communication has three different elements which are:

a) Theme or subject, which refers to the subject matter or specialised fields of study;
b) Users or communicators with different levels of knowledge: 1. Producers (i.e. experts and professionals); 2. Receivers in an interactive relation with producers; 3. The public in general who are passively involved in specialised communications corresponding to "laypeople";
c) Situations in which these communications happen, corresponding to situations of use.

This could be considered as the main idea of communicative theory in which Cabré also develops her idea to differentiate the functions of terminology, which are a) representing and b) transferring specialised knowledge, and specialised dictionaries are one of the materials used in these processes. In this regard, analysing the situations of use or characteristics of users or the subject matter is necessary and inevitable. Figure 1 shows the structural view of terminography and LSP lexicography by types of user:

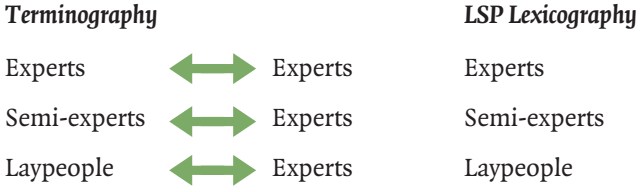

FIGURE 1. Structural view of end-user classification in terminography vs. LSP lexicography

To sum up, terminography focuses on interactive use situations in which experts as the producers of the specialised knowledge are always the main part of a discursive circumstance that leads terminographers to consult with professionals at all stages of terminological works.

3.2 Dictionary Functions

The primary lexicographic decisions in constructing a dictionary are based firstly on determining its functions, and secondly on the basic needs of its potential users; however, specialised dictionaries are often aimed at one or more functions. Bergenholtz and Nielson generally consider two different functions of LSP lexicography corresponding to use situations (Bergenholtz & Nielsen, 2006):

1. *Cognition-oriented function* which deals with the acquisition of information and deriving and verifying the knowledge of users:
   a) To provide general cultural and encyclopaedic information to users;
   b) To provide special information about the subject field to users; and
   c) To provide information about the language to users.
2. *Communication-oriented function* which deals with problem-solving information:
   a) To assist users in solving problems related to text reception in the native language;
   b) To assist users in solving problems related to production of texts in the native language;
   c) To assist users in solving problems related to text reception in a foreign language;
   d) To assist users in solving problems related to production of texts in a foreign language;
   e) To assist users in solving problems related to translation of texts from the native language into a foreign language; and
   f) To assist users in solving problems related to translation of texts from a foreign language into the native language.

3.3 Experts and Dictionaries

In our case, as far as experts are concerned we can conclude that experts due to their knowledge and proficiency are more likely to be involved in communicative situations and the most suitable function a dictionary can provide would be the communication-oriented function. Figure 2 summarises the status of experts in the specialised lexicography studies according to the typologies discussed above.

As a result, the most probable types of information that experts consult will not be too different to other groups but the content is. In other words, like the other users of a dictionary they may require linguistic, semantic and pragmatic information but the level of specialisation will differ.

In our study we firstly try to find out if experts also demand these requirements or if, on the contrary, they

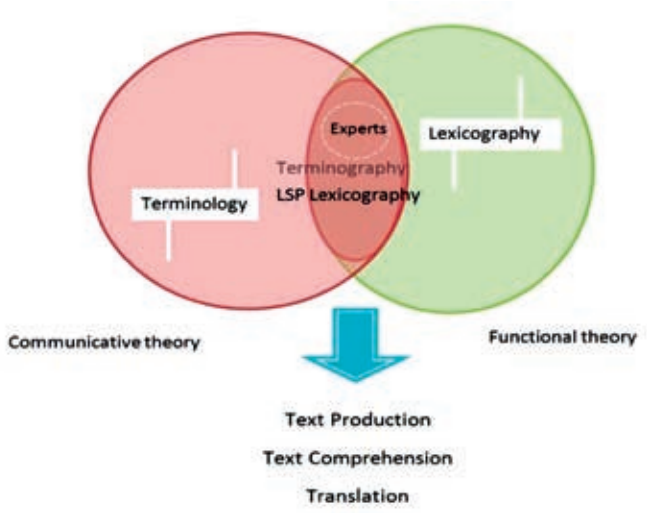

FIGURE 2. Experts and specialised lexicography

need some different data. Secondly, we seek to learn which problems and difficulties they find when they consult available resources. As regards these probabilities, we conducted evaluation experiments where experts were asked to complete a questionnaire involving either selecting the most needed information related to their professional tasks or rating existing specialised dictionaries.

4 The Survey: Description and Results

4.1 Designing a Questionnaire

Lexicographical surveys always start from a study about potential users, what is called profiling, in order to elicit data about their needs and expectations and to find out which information they do not require. To that end we drew up a questionnaire to gather information about experts as the users of specialised dictionaries and their perception of their usefulness and usability in general. Our purpose was to elicit general information about:

- Pattern of use of specialised dictionary by experts;
- The usefulness of specialised dictionaries in communication-oriented situations;
- Experts' attitude towards different formats of reference books;
- Evaluation of existing specialised dictionaries from the experts' point of view;
- Possibilities of improving specialised dictionaries aimed at experts for the future.

To extract reliable data and obtain optimal feedback from any type of user group, we needed to design an adequate psychometric criterion followed by well-structured evaluation instruments as otherwise the results would be wrong or misleading (Cook & Beckman, 2006). In order to achieve the most reliable data via the questionnaire, we organised our questions based on the main ideas about "characteristics of the user group and types of use situations" developed by Cabré (1999a, 1999b), Bergenholtz and Nielsen (2006), Bergenholtz and Tarp (2003), Nielsen and Mourier (2005), Welker (2010) and Bergenholtz and Gouws (2010). In addition we modified our questionnaire by considering and comparing with previous studies about dictionary users and their expectations which have been widely carried out in the fields of translation and specialised language learning. Questionnaire content is specified in Figure 3.

Background data:
- Personal information (gender, age)
- Academic information (course, language combination)

Pattern of use:
- Types of dictionaries
- Frequency of use
- Reasons for using a dictionary
- Use situations and appropriate types of dictionaries
- Reasons for looking up terms

Formats:
- Format preference (printed dictionaries, dictionaries on CD-ROM and online dictionaries)

Evaluation:
- Adequacy of existing dictionaries
- Main problems in finding optimal information
- Main cause of difficulty in information searches

FIGURE 3. Questionnaire content

4.2 Participants

The survey was addressed to all experts from different fields of studies and it was not limited to one country or specific domains. However, due to the limited time of the project accessibility reduced our participants to Iranian academics, randomly selected from different universities, and professors in the department of translation and language science at Pompeu Fabra University. Our population was 40 experts who have these characteristics in common:

1. All of them use at least one foreign language proficiently in communicative situations;
2. All of them use English frequently for communicative activities (regardless of their proficiency);
3. All of them have professional experience in communicative activities: text production, text comprehension, translation;
4. All of them use both native and foreign languages in professional activities.

Its main goal was to shed light on the experts' opinions about existing lexicographic resources and on their use of these resources and their needs while involved in communicative situations. Moreover, we aimed to obtain information about the different types

of dictionaries they used and their preferences regarding content and organisation.

4.3 Analysis of Data

The analysis of the data obtained in our survey provided valuable information related to dictionary use by experts. Below we present a brief description of some of the results we achieved.

1. *Basic information.* The first section of the questionnaire shows that all of the subjects have devoted their time largely to working with at least one more language other than their mother tongue language. The majority of them (90%) use English as their main language (second language) in their text-dependent activities.

2. *Type of dictionary and frequency of use.* In this survey we sought to find out what types of dictionary the experts use in their academic activities (Table 1) and how often they consult the most used types of dictionary (Table 2).

The results show primarily that in their academic activities the experts prefer to consult monolingual specialised dictionaries to the other types. In addition, general bilingual dictionaries at the second level are one of the most used types of dictionary. This shows that encyclopaedias which deal more with cognition-oriented information are useful for experts occasionally, since they already possess exclusive and cognitive knowledge about their fields; besides, etymological information or standardised forms are not the main problematic needs.

Types of dictionary	Number	Percentage
General bilingual dictionary	22	55
Monolingual specialised dictionary	30	75
Bilingual or multilingual specialised dictionary	2	5
Glossary	8	20
Etymological dictionaries	0	0
Encyclopaedia	14	35
Normative dictionary	10	25

TABLE 1. Most used types of dictionary

Frequency	Monolingual specialised dictionaries	General bilingual dictionaries
Every day	5%	15%
Twice/three times a week	50%	40%
Once a week	25%	20%
Less than once a week	20%	25%
Total	100%	100%

TABLE 2. Frequency of use

Furthermore, bilingual and multilingual specialised dictionaries, compared to monolingual dictionaries, are used not only very rarely but also less than the other types of reference resources. It means that the majority of specialised dictionaries that are solely aimed at experts should be designed for monolingual functions.

Besides, the frequency of use of general and monolingual specialised dictionaries is more or less the same. Although for analysing these data we need to have more information about their general language proficiency, overall the experts use both types of dictionaries in their regular academic activities with a similar pattern. What we can see from this result is that experts need linguistic information alongside specialised knowledge, although estimating the level of inquiry is a complicated issue and, of course, depends as well upon the characteristics of L1[6] and L2[7]. Thus to gain clearer conclusions we need to focus on particular cases, and having a general idea about all experts is impossible.

3. *Aim of use.* We subjected the aim of use to a list of text-dependent options including regular communicative activities in which the experts are presumed to be involved (Bergenholtz & Kaufmann, 1997; Bergenholtz & Nielsen, 2006). Based on their main involvements, the experts were expected to choose types of dictionaries which they use in their activities. Thus if they had not been involved in any activity they were asked to leave the question out, while in the case of being involved they were also free to choose "none of them" if they considered these types are not appropriate.

Generally, all the experts deal with text comprehension either in their mother tongue language or in a foreign language. Besides, according to our survey the experts are more involved in text production rather than translation (Table 3). This should be considered when designing a dictionary aimed at experts, since it will be helpful for lexicographers in evaluating and prioritising the lexicographical information given by dictionaries.

Communication-oriented situations	Measure of involvement
Text reception	100%
Text production	85%
Translation	25%

TABLE 3. Communicative involvement

In the light of the above, Table 4 shows the results of using different types of dictionary by the experts according to use situations and regardless of frequency of use.

Types of dictionary	Text production	Text comprehension	Translation
Monolingual specialised dictionary	50%	40%	5%
Bilingual or multilingual specialised dictionary	2.5%	—	2.5%
Glossary	10%	10%	—
Encyclopaedia	5%	15%	—
General dictionary	50%	40%	25%
Normative dictionary	15%	—	10%
None of them	15%	30%	—

TABLE 4. Use situation and appropriateness of types of dictionary

The results illustrate the most appropriate types of dictionary in each situation. Although the experts employ various types of dictionaries to meet their needs, in text production and text comprehension they mainly rely on specialised and general dictionaries, while in translation the most used type is general dictionaries. The number that use none of these types of dictionary in text comprehension is remarkable, since it shows that 30% of the experts never use any type of dictionary in understanding technical texts. Although the reasons can be different and subject-dependent in some cases, the experts mentioned partly that they prefer to consult academic papers and handbooks rather than a specific type of dictionary. However, they still trust existing specialised and general dictionaries.

4. *Types of needed information:* The experts were also asked about the types of information they look up in different communicative situations, whether in specialised dictionaries or other resources. We offered several options which the experts had to rank in terms of priority. Table (5) shows that the experts use dictionaries and other information resources mostly to look for definitions (93.3%) and lexical relations (90%), followed by other types of information at a secondary level yet with many of them still ranked more than the average.

Types of information	%
Definition	93.3
Domain tag	66.6
Grammatical information	58.3
Visual information/Illustration	60
Collocations	41.6
Lexical relations (synonyms, antonyms, etc.)	90
Standardised forms	56.6
Examples of real context	41.6

TABLE 5. Most needed information

5. *Format preference.* We wanted to know also which formats of dictionary the experts prefer (printed, electronic or online dictionaries). A majority of them prefer to use e-dictionaries and online formats (75%) and a minority of them prefer to use both types (25%).

Furthermore, the experts were asked about whether they prefer one single integrated dictionary or they feel comfortable with searching amongst different types of dictionaries to obtain the needed information. We classified the results by their comments about the adequacy of dictionaries (Table 6). Interestingly, those experts who felt satisfied by existing dictionaries prefer to use different types of dictionaries, while the majority of the other half prefer to use one integrated dictionary instead of looking up many types and taking up a lot of time (Table 7). This shows that alongside the other factors which are involved in measuring the level of adequacy, *accessibility* is also one of the crucial factors for those who need some evolution in the new generation of dictionaries.

Answers	Number	%
Adequate	20	50
Inadequate	20	50
Total	40	100

TABLE 6. Adequacy of existing specialised dictionaries

Adequacy of existing dictionary	Integration	Number	%
Yes	One integrated dictionary	—	—
	More than one dictionary	20	100
No	One integrated dictionary	14	70
	More than one dictionary	6	30

TABLE 7. Dictionary integration

Accessibility and the overall design of dictionaries has been one of the most discussed topics in recent years. Having quick access to any type of information is the characteristic of the "information society", though finding related information in existing resources due to the user's needs is mostly time-consuming and causes more ambiguities (Bergenholtz & Gouws, 2010: 104). Dictionaries as assistance for solving the problems are themselves affected by this characteristic of the "information society".

It is worth noting that there is no consensus among the experts about the adequacy of existing specialised dictionaries. Surprisingly, exactly half of them believe that specialised dictionaries are satisfactory and the other half believes that existing types cannot meet their needs (Table 6). Nevertheless, when the experts were asked about the quality of existing dictionaries some of them even pointed out that there is no specialised dictionary in their fields of study (particularly in interdisciplinary domains and sub-fields) and consequently the inadequacy of existing types in some cases refers to quantity and not specifically quality.

6. *Difficulties of use.* Our questionnaire also explored the difficulties the experts have experienced when looking up terms, either in finding related information or in finding the terms. The first problem they mentioned was that they could not find the terms they looked for (67.5%). Secondly, the experts pointed out that it is difficult to find the specific information they look for (55%). Finally, the experts believe that they find many errors in specialised dictionaries and in these cases the information given in dictionaries (including definitions or lexical relations or domain tags) is not precise and correct (47.5%).

7. *Reasons for difficulty.* Based on the comments and answers the experts gave in the evaluation section, we found the following reasons for difficulties.

- In terms of quality:
  1) Lack of neologisms
  2) Lack of optimal lexicographical information, i.e. illustrations, real context examples, grammatical information, etc
  3) Lack of precise information for terms
  4) Lack of a reliable dictionary in some fields
  5) Lack of an updated dictionary
- In terms of form and quantity:
  1) Lack of a dictionary in many interdisciplinary fields
  2) Lack of an independent technical and scientific dictionary in sub-fields
  3) Lack of an optimal number of electronic and online dictionaries

5 Discussion

Using the results of the questionnaire, we have given a description of the study we carried out with 40 experts to discover their opinions and real needs as specialised dictionary users. Our main objective was to find out the usefulness of existing specialised dictionaries for experts given that experts need and use specialised dictionaries throughout the whole process of solving problems in communicative areas with a significant proficiency in the subject matter which is different to semi-experts and laypeople. Overall, our results show that experts use dictionaries in text production and text comprehension as two predominant use situations in communicative circumstances. This seems to be different to the idea of Bergenholtz and Nielsen (2006: 297) that "experts are not likely to consult any specialised dictionary during the process of producing technical texts, but they use dictionaries for finding information in fields related to their own". Our results even show they use specialised dictionaries more when producing texts than understanding them. This might refer to a situation in which the experts use dictionaries to confirm their current knowledge and their desire to be as accurate as possible in their textual productions. This tendency will thus increase when experts are dealing with interdisciplinary fields inasmuch as they have mentioned this situation as one of the most problematic ones. In addition and on the same grounds, we can justify their need for definitions of terms in spite of their extensive knowledge, but there might be some additional reasons as well in this situation such as obtaining information about new concepts and about the usage of terms in other related fields. The latter could be perceived by their tendency to get information about "domain tags".

Interestingly, although the experts prefer to receive information about standardised forms, they are not likely to consult normative dictionaries. This paradoxical result might be due to their need to have information about standardised forms in an integrated dictionary format and not separately.

Furthermore, the preference for using monolingual dictionaries, given that the majority of these experts use English as their second language in their text-dependent activities, shows that they use specialised dictionaries differently to semi-experts and non-experts. This is because semi-experts (i.e. translators and students) and non-experts (i.e. interested laypeople) are more likely to consult bilingual dictionaries if the problematic situation refers to a language different to their mother tongue language, as shown by the results from a considerable amount of research in the field of translation and specialised language learning.

Experimental knowledge of the authors in terminological activities shows that experts may prefer to use monolingual specialised dictionaries for three different reasons:

1. They do not trust bilingual specialised dictionaries because they find inaccurate lexical relations and definitions. Many existing bilingual dictionaries are provided for students and learners of

specialised fields and hence the conceptual relations provided by these dictionaries do not meet experts' needs.
2. They prefer to use original sources since they are written by experts, whereas translated sources or bilingual dictionaries might be a non-professional translation by semi-experts with limited knowledge about technical issues in specialised domains.
3. Technical terms mostly follow international conventions, largely based on English (except for some technical terms in the arts such as music or plastic arts terminology). Thus experts have a great tendency to read and produce texts in a language other than their native language. This process leads them to rely on original monolingual dictionaries.

Finally, there are no significant results about the adequacy of existing specialised dictionaries because the experts perceive them as both adequate and inadequate in some aspects in parallel, although we did receive a number of critical comments from the experts about the lack of reliable specialised dictionaries and subfield dictionaries. In our view we need to study specialised fields specifically due to their characteristics and particular needs before making a final decision about the adequacy of reference resources in those fields. For instance, a lack of illustrations in some fields might lead to problems while in another field they might make no sense. However, the need for updated information and reliable and accurate definitions as well as using state-of-the-art technologies in constructing dictionaries could be generalised to all domains. Finally, it is worth noting that our results overlap in part with the general ideas of Martínez Motos (2011) about analysis of pharmaceutical science terminology.

6 Conclusion and Suggestions

6.1 Concluding Remarks

We have studied experts' needs and the situations in which these needs arise, as well as the information and lexicographic components they require as a result. To summarise the results, we can point out five general ideas and conclude that:

1. Experts' needs have to be considered in the process of writing dictionaries, bearing in mind that their lexicographic needs are different to semi-experts and non-experts. We need more reference resources in all scientific fields which primarily target experts.
2. Existing specialised dictionaries need to be reviewed and improved, either in their formal structure or in their information content based on experts' need.
3. Interdisciplinary fields and sub-fields crucially need special attention in terms of publishing reliable and useful resources for experts.
4. Due to the fast growth of science and technology, lexicographical resources need to be updated regularly as otherwise they will lose their validity in a short time.
5. Lexicography in its new age needs more work at its crossroads with technology, and hence it is crucial to use innovative and state-of-the-art tools to reach optimal levels of accessibility and validity in lexicography.

6.2 Recommendations for Future Studies

Specialised fields need crucial consideration in terms of their terminographical and lexicographical needs. Differentiating user types into experts, semi-experts and non-experts primarily refers to the different kinds of information they need. Thus experts as well as other groups need special attention as even if they have extensive knowledge about their subject matter, this does not mean that they do not use dictionaries in their everyday tasks. This fact leads us to focus on specialised fields and profiling specific characteristics of each field of study in order to design useful specialised dictionaries for experts in different domains.

The results of this research give us a general perspective about experts' expectations. However, designing an efficient dictionary entails specific considerations either in terms of its structures or in terms of information content due to the subject-dependent parameters. Additionally, many other factors might be involved in such research including geographical elements or nationalities or the source and target languages or even the development of scientific language in some countries (e.g. Iran). In our research, non-Iranian scholars follow the same pattern as Iranian scholars, although it might be possible to achieve a different result if we focus on a specific nationality. Considering these parameters will be fruitful for future studies in achieving the most reliable and valid results.

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Notes

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2. Modern functional theory of lexicography proposed by Bergenholtz and Tarp.
3. Communicative theory of terminology proposed by Cabré.
4. Corresponding to the cognitive-oriented function.
5. Corresponding to the communication-oriented function.
6. Native language.
7. First foreign language.