InterpretBank. Redefining computer-assisted interpreting tools

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Abstract

This paper presents InterpretBank, a computer-assisted interpreting tool developed to support conference interpreters during all phases of the interpreting process. The overall aim of the tool is to create an interpreter's workstation which allows conference interpreters to optimize the workflow before, during and after the event they are called upon to interpret. The tool takes into consideration the specific needs of conference interpreters, such as the way they prepare for a conference, the modality of terminology access, and so forth. It also exploits the latest advances in computational linguistics, especially in the field of information retrieval and text mining, making use of the abundance of information available on the Web to provide interpreters with specialized information which can be used to increase the quality of interpreter performance. The paper also introduces some theoretical principles of the use of terminology tools in interpretation and the results of initial empirical experiments conducted with this software.

1 Introduction

The use of information and communication technology (ICT) is ever-present in almost any professional, language-related activity, such as translation or copy-writing. While conference interpreting, like any other human activity, has been influenced by general advances in ICT, such has e-mail or the World Wide Web, the impact of interpreting-specific ICT solutions has been marginal. Some initial interest in the field of ICT applied to interpreting has been devoted to *setting-oriented* technologies, such as remote and telephone interpreting. Over the last few years, however, the focus of attention of practitioners and scholars seems to have moved towards *process-oriented* tools, such as terminology management, information retrieval, and so forth[1].

In the context of the latter area of interest, this paper presents InterpretBank, a computer-aided interpreting tool which supports interpreters during the various phases of an assignment, offering functionalities to prepare linguistically and extra-linguistically for a conference, manage terminological information and access the relevant terminology in the booth. The rest of the paper is organized as follows: section 2 introduces issues of linguistic and extra-linguistic needs of interpreters working on specialized conferences; section 3 presents a brief overview of computer-assisted interpreting (CAI) tools developed to date; section 4 introduces the main solutions and features proposed by InterpretBank; section 5 presents some empirical research conducted on CAI tools and on InterpretBank in particular. Finally, the conclusion summarises the topics introduced in this paper and presents some future perspectives.

2 Theoretical background: Linguistic and domain knowledge

Simultaneous interpreting, in particular at technical and scientific conferences, poses particular challenges to linguistic and domain knowledge that must be acquired prior to the assignment and that must be accessible during the interpretation itself (Thrane, 2005; Fantinuoli, 2016a). At a typical conference, interpreters are called to work for specialists who share background knowledge that is totally or partially unknown to people who are not experts in that particular field (Gile, 2009; Kucharska, 2009). As a consequence, interpreter-mediated communication

[1] See Fantinuoli (2016a) for more information on the difference between setting and process-oriented technologies in conference interpreting.

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is characterized by a *knowledge gap* between interpreters and conference participants (Will, 2009; Fantinuoli, 2016a). This gap concerns both *linguistic knowledge*, especially related to terminology, and *domain knowledge*, i.e. expertise in a specific topic, information about the speaker, the situational context, etc.

To fill this gap, interpreters are called to do preparatory work beforehand. In fact, if translators can acquire much of this knowledge while translating, interpreters need to acquire it in the time before the conference. Preparation is considered essential to cope with the numerous difficulties that may arise during interpretation and that may be the cause of errors[2] (Pöchhacker, 2000). For this reason, over recent years many scholars have focused much attention on the preparation phase, especially on the way to define, constitute and access the knowledge needed to perform well at a conference (Fantinuoli, 2006; Rütten, 2007; Will, 2009; Stoll, 2009; Díaz-Galaz et al., 2015).

In the context of highly specialized conferences, a central role, in terms of knowledge acquisition and access, is played by ontologies and term collections. They are required to create the knowledge system needed to achieve precise and shared comprehension (see Morelli and Errico, 2007). However, during the act of interpreting, the processing of specialized terminology may be a cause of saturation (section 4.4) and, together with deficiencies in the understanding of the subject, one of the main reasons for errors or imprecisions.

The knowledge system that interpreters constitute in the preparatory phase is typically recorded in multilingual glossaries (or to be more precise the terminological part is included while the domain knowledge – definitions, conceptual systems, example of usage, etc. – is generally omitted). Once in the booth, the terminological information has to be actively retrieved, with or without external support, because even if several strategies are adopted to avoid the use of terminology, such as paraphrasing, hyponyms, or even omissions, the use of precise, correct and shared terminology remains a prerequisite to achieve efficient communication and to ensure that interpreters are perceived as a competent actor in the communication setting[3].

Software developers and several scholars have suggested that CAI tools could support interpreters in better rationalising and organising the process of knowledge and terminology constitution and its deployment during the task of interpreting (see for example Rütten, 2007; Will, 2009; Stoll, 2009; Tripepi Winteringham, 2010). In the next two sections the tools developed to date will be briefly discussed (section 3) and the basic ideas of InterpetBank will be discussed (section 4).

3 An overview of computer-assisted interpreting tools

The number of software applications developed for computer-assisted interpreting is very limited. They are quite heterogeneous in terms of their architecture, scope and functionalities and reflect the ideas and habits of the respective developer, generally an interpreter himself, more than the actual needs of the interpreter community. As CAI tools are relatively new, there is still no evidence of the advantages or disadvantages of their use. Among the different software available, there is no shared view on which approach or feature can best meet interpreter requirements and expectations.

In recent years, some initial attempts at evaluating CAI tools have been made. Yet, no

[2] Stoll (2009) states, for example, that an insufficient preparation can cause an increasing cognitive load during interpretation. This leads to a poor text analysis, memory activation and text production. As a consequence, the interpreter needs to apply "repairing strategies" with negative consequences on the quality of interpretation.

[3] Surveys conducted among delegates of technical and medical conferences indicate that "correct terminology" – among other interpreter-related qualities – is considered critical for the perceived quality of interpretation services, see for example Kurz (2001).

sound methodology or golden standards have been advanced. Some initial studies propose an articulated way to asses the tools (see Costa et al., 2016), but the priorities set and the weighting schemes are somewhat questionable. So, for example, the number of possible working languages is given a elevated ranking, though it is arguable that the presence of a high number of language labels may have some influence on the software usability. Similarly, the number of exported formats is awarded elevated importance, even if the formats may only be for internal use and therefore irrelevant in terms of software usability. Somewhat surprisingly, the applied weighting scheme does not take into account the presence of a search mechanism designed to cope with the peculiarities of the interpreting process, possibly one of the most distinctive and peculiar features of CAI tools (section 4.4). A more interpreter-oriented assessing system has been proposed by Will (2015). Based on the DOT terminology model (Will, 2009), the author identifies six categories to asses CAI tools, from the presence of a simultaneous modality to the flexibility of the data viewing system. Notwithstanding, the applied weighting system seems to be somewhat arbitrary and the conclusions unmotivated.

Without sound criteria for the assessment of CAI tools at our disposal, a fairly broad categorization can be tentatively proposed on the basis of the architecture and functionality spectrum they offer. Accordingly, CAI tools can be divided into two groups: *first-generation* and *second-generation* tools. *First-generation* tools are programs designed to manage multilingual glossaries in an interpreter-friendly manner, but do not envisage any other specific supporting activity of the interpreting process, such as information retrieval, text management, etc. The list of first-generation software is comprised of Interplex, Terminus, Interpreters' Help, LookUp and DolTerm. Only Interplex[4] and Interpreters' Help[5] are actively maintained and are commercially available. They are graphical interfaces designed to store and retrieve terminological data from a database and differ from terminology management systems for terminologists and translators as they use simple entry structures and offer some form of dedicated functionality to lookup glossaries in the booth. All tools can store additional information to the terms in explicitly or implicitly dedicated fields and allow the categorization of entries through a one-tier or a multi-tier categorisation system. None of the first-generation tools implement any sort of advanced search algorithm that takes into account the time constraints of the interpreting task, such as misspelling correction, progressive search in one or more glossaries, etc.

Second-generation CAI tools address the goal of extending the limited scope of first-generation CAI software building on initial academic research and investigations on terminology and knowledge management, proposing a more holistic approach to the interpreting task. They offer advanced functionalities that go beyond basic terminology management, such as features to organise textual material, retrieve information from corpora or other resources, learn conceptualised domains, and advanced search functions. The second-generation tools developed to date are Intragloss[6] and InterpretBank[7]. Again, the two tools are very different in terms of approach and functionalities. Intragloss focuses on the preparatory phase of an assignment and presents a novel approach to glossary building, as it is based on the interaction between preparatory texts and the terminological database. Among other things, it supports creating glossaries directly from within the preparatory documents or websites by highlighting a term in the document and searching for its translation in online resources such as glossaries, databases, dictionaries, etc. As in all other tools, terminology can be organized by domain or assignment. For conference preparation, it automatically extracts all the terms from the

[4] www.fourwillows.com/interplex.html
[5] www.interpretershelp.com
[6] www.intragloss.com
[7] www.interpretbank.com

domain glossary that appear in the preparatory documents, thus directly linking the texts with the available terminology repository. As far as the glossary lookup is concerned, it offers basic functionality in line with first-generation CAI tools.

The second tool, InterpretBank, is the object of this paper and will be presented in the next section.

4 InterpretBank

InterpretBank is a software developed as part of a doctoral research project at the University of Mainz/Germersheim. The overall aim of the tool is to create an interpreter workstation which allows conference interpreters to optimize their workflow before, during and after the event they are called upon to interpret[8].

InterpretBank has a modular structure including a corpus-based preparation utility which comprises automatic text collection and terminological extraction (4.1), an editor designed to create and manage specialized glossaries (4.2), a memorization utility to support interpreters in learning conference related terms (4.3) and a dedicated conference modality to access terminology in the booth (4.4). The modules are independent pieces of software designed to cope with a particular task of the interpreting workflow. However, as a toolkit they interact seamlessly with each other.

In the next sections, the theoretical principles for the development of the modules and the most unique features implemented within the tool will be presented.

4.1 Collecting corpora and extracting linguistic information

Conference preparation is generally time-consuming and interpreters often experience the feeling of not knowing exactly how to perform this task efficiently. To help interpreters rationalise this activity, a computer-assisted approach based on corpus exploitation is proposed (Fantinuoli, 2006, 2011). Adapting the corpus-based approach originally developed for L2 acquisition (see for example Carter et al., 2007) and for translation tasks (see for example Zanettin, 2002), the author introduces the corpus-driven interpreter preparation (CDIP) as a means to make the process of linguistic and domain knowledge acquisition "terminology driven", i.e. from the terminology to the conceptual structure of a particular domain.

This approach attempts to solve the dichotomy between terminology-oriented preparation and domain-oriented preparation which has been described by Gile (2009):

> [...] interpreters experience very concretely the deleterious effects of insufficient familiarity with technical terms that are used in conference. Since very little time is available for advanced preparation, they generally have to choose between primarily extralinguistic preparation and primarily terminological preparation. Most of them give preference to terminology [...].

The CDIP involves the idea that corpora can be the source of a potentially endless "serendipity process" (Bernardini, 2001), as one term can lead to another, depending on the interpreters' intuition and requirements. In this approach, interpreters can "explore" the corpus starting from a list of specialized terms and learn them in real context, discovering their meaning and the way they are used by domain experts.

On more practical terms, the CDIP can be seen as an improved way to read preparatory documents as concordancers grant the possibility to read textual material in a dynamic and linguistically-motivated way. For example, the visualisation of word patterns, which is typical

[8] For a detailed overview of the interpreting phases, see for example Kalina (2007) and Will (2015).

of concordancer tools[9], can help users infer meaning and usage (in context) of a term and discover relevant collocations, in this way supporting them in extending both their passive and active linguistic knowledge.

The starting point of this kind of preparation is a list of terms and a corpus of specialized texts. The corpus-based module has been designed to automatically build specialized comparable corpora from the Web using a small set of terms, e.g. the titles of the conference speeches[10], and to extract the most important terminology and phraseology of the domain[11].

The terminology extraction algorithm extracts the relevant (monolingual) terminology using a hybrid method which combines morphosyntactic rules and statistical measures. Since the extracted terms are statistically motivated, i.e. their status as candidate terms is based on the relevance for the domain, they can be considered important for the assignment and included in the conference glossary. Once imported in the glossary editor, this list of terms can be processed to find suitable translations using the features described in section 4.2.

4.2 Creating and managing glossaries

The glossary editor is a module designed to create and manage assignment-based glossaries. Besides common database functionalities, such as data filtering, merging, etc., the tool integrates a series of features to support the user in the compilation of new glossaries, such as automatic translation, lookup in online terminology databases (e.g. the terminology database of the European Union[12]), a definition retrieval system for finding information on specialized words as well as a concordancer to integrate the preparatory documents and find examples of term use in real contexts. These functions are designed to integrate seamlessly with the first step described in section 4.1 as they allow to find translations suitable for the initial monolingual list of terms.

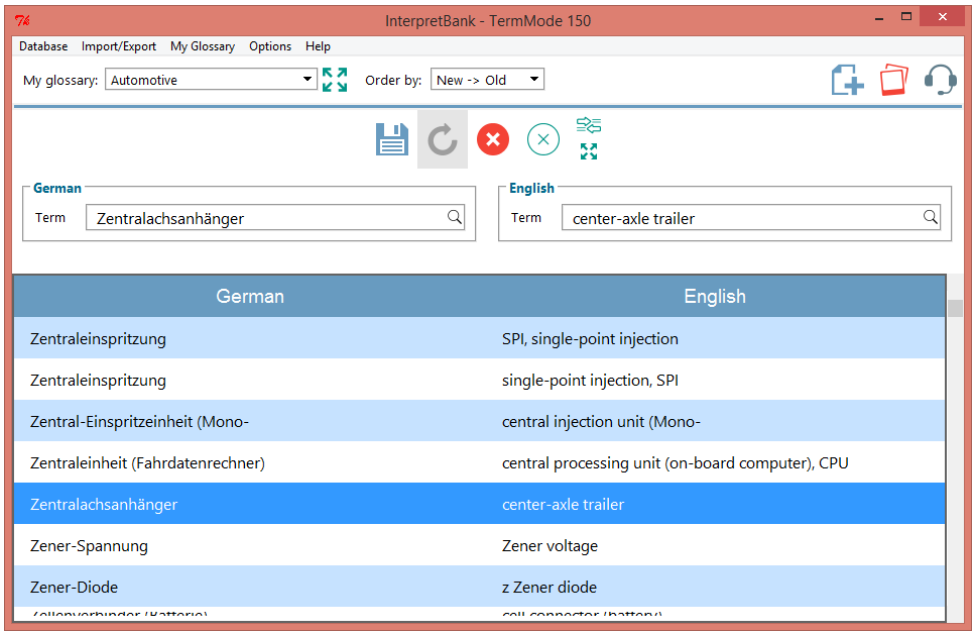

Figure 1: Glossary editor with simple visualisation mode.

According to Gile (2009), interpreters tend to add very little information to their glossaries.

[9] For a translator-oriented concordancer, see for example Fantinuoli (2016b).
[10] The corpus creation procedure is described in more detail in Fantinuoli (2012).
[11] The term extraction procedure is described in more detail in Fantinuoli (2006).
[12] www.iate.eu

For this reason the predefined data structure is simple and setup procedures can be avoided. Besides the term and its translation, it includes only a few general fields for storing extra information at concept and term levels, such as definitions, personal notes, etc. The user can choose between a simplified view, showing only terms and their translations, and an advanced view containing extra information too. In order to foster terms' re-usability, all glossaries are saved in a single database and can be categorized for disambiguation with a two-tired classification system, for example *domain+subdomain* or *conference name+domain*, etc.

The user interface differs from traditional solutions used in the language industry, as it integrates a terminological card view with a tabular treatment of data which "reflects the retention of a paper-oriented presentational view of terminological information" (Wright and Budin, 2001, p. 575). This seems to be the visualisation structure preferred by interpreters to organize their terminology.

The glossary can be accessed in memorization modality (section 4.3) or in conference modality (section 4.4).

4.3 Memorizing terminology

The peculiarities and time-constraints of simultaneous interpreting requires the ability to quickly process source text information, the terminological part, among other things. It goes without saying that in order to make simultaneous interpretation possible, terminology equivalents in the two working languages need to be at the interpreter's immediate disposal. Since it does not feasible to rely exclusively on external glossaries to lookup terminology in the booth (section 4.4), it is necessary to memorize such equivalents, at least for the most frequent technical and scientific terms. To help the interpreter achieve this goal, a memorization module (MemoryMode) has been implemented within the software. Its function is quite trivial: single glossaries can be visualized in a flash card interface which alternates the term and its translation.

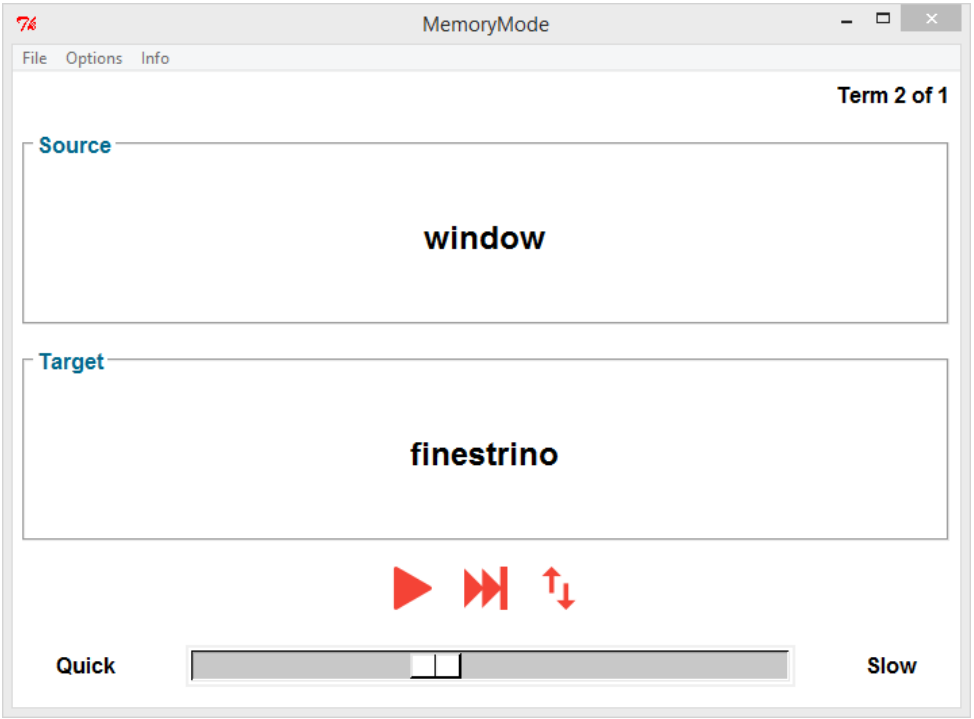

Figure 2: Memorization modality.

This system supports interpreters in visually drilling and automatizing the translation of the

conference terms. With the goal of making the tool as flexible as possible, speed, language direction and term order can be set by the users. It goes without saying that this basic way of memorizing terms is suitable only when exact equivalences for the same concepts are possible.

4.4 Accessing terminology in the booth

During simultaneous interpreting, listening to the oral text and producing the translation are time-delayed. In this time span, called *décalage*, many co-occurring processes take place, such as text analysis, activation of background knowledge, self-monitoring, etc. (see Gile, 2009). In this phase, the interpreter is also called to find translation equivalents for specialized terminology used by the speaker (section 2). All processes taking place during interpretation are interconnected and depend on the availability of sufficient cognitive processing capacity which is divided among the co-occurring processes (see Gile, 2009).

The difficulties connected with the use of specific terminology, especially if the text is terminology-dense, may result in an overall saturation or a saturation in one of the efforts. This can be the cause of errors, omissions and, in most broad terms, can determine a poorer quality of interpreter performance. In order to avoid a cognitive overload of the interpretation task, interpreters need to have at hand the right term at the right moment without interfering with the balance of the other various processes. At best, they should have "interiorized" the bilingual terminology so that it can be at their disposal with minimal effort. Yet, it is virtually impossible to memorize all terms used at a specialized conference. Furthermore, the spontaneity of most speeches makes it difficult to predict beforehand which terms will be used. Due to the above reasons, interpreters tend to learn only the terms they assume to be the most important ones, omitting less frequent or highly specialized words.

In order to cope with this shortcoming interpreters may employ terminology tools during simultaneous interpretation. Since any activity or disturbing factor that does not directly focus on the traditional "translational process" (Pöchhacker, 2009, p. 97) should be reduced to a minimum, at least three conditions should be met to allow the use of a terminology tool:

- by means of anticipating part of the cognitive load from the interpretation to the preparation, for example with the approach in section 4.1, interpreters release resources that can be used for other tasks while in the booth (Kalina, 1998; Stoll, 2009);
- the looking up activity should be selective and focused;
- the tool should be designed to minimize the cognitive load added to the interpreting process.

The last point plays a central role in the design of a CAI tool. In order to be booth-friendly, the searching mechanism needs to behave quite differently from the established terminology tools used by translators because it needs to take into account the time constraints and the complex cognitive processes governing simultaneous interpretation. In broad terms, the interface should be designed to simplify the interaction between user and machine, reducing the cognitive effort necessary to use it, speed up the search process and produce a suitable output in terms of visualisation and number of results.

Despite the lack of empirical evidence (section 5), it can be hypothesized that in order to minimize the cognitive load of the querying process, i.e. to make the tool truly booth-friendly, a search tool should achieve at least the following goals:

- have a user interface which is clear and unobtrusive
- require a short user's input

- produce pertinent results
- offer a clear visualisation of results
- not be influenced by spelling errors

Compared to traditional dictionary interfaces, for which the user has to enter the entire word or to make a choice among suggested matches, ConferenceMode is designed to accept partial words, possibly containing spelling errors, without affecting the reliability of the results. It implements two methods to start a query: the traditional method requires entering a series of characters into the search field and starting the query with the Enter key. In order to reduce the number of keyboard strokes, and consequently minimize the cognitive load, the second method performs the query progressively without the need to press the Enter key. The main idea is straightforward: every keyboard event triggers a new query. The query is run recursively with any new character until a small number of possible translations is retrieved for the user to comfortably choose from the results. At this point the search operation is concluded and the software is automatically ready for a new query.

In order to further reduce the cognitive load needed to query the database, the tool uses fuzzy search (which acts as an error correction mechanism for misspellings typed by the interpreter or saved in the glossary), stopword exclusion to reduce the number of matches displayed as well as the use of diacritic and accent-insensitive searches. This function avoids the need to repeat a query, which is not possible in the context of interpreting, if the original query has not produced the desired result because of a spelling error or the like.

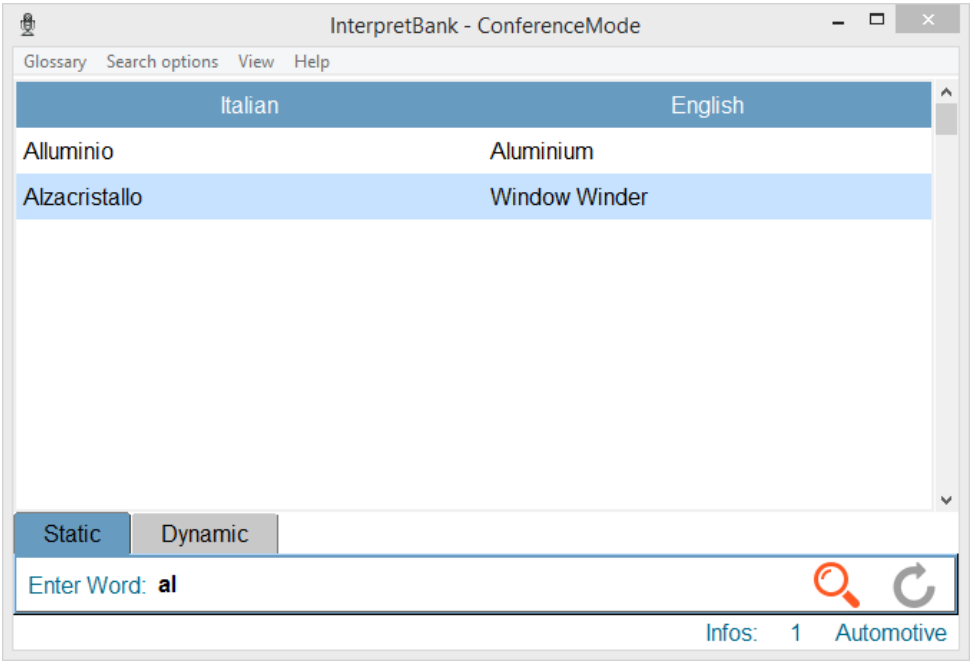

Figure 3: Conference modality.

As the interpreter at work may not have the time or the cognitive ability to detect and choose the correct translation of a specific term among the myriad of possible solutions that are generally offered by dictionaries (Donovan, 2006; Tripepi Winteringham, 2010), InterpretBank works on the basis of conference-related glossaries. In order to discriminate results according to the conference topics and their relevance for the assignment, ConferenceMode performes a query progressively in the hierarchical structure of the database. The user can set a glossary

priority in order to have one or more glossaries as the default assignment glossary. This will be the primary set of data searched by the tool, as it is considered the most relevant for the event the interpreter is called upon to interpret. If no result is produced, the module automatically extends the query to the entire database. In this way, the tool provides a means for term decontextualisation based on the domain or the conference subject, but allows for taking advantage of the entire terminological repository (which is conference or domain independent) collected by the interpreter.

Too much information can be an obstacle for the interpreting process in the booth. For this reason, the additional terminological fields which may be part of an entry (context, grammar, examples, etc.) are not shown by default, and only the terms and their translations are seen. If needed, however, the interpreter may choose to view this extra information too.

5 Empirical research

Even if the interest among practitioners seems to have increased during the last few years, CAI tools have remained fairly marginal in the growing body of interpreting studies, as confirmed by the small number and scope of publications dedicated to this topic. This is particularly true for experimental studies. However, the first papers and final theses on this topic have been published. They are particularly important as more knowledge about the use of CAI tools is needed to evaluate the tools and to pave the way to their further development.

In the context of tools dedicated to interpreter preparation, Xu (2015) experimentally investigated how the Corpus Driven Interpreter Preparation, as described in section 4.1, can improve trainee interpreters' performances. In the experiment, the tasks involved were the building of small comparable corpora as well as the use of automatic term extractors and concordance tools to discover terminological and factual information about a specific topic. The results show that the test groups consistently had better terminology performance during simultaneous interpretation, interpreting more terms correctly, having higher terminology accuracy scores and making fewer terminological omissions. This had an impact on the holistic interpreting performance scores which were higher than in the control groups.

As far as the use of InterpretBank in the booth is concerned, Gacek (2015) empirically analysed if its use improved interpreter performance in terms of terminological quality. Based on the experimental data and the participants' comments, the study shows that the use of a booth-friendly search tool is more efficient in improving the terminology rendition in terms of correctness and completeness than other more traditional solutions. Similar conclusions were drawn by Biagini (2016) who correlated the empirical findings of his experiment with the responses provided by the participants in a survey. In his empirical study, conducted with stringent scientific criteria and with the use of advanced statistical measures, the author aimed at answering the question if the use of an electronic glossary in the booth could be seen as a disturbing factor in the interpreting process or if it could provide support, even for novice interpreters. He compared the interpreting performance of a terminology-dense text of two groups of testers, the first using InterpretBank and the second a traditional glossary on paper. The results of the experiment show that all testers had a better performance when using the software. They were able to search and correctly translate a larger amount of technical terms, reducing term omissions at the same time. The author suggests that the improved terminology performance could be due to the fact that CAI tools reduce the cognitive load needed to look up terms when compared to other traditional methods.

Another area of interest for empirical research is related to the didactics of CAI tools. As some universities recognise the need to adapt their curricula to the emerging use of new technologies in interpretation, a pilot study was conducted at the University of Bologna to

understand if it is recommendable to integrate CAI tools in their curriculum (Prandi, 2015). The aim of the experimental study was to collect information on the students' approach to InterpretBank in the booth while interpreting terminology-dense texts. The experiment showed that most testers were able to conduct effective terminology searches (with an average 90% rate of terms correctly identified), even if they still were novice interpreters. The analysis of audio/video as well as keylogging data showed that the amount of experience in the use of the tool plays a key role in helping students integrate it in their workflow. As a drawback, the author stressed the tendency of some testers to rely too much on the software, with obvious negative consequences on the overall performance. The author concludes that CAI tools can be successfully integrated into the curricula of future interpreters, provided they already have ample experience in interpreting (for example at the level preceding the final exams, as the texts need to be of a rather specialised nature) and enough time to understand how to adapt their interpreting strategies to the use of the tool.

6 Conclusion

In this paper we proposed some of the ideas and motivations for the development of InterpretBank and described some of its functionalities. Our software supports professional interpreters during the linguistic and domain-oriented preparation of an assignment as well as during interpretation in the booth with the overall goal of increasing interpreter performance. Initial empirical studies have been conducted on this tool to analyse its impact on the didactics of interpreting as well as on the interpreter's performance. Though initial results seem to be encouraging, it is still premature to draw any definitive conclusions about the advantages and disadvantages of the use of similar tools. More process and product-oriented research in this area is required. ITC is advancing quickly and is opening new perspectives in the area of CAI tools. Speech recognition, for example, could represent the next step in the evolution of CAI tools. It could be used to automatically extract terminology in real-time from the interpreter's database or to show name entities, numbers and the like on the interpreter's monitor. Results from empirical experiments would not only help us to better understand the way CAI tools influence the interpreting process but also give us suggestions on how to improve the available tools.

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