Translating with the Web

Professional translators' information-seeking behaviour in translation with online resources

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Tiivistelmä

Tämän tutkielman aiheena on ammattikääntäjien tiedonhaku, kun käytettävissä on ainoastaan verkkolähteitä. Tutkimuksessa on tarkasteltu, mistä ja miten ammattikääntäjät etsivät tietoa internetistä kääntäessään lähtötekstiä englannista suomeen. Lisäksi tutkimuksen tarkoituksena on osoittaa, että tiedonhakutaidot ja lähdekriittisyys ovat käännöskompetensseja, joita tulisi sekä ylläpitää että opettaa osana kääntäjäkoulutusta.

Tutkimuksen aineisto kerättiin empiirisesti käyttämällä kolmea metodia. Käännösprosessi ja sen aikana tapahtunut tiedonhaku tallennettiin käyttäen Camtasia-näyttövideointiohjelmaa ja Translog-II -näppäilyntallennusohjelmaa. Lisäksi tutkimukseen osallistuneet kääntäjät täyttivät kaksi kyselyä, joista ensimmäinen sisälsi taustatietokysymyksiä ja toinen itse prosessiin liittyviä retrospektiivisiä kysymyksiä. Kyselyt toteutettiin Webropol-kyselytyökalulla. Aineistoa kerättiin yhteensä viidestä koetilanteesta. Tutkimuksessa tarkasteltiin lähemmin kolmen ammattikääntäjän tiedonhakutoimintoja erottelemalla käännösprosesseista ne tauot, joiden aikana kääntäjät etsivät tietoa internetistä.

Käytettyjen verkkolähteiden osalta tutkimuksessa saatiin vastaavia tuloksia kuin aiemmissakin tutkimuksissa: eniten käytettyjä olivat Google, Wikipedia sekä erilaiset verkkosanakirjat. Tässä tutkimuksessa kuitenkin paljastui, että ammattikääntäjien tiedonhaun toimintamallit vaihtelevat riippuen niin kääntäjän erikoisalasta kuin hänen tiedonhakutaitojensa tasosta. Joutuessaan työskentelemään tutun työympäristönsä ja oman erikoisalansa ulkopuolella turvautuu myös osa ammattikääntäjistä alkeellisimpiin tiedonhakutekniikoihin, joita käännöstieteen opiskelijoiden on havaittu yleisesti käyttävän. Tulokset paljastivat myös, että tiedonhaku voi viedä jopa 70 prosenttia koko käännösprosessiin kuluvasta ajasta riippuen kääntäjän aiemmasta lähtötekstin aihepiiriin liittyvästä tietopohjasta ja tiedonhaun tehokkuudesta.

Tutkimuksessa saatujen tulosten pohjalta voidaan sanoa, että myös ammattikääntäjien tulisi kehittää tiedonhakutaitojaan pitääkseen käännösprosessinsa tehokkaana. Lisäksi kääntäjien pitäisi muistaa arvioida kriittisesti käyttämiään tietolähteitä: lähdekritiikki on tarpeen erityisesti verkkolähteitä käytettäessä. Tästä syystä tiedonhakutaitoja ja lähdekriittisyyttä tulisikin opettaa ja harjoitella jo osana kääntäjäkoulutusta. Kääntäjien ei myöskään pidä jättää tiedonhakua pelkkien verkkolähteiden varaan, vaan jatkossakin käyttää hyväkseen niin painettuja tietolähteitä kuin myös henkilölähteitä.

ASIASANAT: kääntäminen, prosessintutkimus, ammattikääntäjät, tiedonhaku, verkkolähteet, internet, Camtasia, Translog-II

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1. INTRODUCTION

The act of translation, even in its most rudimentary form, requires knowledge: knowledge about the source and target language, for example the grammar and lexicon, as well as knowledge about the topic and genre of the source text, and possibly about the intended target audience. A professional translator may have all the knowledge he needs to translate simple, general texts and those that are within his scope of familiarity, but more often than not he will also require information that is not readily available as existing knowledge in his head. This creates a need for external information which can be fulfilled in several different ways, most common of which used to be consulting a dictionary. But translators' work process has changed drastically over the last three decades, at least in regard of technology. Although there still are a few translators who mostly use pen and paper as their translation tools, nowadays most translators use computers and electronic resource materials rather than paper dictionaries and encyclopaedias. Translation memories are now the norm of the industry, commissions are received via email from all over the world, and there are fewer in-house translators than ever. Thus, the skill set of a translator has had to change, too, and information-seeking (IS) skills and information technology (IT) skills have taken their place within the translator's toolbox.

In the era of Internet, translators need to be experts in finding correct information sources from the Internet, which sometimes resembles finding a needle in the haystack. They also need to be experts in syphoning the seeds from the husks, that is, choosing the reliable sources from the millions of seemingly useful hits they get after making a search engine query. Translators are the ultimate knowledge workers, dependent on information all through the translation process which takes place between a source text and the final product, the target text. Now, they also need to be experts in information seeking and literate not only in their native and working languages but also in terms of information. This study explores the information seeking behaviour of professional translators employing the Web as their only reference material resource. It aims to show where and how professionals scour the surface of the Internet, and that even professionals need to hone their skills in this respect. On the other hand, it also tries to show that translators cannot rely solely on the Internet. Furthermore, its purpose is to add its voice to the discussion on the

importance of information literacy in translation and translator training, as translation moves towards being more and more internet-orientated profession.

2. TRANSLATION, KNOWLEDGE AND INFORMATION

Translation is an action which can rarely be executed merely on existing knowledge. It may be possible to translate basic texts without using external resources such as dictionaries or other people, and even then the level of linguistic competence in both languages involved needs to be high. Thus, dictionaries and other external representations of information are used frequently in translation and cannot be ignored as integral part of it. For the most part, research on information pertains to the fields of either information and communication technologies (ICTs) or library and information sciences (LIS), but it has also been linked to translation studies for the above mentioned reason. Thus, this chapter discusses the relationships between translation, knowledge and information drawing from previous research in the fields of information sciences (later ISs), knowledge management (later KM) and translation studies (later TS) as conceptual background to the topic of this pro gradu thesis.

2.1 Translator as a knowledge expert

Information and knowledge are in the hub of translation as action, because translators simply cannot transfer meanings from one language to another without understanding the information offered in the source text and finding an acceptable correspondence of that information in the target language. As said above, this transfer process regularly requires more information than the translator already has available or acquired. For example Risku (2013: 2-4) states in her article, *Knowledge management and translation*, that it is crucial for translators to be able to recall both implicit and explicit knowledge in order to manage the act of translation. She says that "translators are dependent on their own skills, intellectual capacity and creativity, on constantly expanding their knowledge, and on the availability of technological and social knowledge resources when seeking solutions to the problems posed by specific translation." Considering this statement, it is clear why

Risku, drawing from the concepts of KM and TS, identifies translators as knowledge experts claiming that translation is knowledge work based on their shared feature of lacking standardised procedures or rules that, if followed, would ensure success. Although translators may employ translation strategies learned in translator training and have their own way of working, the flow of translation process remains dependent on the demands and requirements imposed on the translator by the source text and the specifics of the commission at hand.

As knowledge experts, translators are constantly finding as well as managing information which in turn becomes knowledge and intellectual capital. According to Risku, Dickinson & Pircher (2010: 88), translators manage their personal knowledge efficiently. The concept of knowledge management comes from the field of management research and practice, and is defined by Risku as methodical and intentional organisation and development of knowledge (Risku 2013: 1). The term *knowledge expert* can be considered as a near synonym to another term used in KM, that is, knowledge worker. It was coined by Peter Drucker in 1959 when he defined it in his book Landmarks of Tomorrow as "...the man or woman who applies productive work ideas, concepts and information rather than manual skill or brawn" (as quoted in Reinhardt et al. 2011: 158). It was created in an era when knowledge-based work was just starting to gain foothold as important part of business, but now it can be seen as the prophecy of the global information society in which we currently live. The term knowledge worker is widely used in KM and in studies such as Reinhardt et al 2011, who developed a typology of knowledge actions based on then existing literature.

Although their typology is based on people working in corporate settings such as educational, research and corporate organizations, or on software development in project settings, it can still be reviewed here as a general model on behaviour of a knowledge worker, and as common ground between KM and TS. Table 1 (next page) is adapted from Reinhardt (2011: 158) and shows the various knowledge actions and their definitions and its content clarifies why this term can be used when talking about translators. The descriptions cover quite accurately the various ways that translators as knowledge experts handle, acquire and distribute information as part of

their work. The same can also be said about the various knowledge worker roles that Reinhardt et al. (2011) describe. The typology of the roles is shown in Table 2 (next page) which is also adapted from original article (2011: 160).

ACTION	DESCRIPTION
Acquisition	Gathering of information with the goal of developing skills or project or obtaining an asset.
Analyse	Examining or thinking about something carefully, in order to understand it.
Authoring	The creation of textual and medial content using software system, for example, word processing systems/presentation software.
Co-authoring	The collaborative creation of textual and medial content using software applications, for example, word processing systems/ presentation software
Dissemination	Spreading information or information objects, often work results.
Expert Search	The retrieval of an expert to discuss and solve a specific problem.
Feedback	The assessment of a proposition or an information object.
Information organization	The personal or organizational management of information collection.
Information search	**Looking up information on a specific topic and in a specific form.** Often we search using the folder structure of a file system or we search using an information retrieval service.
Learning	**Acquiring new knowledge, skills or understanding during the execution of work or based on formalized learning material.**
Monitoring	**Keeping oneself or the organization up-to date about selected topics**, for example, based on different electronic information resources.
Networking	Interacting with other people and organizations to exchange information and develop contacts.
Service search	Retrieval of specialised web services that offer specific functions.

Table 1. Knowledge actions according to (emphasis added).

In tables 1 and 2, the sections in bold are the ones that can be directly linked to translation as a task and a profession. On this basis, it can be established that

translators are indeed knowledge experts or workers, as Risku and Risku, Dickinson and Pircher claim above.

ROLE	DESCRIPTION
Controller	monitors the organizational information based on raw information
Helper	transfer information to teach others after having solved a problem
Learner	**uses information and practices to improve personal skills and competence**
Linker	**associates and brings together information from various sources to create new information**
Networker	create personal and other connections with people in the same field to share information and help others
Organizer	are involved in personal or organizational planning of activities
Retriever	**search and collect information on a given topic**
Sharer	disseminates information inside a community
Solver	**finds or provides a solution to a problem**
Tracker	monitors and reacts on actions that may become problem

Table 2. Typology of knowledge worker roles (adapted from Reinhardt et al. 2011: 160)

2.2 Translation, technology and translation competences

The last 25 years have brought major changes in technology in general, but by far the most influential change, in terms of translation, includes the developments in information and computer technology. Terms such as computer-assisted translation (CAT) or machine translation (MT) were new and unknown to the majority of translators in the early 1990's, but nowadays they are common tools of translation. Furthermore, globalization has taken over the translation business and has changed the face of translation even more. Naturally, all these changes have a direct impact on translation as a profession as well as a process. For these reasons, some discussion is needed on what competences translators need as knowledge experts, and how the demands of the trade have changed or increased due to ICTs. In the following subsections, the concept of translation competences is discussed, first, from the

perspective of translation studies and translator training, and then from the perspective of working life.

2.2.1 Translation competences

The concept of competence has been studied and defined in multiple ways in translation studies. There are several research groups in Europe that study the acquisition or development of translation competence (TC). The PACTE[1] group has been active since 1977 and they have produced a theoretical framework of TC. More recently, two other authorities have emerged in this field: The University of Graz has since 2007 run a longitudinal study TransComp, and the European Master's in Translation (EMT) expert group has made theoretical and pedagogical contributions since 2009. Moreover, there are individual researchers who have published studies in this field, such as Birgitta Englund-Dimitrova and Anthony Pym. Here, two models and their definitions for TC are presented.

The PACTE model of competence was published first in 1998 and later modified in 2003. It divides translation competence into five sub-competences that can be seen in table 3. In this model, knowledge is mentioned in three of the sub-competences, but information in none. Instead, the sub-competence that contains ICT and information

SUB-COMPETENCE	COMPONENTS
Bilingual sub-competence	pragmatic, socio-linguistic, textual, grammatical and lexical knowledge
Extra-linguistic sub-competence	general world knowledge, domain-specific knowledge, bicultural and encyclopaedic knowledge
Knowledge about translation	knowledge on translation as a process and a profession
Instrumental sub-competence	knowledge on use of documentation resources and ICT's in translation
Strategic sub-competence	Acts as a supervisory competence; procedural knowledge on how to plan, control and execute the translation process, how to recognise and solve translation problems etc.
Psycho-physiological components	various cognitive and attitudinal components and psycho-motor mechanisms (see PACTE 2003 for more details)

Table 3: The PACTE model adapted from PACTE (2003, 3).

[1] Process in the Acquisition of Translation Competence and Evaluation

resources is labelled as instrumental sub-competence. It seems that in 2003 computers were considered as separate technical tools, and the documentation resources included mostly printed sources, other people and maybe the early versions of electronic corpora (2003, 59). The EMT group, on the other hand, defines *competence* as "combination of aptitudes, knowledge, behaviour and know-how necessary to carry out a given task under given conditions" (EMT 2009: 3). Figure 1 (below) shows the six interdependent competences the expert group have suggested for the framework. They are proposed as a minimum requirement set of competences which can be developed further by adding particular competences, such as localisation. More specific components to each sub-competence are given on pages 4-7 of the paper (see EMT 2009 in the list of references for a link to the original document).

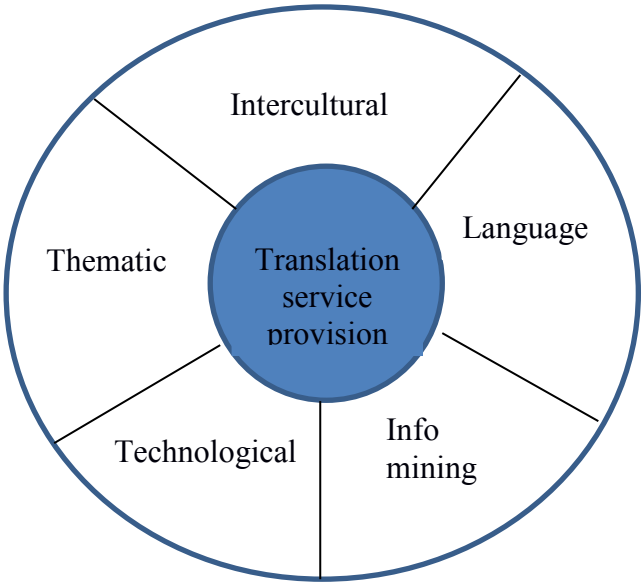

Figure 1: The EMT 2009 model of translation competences (adapted from EMT 2009: 4)

The EMT framework has been formulated based on the needs of EU and for the purpose of developing translator training throughout European universities and ensuring more uniform educational standards. Thus, it is a pedagogical and practical rather than theoretical model, whereas the PACTE model is based on empirical and experimental research. Nevertheless, the models share common elements relevant to

the present study: What the PACTE model refers to as instrumental sub-competence is essentially the same as what the EMT model describes as the info mining and technological competences. When PACTE is talking about knowing how to employ "documentation resources", the EMT group uses the term *info mining* which is derived most likely from the term data mining used in computer sciences. According to EMT, info mining comprises of the following components:

> - Knowing how to identify one's information and documentation requirements
>
> - Developing strategies for documentary and terminological research (including approaching experts)
>
> - Knowing how to extract and process relevant information for a given task (documentary, terminological, phraseological information)
>
> - Developing criteria for evaluation vis-à-vis documents accessible on the internet or any other medium, i.e. knowing how to evaluate the reliability of documentary sources (critical mind)
>
> - Knowing how to use tools and search engines effectively (e.g. terminology software, electronic corpora, electronic dictionaries)
>
> - Mastering the archiving of one's own documents. (EMT 2009: 6)

The EMT definition of info mining dissects the term into its components and shows how complex a task it is describing. For translators this is crucial as they depend on various information sources to perform their job and, thus, need to stay informed on the most current information on many fields. This means constantly up-dating their knowledge and know-how on information as well as ICT and translation tools. The EMT model is clearly more suited than the PACTE model to the current state of translation as it takes into consideration the technological changes that have happened. It is an ongoing process, because technology and thus also translation tools change all the time, and so must translators.

2.2.2 Requirements of the profession

It is not enough to formulate theoretical models on translation competence if they do not reflect reality. For this reason, Chodkiewicz (2012) studied how relevant professional and student translators perceived the competences of the EMT model in

terms of their current or future profession, and reported on her study in an article in the Journal of Specialised translation. She found that language, intercultural and info mining competences were considered as three most important competences, in this order, by both students and professionals (2012: 48). There are also a number of other studies from the perspective of translation competence, translation education and actual working life requirements (cf. Suojanen 2000 and 2008, Hänninen 2007, Laurila 2012).

Most recently this topic has been studied by Toivanen 2013 and Uppa 2014. Their findings reveal which competences are perceived as the most important in the reality of translation profession. Toivanen (2013) conducted an online questionnaire study which was aimed at experts of education and working life primarily from the field of translation. Her study focused on the experts' views on the current working life requirements and consequent competences translators need now and in the future. Her data contained the answers of 28 Finnish experts on education and work life. According to Toivanen, information seeking skills were the most pronounced aspect of translators' working life today, whereas entrepreneurial and technology skills came second and third, respectively, before language skills as fourth (Toivanen 2013: 41-42). Among the respondents in Toivanen's study, information seeking was mostly referred to as finding reference texts, whereas technology skills entailed the ability to use both technical devices and information technology. Toivanen states that although translators' trade mark expertise is staying in demand, in the future it must be supported and surrounded with more supplementary competences, such as entrepreneurial skills and technical know-how, which are not included in the core components taught in translator training (2013: abstract).

Uppa (2014), on the other hand, studied translation agencies' expectations on translators' competences, asked which of the competences were most crucial for the success of the work relationship and how they defined a good translator. Similarly to Toivanen, she adopted a practical point of view into translation as a profession, but focused on actual employers, the translation agencies, and chose interviews as her data collection method. According to her results, translation agencies also deemed technological skills to be very important, especially mastering the use of TM software. Other aspects the agencies saw as important were specialisation, language

skills, social skills and efficiency. Overall, specialising in some field was seen as the most important. (Uppa 2014: 70-72).

These studies demonstrate that competences linked to information and knowledge as well as their management are perceived as very important from the perspective of the translator's professional life. There is accumulating interest in the topic of assimilating real-life competences into the translator training in order for it to respond to the demands of the working life. For this reason, the issue of information literacy and information seeking skills as sub-competences is also relevant. The EMT model presented in section 2.2.1 already contained elements that are closely linked to these aspects, but they have also been examined in recent research.

2.2.3 New competences: Web searching and information literacy

As knowledge managers, translators need to know how to evaluate information, exploit it and use it in a creative way (Risku 2013: 5). Although many online resources are merely electronic reproductions of already existing physical information sources, not all information in the web is valid and usable for translators' purposes. This is why evaluating information found on the web critically is more important than ever. Anthony Pym, for example, claims that the emphasis in translational action has changed drastically due to the Internet and is now more on making a selection between possible options than on generating a solution to solve a translation problem (Pym 2013, 493). However, only few researchers from the field of TS have ventured into studying the effects of the Internet on translation so far. There is undoubtedly a need for more research studying the effects the Internet has on the translation process, how translators find, select and use information sources in the web and how they evaluate the content of online resources. This chapter will discuss briefly, first, the effects of the technological changes on translation and the issue of source criticism or information literacy and, secondly, the most recent research on this topic in the field of TS.

In terms of translator's skills or competences, which were discussed in section 2.2.1, Anthony Pym has recently reviewed the skills translators need now as translating has

become more and more technology-oriented due to the effects of machine translation (MT) and use of translation memories (TM). He defines skill as ´knowing how` as opposed to knowledge being ´knowing that` and identifies ten skills that translator, in his opinion, needs to learn and employ especially when dealing with MT/TM. (Pym 2013: 493). He divides them into three categories: 1) learning to learn, 2) learning to trust and mistrust data and 3) learning to revise translations as texts. In the first category he includes skills such as learning fast through use of online resources, working with colleagues in order to resolve learning problems and evaluation of the tools in use in terms of technical requirements, pricing and the actual work process with the tool in question. Pym's second category covers issues relating to the reliability of MT/TM databases as information source, as according to Pym, translators tend to favour them over other sources if TM is available. The third discusses the skills needed to deal with the effects that translation tools, such as Trados Studio, have on text segmentation during translation process in relation to revising the produced translation.

Uppa's findings on what the translation agencies consider the most important skills for translators can be directly linked to Pym's second category, as it addresses what translators need to learn if they want to fulfil the requirements set by the agencies and other commissioners who expect the translator to use TM's or MT. On many occasions now, translators are forced to use TM's and translation software, such as Trados, if they want to qualify for a translation job. Still, as Kudashev and Pasanen (2005: 75) state in their article *Kääntäjän ja tulkin tiedonhausta ja tiedonhallinnasta* (On the information searching and management of translators and interpreters), information seeking skills are only taught as a by-product of translation courses and not as individual area of the studies. According to them, this results in fragmented knowledge or know-how on information searching instead of full competence. For this reason, they argue that IS skills should be taught, as today's translators need a broader range of skills than before, which Uppa and Lahtinen also demonstrated.

3. INFORMATION AND KNOWLEDGE IN THE TRANSLATION PROCESS

In the previous chapter, the basic relationships between information and knowledge

in translation were discussed from various perspectives. The reviewed aspects were examined in order to show how complex the subject of this study is, but also to create a theoretical background for it. This chapter, on the other hand, takes a more practical point of view. Section 3.1 will discuss the various types of information translator uses. It also introduces two models on how these information sources have been categorised. In sections 3.2 and 3.3, previous research on this topic is reviewed.

3.1 Types of information and translation aids

The information that translators use when they translate can be categorised at least in two general ways: types of information and the representations of the information or external knowledge. For example, Risku, Dickinson & Pircher (2010, 89) divide the different types of information translators' need during the translation process into five categories:

1) language, linguistic and translational knowledge,

2) country and cultural knowledge,

3) general and subject matter knowledge,

4) client and business knowledge and

5) IT and computer skills.

A more detailed division of the information sources used by translators is presented as a typology of *translation aids*, which Britta Nord created in 1997 for her study on professional translators using translation aids in authentic translation situations. Here, Nord uses the term translation aids as synonym for reference tools, which are external representations of knowledge used by a translator to complement his or her internal or implicit knowledge. She summarises the study, originally written in German, in her 2009 article *In the year 1 BG (before Google)* thus granting access to it to those unable to read the original. Figure 2 (see previous page) is an adaptation of Nord's typology. Nord divides translation aids into three main categories which are

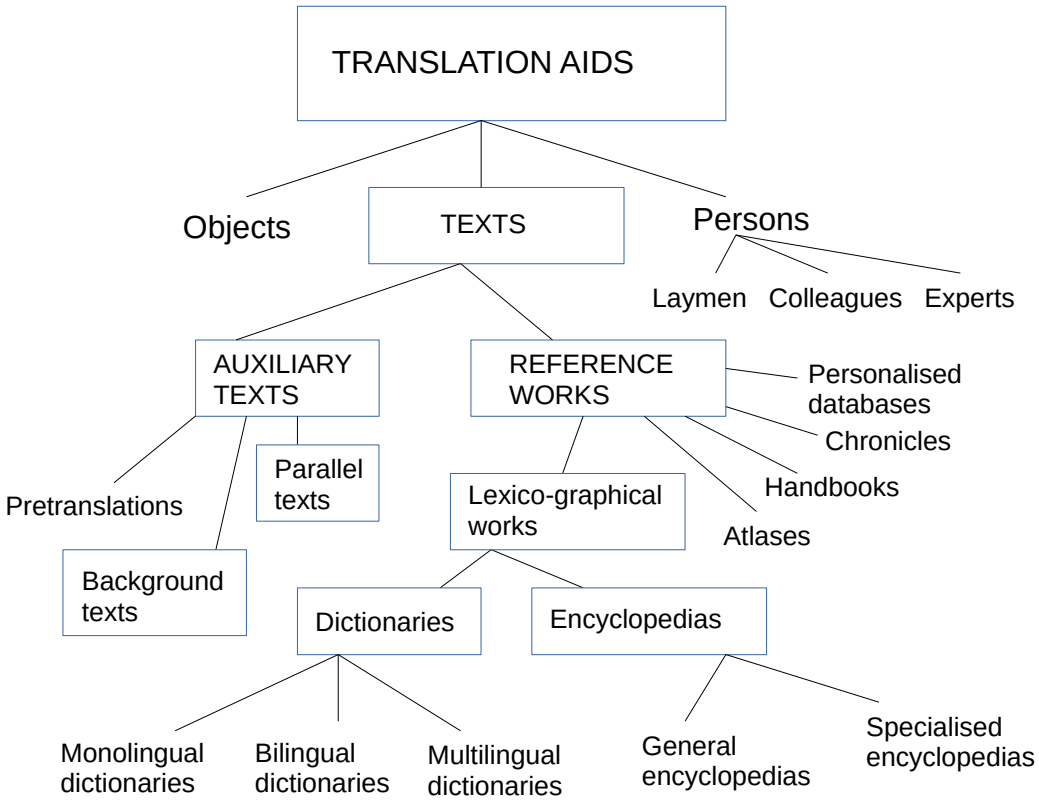

Figure 2. Nord's typology of translation aids (adapted from Nord 2009: 209).

objects, persons and texts. The elements relevant to the present study have been framed in blue.

In their article, Kudashev and Pasanen (2005: 76-77) describe a third way of categorising information sources. They name five characteristics on which the translator's information sources can be categorised: type, purpose of use, comprehensiveness, quality and topicality. Based on the type of information, Kudashev and Pasanen further divide the sources into linguistic sources, such as dictionaries, and substance or topical sources, such as encyclopaedias. Dictionaries can be further intended either for understanding texts (passive use) or for writing texts (active use). Based on the purpose of use, information sources can also be grouped as reference sources, which are used for quick searches, and full text sources, which need more time for reading. However, according to Kudashev and Pasanen, the most important characteristic of classification is the quality of the information source. Furthermore, they underline the need for critical mind when

evaluating the sources, especially in case of internet sources but also with printed information sources. Here, they point out that topicality or currency of the information is a key element on the basis of which a translator can also make an informed choice of knowingly using an outdated source if the task requires it.

3.2 Studies of reference material use in translation

Risku, Dickinson and Pircher (2010: 90) studied the five types of information listed in section 3.1 in terms of aspects which could be codified, that is, linked to specific KM tools or instruments, such as databases and publications, in case of the said aspect. In the case of general and subject matter knowledge, they found that reference materials are one of the aspects that can be codified or organised, whereas uncodifiable aspects of this type of knowledge included e.g. education in its broad sense, world experience and continuous eagerness for learning. This also means that their use can be operationalised as the incidents of usage can be observed and thus also measured. For this reason, in TS reference materials have been studied from the viewpoint of how they are used during translation.

Kudashev and Pasanen state in their article that in an ideal situation a translator would have or at least should have knowledge of all the available dictionaries in his native language as well as his working languages (2005: 77). They also point out that most of them contain outdated information by the time they come out of press. Nevertheless, most previous studies on the use of reference material in the translation process have been carried out on many occasions with the focus primarily on the use of printed materials such as dictionaries. There are multiple studies on dictionary use in the field of Translation studies (later TS) but also in Information Sciences (later IS), Library Sciences and Lexicography. In this chapter, previous research in TS and IS on the use of one or more reference material sources during translation is discussed, taking into consideration studies done on all levels of translation proficiency. First, studies on the use printed reference materials, including dictionaries, are reviewed. Then, moving closer to the topic of the present study, previous studies on the use of online resources in translation are discussed.

3.2.1 Printed sources in TS

As mentioned in the beginning of this chapter, studying information usage, retrieval and management belongs mostly to the fields of LIS and lexicography. Translators as knowledge experts have, however, caught the interest of researchers in these fields multiple times, because dictionaries have been and still are integral part of translation. As a result, the use of dictionaries has been examined from various perspectives by, for example, Sue Atkins and Krista Varantola. In their article, *Monitoring dictionary use*, Atkins and Varantola (1997) report on their findings on the dictionary use of 32 Finnish translation students. Their comparison of trained versus untrained translators in terms of their satisfaction on the success on dictionary searches indicates that trained translators are more aware of the possibility of a dictionary not providing reliable information. In addition, similarly to the studies discussed above, trained translators only accepted the information they found in one information source, in this case a mono- or bilingual dictionary, if they were able confirm it from other sources. In 2005, the dictionary use of trainee translators was also studied empirically by Maria del Sánchez Ramos. Sánchez Ramos (2005) found that the subjects of her study, first and second year translation students, were unfamiliar with electronic dictionaries. According to her, translation students need more advice on how to use dictionaries in general and, moreover, need to teach themselves to use electronic dictionaries as well as reference sources other than dictionaries.

Most of the earlier studies of this topic in the field of TS have also focused solely on the use of printed reference materials, such as dictionaries (c.f. House 2000 or Livbjerg and Mees 2003). Riitta Jääskeläinen (1989) conducted an empirical study on the role of reference material in translation using the think-aloud protocol (TAP). She compared professional and non-professional translators' use of dictionaries and other printed reference materials, including two encyclopaedias and issues of a newspaper and a scientific journal. She found that all the subjects used dictionaries as their primary reference source, but that novices used bilingual dictionaries whereas professionals used mostly monolingual dictionaries (1989: 188). Furthermore, Jääskeläinen found that professionals used the other reference materials as confirmatory reference sources, that is, they did research to confirm the

information they had found instead of relying on or trusting a single reference source (ibid.). However, it must be pointed out that Jääskeläinen chose fifth year students of translation to represent professional translators whereas the non-professionals were represented by first year translation students. Thus, her study does not, per se, describe the reference material use of professional translators in the same sense as how professional translator is defined in this pro gradu. Furthermore, the use of TAP in translation studies has been criticized. As voicing one's thoughts is not normally a part of the translation process, it has been argued that it interrupts the flow of the process and, thus, alternates it. For example, Jakobsen (2003) found that incorporating think-aloud into the process slowed down target text production regardless of the language direction or whether translators were experts or semi-professionals (2003: 79). The methodological issues are discussed further in chapter 4.

Nord, on the other hand, focused solely on professional translators in her 1997 study on use of translation aids (reported in Nord 2009). Nord observed 13 professionals as they translated texts of their own choosing with no restrictions on reference material or other aids. She then asked the translators to comment on their use of aids, recorded these comments and used the transcribed recordings as her data. Nord analysed the data on six factors: frequency, occasion and reason of usage, query, choice of aid and the effects of the use (2009: 204). Her central concept was the *usage action* which she defines as an incident of the translator using one specific translation aid with one specific aim in mind (2009: 205). Furthermore, she introduces the term *usage context*, which she defines as a chain of usage actions connected by the same incident (ibid). According to Nord, these usage contexts start when the translation process is blocked, which means that they are initiated by translation problems which require the translator to look for external support from reference materials, and end in either the translator resolving the problem with the help of the translation aid or the translator ending the usage action as unsuccessful (ibid).

Nord (2009: 210-215) reports that all subjects in her study used reference materials and interrupted their translation process approximately once in every three and half minutes, which amounts to 17 usage contexts per hour of translation. She found that

in addition to general bilingual and technical dictionaries, the reference source the professionals used the most were auxiliary texts, which include, according to Nord's typology introduced in section 3.1, pretranslations, background texts and parallel texts. In addition, Nord found that the ST, or rather its level of technicality, influences the choice of used translation aids. She reported that the professionals relied increasingly on auxiliary texts and technical dictionaries over general bilingual dictionaries and encyclopaedias whenever the ST was more technical.

Similarly to Nord, Domas White, Matteson and Abels (2008) studied 19 professional translators and how translation as a task influences their information needs and use of reference resources. They observed two focus groups, i.e. translators with short to moderate experience (0-4 years) and with medium to considerable experience (8 to over 30 years) of experience in translation work, collecting data in the form of focus group interviews, direct observation and note taking (2008: 597-580). They arranged the resources used by the subjects in order based how much they were used: 1) general dictionaries, 2) specialised dictionaries, 3) special linguistic tools, such as books on grammar or word formation, 4) annotated dictionaries, glossaries and databases of translations, and 5) journals, books, online documents etc. (2008: 587). In general, Domas White, Matteson and Abels (2008:588) found that translators appear to be task-orientated and thus use whichever resources are productive in that regard. Furthermore, they describe translators as "creative and flexible about the sources they consult" and preferring resources that are user-friendly, high in quality and that are most suited to the translation task at hand (ibid). Domas White, Matteson and Abels have created one of the few models available on the information behaviour of professional translators, which is based on empirical data rather than mere theory (see Domas White, Matteson & Abels (2008:591-592) for more information). They also discuss various problems mentioned by the subjects in regard to the use of electronic resources, but most of their notions on these aspects seem out-dated and are for that reason not discussed here.

There are also more recent studies that focus on the use and usability of online dictionaries in general (c.f. Lew 2013, Lew & de Schryver 2014 and Verlinde & Binon 2010) and that focus on translators, such as Pastor and Alcina (2010).

Nevertheless, as printed materials have been turned into or replaced by electronic resources which include a great deal more than only dictionaries, the focus in research has turned also switched to the most used electronic resource of today, the Internet.

3.3 The era of the Internet: use of online reference sources

More recent research on use of reference material in translation includes studies by e.g. Lahtinen (2013) and Kiukkonen (2006). In her pro gradu thesis *Wikipedia kääntäjäopiskelijan tiedonhankintakanavana* (Wikipedia as translation students' information source), Lahtinen (2013) focused on a more contemporary reference source, that is, the Wikipedia. She conducted a survey using a semi-structured questionnaire which she sent to translation students in the University of Tampere. Although the focus group of her study was future translators and her study belongs to the field of TS, Lahtinen adopted theoretical concepts from the field of information studies (IS), such as *information need* and *information seeking* in addition to applying a theoretical model of information seeking of professionals created in the field of IS by Leckie, Pettigrew & Sylvain (see Leckie, Pettigrew & Sylvain 1996 for more information). Lahtinen's study aimed to answer the following questions: whether translation students use Wikipedia while they translate or not, why they use it or choose not to use it, and also to find out what kind of information they usually search for in Wikipedia. Lahtinen found that translation students chose to use Wikipedia mainly because of the easy and quick accessibility it offers as information source. All but one of those who replied to Lahtinen's questionnaire said they used Wikipedia while translating, and more than two out of three reported on using it often or always. However, over 75 per cent would also use another, more reliable reference source to verify the information they found on Wikipedia.

Another study on Wikipedia was done by Alonso (2015) who reported on his findings in her article in the Journal of specialised translation. She also collected survey data online, but in contrast to Lahtinen, her survey was targeted at people who were either translators primarily or otherwise professionally linked to translation industry. Thus, almost 92 per cent of the respondents reported that they worked as a

translator or localiser, but only little over 21 per cent of them stated that translation is their sole occupation (Alonso 2015: 94).

Alonso (2015: 99-100) points out that over 83 per cent of the respondents said they used Wikipedia almost always, often or occasionally during translation, but only about five per cent of them reported never using it, which indicates that almost 9 out of 10 actually used Wikipedia to some extent as they translated. Most interestingly, they did not refer to Wikipedia only in its encyclopaedic aspect but also as a multilingual corpus or dictionary (2015: 100). In most cases, they used Wikipedia to provide them with a broad sense of the topic they were searching information on, and, in line with Lahtinen's results, cross checked with other sources (2015: 102). All in all, almost 80 per cent of the respondents in Alonso's study regarded Wikipedia as useful of very useful as a translation aid, and approximately 58 per cent considered it as very easy to use and reliable as a resource. Although her research focus was on Wikipedia, Alonso (2015: 98) reports that the respondents used a number of different online resources. Google was the most used resource, as 85.7 per cent of the subjects reported using it, closely followed by mono- and bilingual dictionaries (82.8%), whereas terminology databases were used by almost 60 % and Wikipedia by approximately 54 % of the respondents.

3.3.1 Translator in the Web

The section 3.2.1 focused only on Wikipedia as an online resource. Kiukkonen (2006), on the other hand, studied the whole World Wide Web as translation aid. In his pro gradu thesis, *WWW kääntäjän apuvälineenä* (WWW as a translator's aid), Kiukkonen examined what kind of information sources and translation tools are available to translators in WWW, and aimed to discover how and why translators use WWW as translation aid. Similarly to Lahtinen, he used a semi-structured questionnaire and adopted a theoretical background from information studies.

Kiukkonen (2006: 50-52) found that WWW was used most via search engines, of which the most used was, unsurprisingly, Google. The most common action was to check how individual words were used in context. Next two most popular actions

were checking how many times an individual word was used and consulting specialised online dictionaries. The fifth most common action was to use internet sources to verify information from another source, whereas online parallel texts were used by almost 76 per cent of the respondents putting it to 8th place. The best known WWW resources included Google, general online encyclopaedias Wikipedia and Encyclopædia Britannica, online databases Finlex and Fennica as well as various map services and online tools, such as converters and calculators.

On the basis of his findings, Kiukkonen (2006: 70) concludes that the Internet has become the single most important information source for translators, which contradicted with his hypothesis of people being the most important information source before internet sources. This implies that the use of online information sources has replaced not only the use of printed sources but also people, such as experts and colleagues. According to Kiukkonen, this change in preference is due to the diversity and up-to-date nature of information available online in addition to the fact that WWW-sources are quick and easy to use. This result is in line with the findings of Lahtinen and Alonso in terms of Wikipedia, which is one of the information sources also mentioned by Kiukkonen.

3.3.2 Translators' information-seeking behaviour

In the previous section, research on what online resources translators use and why they use them has been reviewed. These studies have not examined the ways in which translators actually perform their information seeking in the Web. Consequently, this section discusses the most recent study on how translators use the web: a multiple-case study on translator students' web searching conducted by Vanessa Enríquez Raído in 2011 for her PhD thesis. In 2014, Enríquez Raído also published a book, *Translation and web searching,* which is based on her 2011 thesis and is also referred to along with the actual study. This book has been the inspiration behind the present study, and the 2011 study has been used here as a model study in terms of methodology. In addition, a study on the influence of language on web searching performance and strategies, which was conducted in 2014 by Leena Salmi and Aline Chevalier, is regarded on the aspects that are relevant to the present study.

A study conducted by Alves and Liparini Campos in 2009 is also discussed as it shares methodical aspects with the studies of Enríquez Raído and Salmi and Chevalier as well as with the present study.

In her PhD thesis Enríquez Raído (2011: v-vi) studied the web searching behaviour by conducting two case studies. First, she conducted a pilot study where the subjects were two more experienced translators, followed by the main study where the subjects were four translation students. The task in both case studies consisted of translating a Spanish popular-science ST into English during which the subjects were asked to complete online search reports (later OSR). Enríquez Raído used a mixed-method approach of direct observation by means of a screen recorder combined with questionnaires and semi-structured interviews for the purpose of triangulating data.

She analysed the data on various aspects, such as the extent and comprehensiveness of the search activities, the amount of repeated searches, and also on how the subjects formulated and modified their queries. She analysed these aspects on three levels based on three concepts: *search term, search query* and *search session.* She defines a search session as "a temporal series of online actions" which the translator performs to satisfy one information need (2011: 363). This definition is almost identical compared to Nord's definition of usage context discussed in section 3.2.1 with the distinction that Enríquez Raído's term refers to the use of online resources rather than printed ones. According to Enríquez Raído, search query is usually defined as "a string of characters entered in a search engine" or some other information retrieval system in the Web (2011: 374). Further, she divides the search queries into *site queries* and *search engine queries,* which refer to queries made on internal search engine located on specific web site and ones that are made by using Google, respectively (2011: 378). The term search term, however, seems to be defined only as a linear sequence of characters (i.e. words) entered into an information retrieval system, which is basically the same definition as given above for search query. Thus, it can be concluded that a query is formed by one or more terms or words which are entered into, for example, Google's search box together before the search is executed.

Enríquez Raído's main result is that the selection of online reference sources is affected by the subject's proficiency level in translation as well as the degree of complexity of the translation task (2011: vi). She reports that the translation students range of online resources was limited by their shortcomings in knowledge and training regarding online translation resources, whereas the more professional subjects were able to employ a variety of information sources (Enríquez Raído 2014: 173). She also reports that previous knowledge on the topic of the ST resulted in fewer instances of ISB and a lower amount of specialised queries (2011: vi). She also concluded that a lower level of expertise in web searching as well as translation was linked to the use of more basic and random content in web searches and less developed modifications of search queries (ibid.).

Enríquez Raído only observed two subjects with professional or semi-professional level of expertise in translation, whereas Alves and Liparini Campos (2009: 197-200) focused on 12 professional translators. They studied what types of external support the professionals used during the translation task and how their use of these resources was affected when a translation memory system or a time limit was introduced. They used eight ST's taken from technical manuals, which the professionals then translated in four different experimental settings, either with or without time pressure or TMS. The translations were done from either English or German to Brazilian Portuguese. Alves and Liparini Campos used Translog to record the translations which did not include the use of TMS, whereas Camtasia was used to record the translations in which TMS was used. In addition, they used direct observation during the tasks and retrospective protocols directly after them, which involved the subject watching the Translog or Camtasia recording made of their translation process. In addition to the retrospection, Alves and Liparini Campos used these recordings with the data they collected into observation charts during direct observation and the retrospection data to classify pauses that occurred during the translations. On the basis of this triangulation, they divided the pauses into eight subtypes (see Alves and Liparini Campos 2009: 199 for details) depending on the type of the used support (internal or external) as well as if the support used affected how the translator resolved the translation problem that prompted the need for support or not.

Alves and Liparini Campos (2009: 203) found that professional translators depend primarily on their pre-existing knowledge before using external information sources when they solved translation problems. According to their findings, in the drafting phase, the professionals used external support mainly for either dictionary consultations or web searches in order to find an equivalent for a particular term. When TMS was used, the most used support shifted from parallel texts and dictionaries to a concordance tool within the TMS. However, the other sources were used to evaluate and either dismiss or approve the TM suggestions. In contrast, when the professionals moved into the revision phase of the translation process, they used internal support and the target text to solve the rest of the translation problems rather than a external support.

Salmi and Chevalier (2014), on the other hand, examined how change in the language used in web searching affected students' information searching strategies. As the Finnish subjects of their study, who represented non-native French speakers, were translation students from the University of Turku, the results are reviewed here. However, in this study, the participants were not performing a translation task but were given a series of questions to which they had to find correct answers by means of the Web, which could be seen as sub-tasks in terms of information searching that takes place during translation. Salmi and Chevalier found that when the Finnish students had to use Finnish to search information on questions presented to them in French, they either added general keywords (i.e. glossary, dictionary or wikipedia) referring to resources or searched for information in another language, most often in English (2014:3). Their results showed that the choice of language used in the searches affected the task complexity as on some topics information was not as readily available in Finnish as it was in French. Furthermore, Salmi and Chevalier conclude that when using languages other than the dominant web language English for web searches, it is necessary to use multiple languages, in this case also English. In addition to this, Salmi and Chevalier found that it took more time and more queries for the students to find the needed information in Finnish than in French.

These results are relevant to all web users whose native language is considered a minority language within the Internet. According to 2013 statistics on internet

languages, English was the number one language with over 800 million users, followed by Chinese with approximately 650 million users. Spanish was the third most used language with about 220 million users, whereas French was ninth with slightly under 80 million users. In contrast, all the rest of the languages covered over 440 million Internet users and over 2.3 billion people, whereas English Internet users represented only approximately 1.4 billion people (online source: www.internetworldstats.com/stats7.htm). These minority languages within the Internet also include Finnish, which would imply that information searching done in Finnish can result in general problems similar to those indicated by Salmi and Chevalier (2014).

4. THE PRESENT STUDY

In Finland, translators' information-seeking behaviour (ISB) has been researched mainly as survey studies (see e.g. Kiukkonen 2005, Lahtinen 2013) or as TAP research. This study focuses on how professional translators use the web during translation process from a process-oriented point of view. There are a few active research projects on this topic, such as the TransComp project in the University of Graz, as well as possible continuation of the work by Salmi and Chevalier (2014) with emphasis or sub-focus on professional translators and ISB, which should provide interesting results. However, currently there is a shortage of empirical research on professional translators regarding their use of web resources.

This present study is based on the most recent study published on the topic in question: Vanessa Enríquez Raído's PhD thesis published in 2011, which is presented as a revised version in her book, *Translation and Web searching*, published 2014, both discussed in section 3.3.2. However, the present study does not aim to replicate the large-scale study conducted and reported by Enríquez Raído, but attempts to adopt those aspects which can be replicated in a small-scale study, such as a pro gradu thesis. It aims to serve the purpose of being an experimental study on the topic, when one of the languages involved in the translation process is considered to be a minority language among the Internet and global languages – that is, Finnish.

Enríquez Raído herself suggested this point of view for future research in the summary section of her book (2014: 186). Furthermore, this study aims to fill a gap in the process-oriented research on the topic of professional translators' web searching behaviour. Lastly, it also aims to discuss the importance of information-seeking skills as translation competence that should be learned and practised, and thus also taught.

The following sections are constructed as follows: Section 4.1 discusses the methods used in data collection and 4.2 introduces the translators who participated in the experiment. In section 4.3 the research design of the present study is discussed with some comparative comments regarding those aspects that differ from Enríquez Raído's study. Then, in section 4.4, examples of the data are given and the analysis methods are explained. Lastly, section 4.5 presents the research questions that this study aims to answer before moving into chapter 6 and to the actual analysis.

4.1 Data collection methods

In this study, a methodology of triangulation has been chosen as it was used by Enriquez Raído (2011) and because it has been shown by other studies to provide a more comprehensive picture of a phenomenon, especially in process-oriented studies. Three different methods were used in the present study to gather data before, during and after the actual translation session. First, the two main data collection tools are introduced, and then the questionnaires used in this study as complementary data collection tool are discussed.

4.1.1 Translog-II and Camtasia

In the present study, the two main data collection methods used were a keystroke logger called Translog-II and a screen recorder called Camtasia. Both of them are computer-based data collection tools that have been used in TPR but usually on their own rather than together.

Translog is a computer program which was specifically designed for translation process research (TPR) by Arnt Lykke Jakobsen in 1995. In simple terms, it records the keystrokes on the keyboard during text production on a computer. It was originally developed by Jakobsen, because he felt that TPR needed a tool with which quantitative data can be gathered in support of the qualitative data produced by the then existing and used methods, such as TAP's, retrospective interviews and direct observation. The first results on its usefulness as data collection tool were reported by Jakobsen in 1999 (see Hansen 1999). Over the last 16 years, Translog has been used in multitude of translation studies on various topics. In their article, *Ten years of Translog*, Schou, Dragsted and Carl (2009) state that Translog has been used around the world for research as well as translator training and other pedagogical purposes, although it is by far mostly used in translation process research (2009: 38-39). A summary on research carried out with Translog up to 2009 is provided in this article, but no up-to-date listing was found. However, the Center for Research and Innovation in Translation and Translation Technology (CRITT) has created a database that contains recordings of translation sessions collected for the purposes of translation process research including data collected with Translog-II. On their web page, a list of most recent and to-be-published works on TPR is given along with access to over 500 hours of raw data as well as post-processed data in form of the CRITT Translation Process Database (TPR-DB).

The strength of Translog as a data collection tool is that it is less invasive compared to direct observation and does not affect or change the translation process in the same way as using the TAP method. Furthermore, it produces a record of not only the translated text but also the process which takes place between the ST and TT. The recording allows a researcher to observe the translation process in more detail than is possible by mere examination of its textual representations i.e. the source and target text. Jakobsen's ultimate goal in developing Translog was to operationalise the cognitive features of the translation process based on the procedural data of logged keystrokes as well as pauses ensuing between them and, as already stated above, to produce additional, more empirical and objective data in support of the data collected with other methods.

Since it was first launched, Translog has been developed into several versions, the latest being Translog-II which is capable of recording both keyboard and mouse activity, includes an eye-tracking function and also allows the recording of audio as well as video. In the present study, this latest version of the software, Translog-II, was used although only the first two functions mentioned above were used. It was downloaded from the CRITT website at bridge.cbs.dk, where the program is freely distributed for academic purposes together with manuals and video tutorials.

The program consists of two components: Translog-II Supervisor and Translog-II User (later TL2U). The first is used to create, modify, replay and analyse a project, and the second acted as the actual test environment accessed by the subjects, which also logs the keystrokes and temporal aspects of the process. TL2U can only be activated after a project has been created in the supervisor mode. Then, using the 'Open project' command, the chosen project file is activated, which in turn opens a pop-up control window. In this window the experiment can be initiated by the subject clicking 'Start logging', which elicits the actual test environment window. This is a split window with the ST shown in the upper part and a blank space in the lower part of the window, on which the translation is written the same way one would on a word processor. Some functions, such as copy paste, can be either allowed or deactivated depending on the preferences of the researcher.

Every action taking place when the TL2U window is active is recorded by the program and collected into a log file which then can be reviewed and analysed. If another window is activated, the recording continues and the inactivity of the TL2U window exhibits itself as a pause lasting until the TL2U window is reactivated. The experiment is concluded by clicking 'Stop logging' at the top of the TL2U window, after which the produced log file can be saved. Translog files are a special type of data and can only be replayed using the Translog-II Supervisor component. For this reason, the Translog data files produced by the experiment, one file per translator, were saved on the same computer where the program was installed. Furthermore, the need for transferring the data from one computer to another was eliminated which, in turn, reduced the risk of data being corrupted or lost.

The other computer program used in this study, Camtasia, is a screen capture and recording software developed by TechSmith Corporation. It is a licensed product and thus must be purchased from TechSmith, as was done for this research. There are also other similar products available, such as CamStudio which is freeware, but Camtasia was chosen due to the fact that it has been reported to be compatible with Translog (Jakobsen 2006: 103). Furthermore, Enríquez Raído deemed it to be "an excellent research instrument" in her own study, which implicates it as obvious choice for the present study as well. The main advantage of this software is that it runs unobtrusively in the background without affecting the translation task.

Camtasia can be used to record all movements and actions on the screen of a computer, and then to edit and produce videos of high-definition quality in e.g. MP3 and MP4 formats. It also allows you to share the produced videos. The videos were saved on the test computer for the reasons mentioned above regarding the Translog-II dataset. The raw video material was later cropped down using Camtasia's editing functions to include only the translation process starting from when the translator clicked 'Start logging' up to the moment they clicked 'Stop logging'. Then the videos were converted into MP4 files which can be viewed without using the actual Camtasia software. Thus, they can also be shared more easily, if someone is interested in using the data in their own research or repeating the present study. An example of the data (Figure 4 in section 4.4.2) is included here as a screen shot only, as videos cannot be attached to this text format.

In this study, Camtasia was used to record the translation process in order to gain information of actions which would not be visible in the Translog data, that is, mainly the online activities linked to information-seeking behaviour. These actions are only marked as pauses in the Translog data, which naturally do not reveal anything regarding the IS actions the translator performed. Thus, using Camtasia combined with Translog was vital for the purpose of this study. Whereas the actions logged by Translog can also be reviewed by watching the screen recording, the two systems do not produce data of all the same aspects of the process. Although the temporal aspects, such as pauses in the writing process, can be observed in both recordings, producing accurate data of their length manually would rely on using the

computer's clock, which runs differently from the one programmed into Translog-II, and, moreover, is affected by the researcher's perception causing time delay. Consequently, this is a valid reason to use these two methods together regardless of the overlap of data, as Translog provides precise temporal or pausological data automatically but only Camtasia can shed light on the content of the pauses. On the other hand, this kind of overlapping can enhance the reliability of the data as the two datasets complement each other while elucidating different aspects of the same phenomenon, which is the purpose of triangulation in the first place.

4.1.2. Questionnaires

Questionnaires are used in various ways in academic studies. They can be used as the main data collection method, as a preliminary method of choosing suitable subjects from a larger pool or as a part of triangulating a set of methods chosen to gain a more profound view of the research topic. In any case, a questionnaire must be carefully constructed to elicit the answers the researcher is hoping to receive. Otherwise, the data can be unusable or distorted, and as such corrupt the results and the study.

In the present study, questionnaires were used on two occasions, first, to gather background information, and second, as a retrospective data collection tool. Both questionnaires were in Finnish and were created using the Webropol online survey and analysis software. The questionnaires were sent from the Webropol web page to each participant via email as hyperlinks. Thus, the answers were easily accessible in the Webropol web page after the participants had completed the questionnaires. Webropol also offers statistical analysis tools, but as the sample was only five they were not used.

The background questionnaire (later BGQ) was formulated on the basis of the one Enríquez Raído used in her PhD study, but the content was modified to eliminate questions that were irrelevant to the present study. The BGQ used in the present study is attached as Appendix 1. It was designed to have the same sections as Enríquez Raído's questionnaire. Thus, the first section contained general BG questions such as name, age, language skills and education. In the second section, the

prospective subjects were questioned more specifically on their previous education and experience in translation. Lastly, section three contained questions on the Internet use and familiarity with various web tools and resources. In the end the subjects were also asked to approve the use of the information they had given for research purposes of the present study alone.

The second questionnaire (Appendix 2) was used, as said above, as a retrospective tool. It was modified from the online search reporting tool which Enríquez Raído used to elicit introspective data from the translators on their search activities during translation (see Enríquez Raído 2011: 519-528 for the original set of questions and 530-531 for the OSR questions). This modification to the experimental design was done based on Enríquez Raído's own critique of the OSR as a research tool which, similarly to TAP, changes the natural flow of the translation process as an additional element to it, and as such "threatens the reliability and validity" of the tool itself (2014: 184).

In this final questionnaire (later FQ), the translators were asked about their possible pre-existing knowledge about the ST topic and whether the text contained individual words they recognised or knew beforehand. Then, in question 7, they were asked to underline on the ST copy given to them the words or terms that they would have checked from some other information source than the Web, and then to indicate what other information source they would have used in each case. They were asked to name at least four such words or terms from the text. In addition, the translators were asked how difficult they found the translation task in respect to various aspects, such as having no printed dictionaries, translation memory or other translation tools. Finally, they were asked to evaluate their own translation and to give their opinion on whether they see it possible or not that translators would now or in the future rely only on electronic and online resources, first, in general and second, from their personal perspective.

4.2 Subject selection

The original plan was to have two or three groups on which a comparative analysis could be conducted. The designed composition of the population was

1) students who had only basic or novice level experience in translation,

2) students who were advanced-level translation students, and possibly

3) professional translators.

The intended sample was two participants from groups 1 and 2, and one or two from group 3. As it became obvious early on that novices would not be interested in participating in this type of experiment, Group 1 was dropped as possible subjects. Two advanced level translation students had already agreed to participate, while the recruitment efforts were directed towards the professional or practising translators.

In order to approach professional translators and recruit some as participants, two different forums were employed, both dedicated to interaction or communication between translators. First, the social media was employed: a query about translators located in the Turku area was posted to the wall of a Facebook group called *Hei me käännetään!* which is a closed social media group for practising translators who have Finnish as one of their working languages. Five translators replied and they were contacted via personal messages in Facebook to ask if they would be willing to participate in a study. After three of the five gave a preliminary consent, an email containing a more specific recruitment letter was sent to them. Finally, those who replied to the email confirming their willingness to participate were accepted as part of the subject pool.

In addition, the Turku chapter of The Finnish Association of Translators and Interpreters (Suomen kääntäjien ja tulkkien liitto, later SKTL) was approached for the purpose of finding more possible participants. The secretary of the association was approached via email and was asked to forward the recruitment letter to the members' mailing list. At a rapid pace, four professional translators answered the email enquiry and, similarly to the previous three, were approached via email to

confirm their willingness to participate. In retrospect, the participants recruited via Facebook could possibly also have been among those who answered the email enquiry, but it has to be mentioned that not all practising translators are members of nationally established associations such as SKTL. In total, there were seven prospective participants who were professionals, one male and six females.

As the number of professionals interested in participating in this study was higher than expected, a decision was made to focus solely on the professionals. Thus, all participants of this study were, in the end, professional translators. In the present study, *professional translator* is defined as translator who is currently actively practising the trade, either as a full-time or part-time profession. This is the first major difference between this study and Enríquez Raído's study where the four participants were students participating in a translation course and had only little or no experience in translation. The other two subjects Enríquez Raído took into consideration in her analysis were a translation teacher with 15 years of experience in translation, and a PhD-level translation student with four years of experience, who both participated in the pilot study instead of the main study. These two participants are more in line with the population of this study. Consequently, this focus was chosen firstly because the opportunity presented itself and secondly, because it would give the present studies a focus that is different from but still linked to Enríquez Raído's study.

The original research plan included a selection process to be based on a background questionnaire. As the decision to focus only on professional translators as participants was made, such selection process was considered unnecessary. Therefore, all the professionals who answered the enquiries were sent a background questionnaire which they were asked to answer before the actual experiment phase was begun. The form and contents of the questionnaire are discussed in more detail in section 4.3.2.

After all participants had answered the BGQ, a process of finding a suitable time for doing the actual experiment was started. Possible times and dates, all in December 2014, were presented to the participants via Doodle, an internet calendar tool, where

they could choose one of the possible times. Four participants made their choice this way and those who did not, were approached by email to confirm that they were still willing to participate, and to inquire about alternative times more suitable to them. Two replied confirming their preference for January, and were then approached again at a later date. In the case of one participant, an extra date was found and agreed upon outside those present in Doodle. All in all, six experiment sessions were arranged, but only five were productive for reasons explained at the end of section 4.3.

4.2.1 Participants

Five professional translators took part in the translation experiment and are introduced here based on their answers on the BGQ. For the purposes of anonymity, they are referred to as Tr1, Tr2, Tr3, Tr4 and Tr5, of which the first three are the subjects of the deeper analysis and the latter two are mainly discussed in addition to them where applicable.

The translators formed a sample that was heterogeneous in terms of some factors and homogeneous in others. For example, two of the translators belonged to the age group of 31 to 40 years, two to the group of 41 to 50 and one was in the age group of 21 to 30 years. This implies that the sample also represents a broad range of expertise in translation. On the other hand, the sample was more homogeneous in the aspect of the educational background and language skills. Four of the translators had a Master's degree in Translation and Language studies and the fifth was finishing her studies in philology in the spring of 2015. Consequently, they all had completed various basic, intermediate or advanced level courses in translation. Three of them, Tr1, Tr2 and Tr4, had taken a course on authorised translation either from English to Finnish, Finnish to English or in both directions. In addition to translation training, two of them also had previous degrees in business and administration.

All the participants' L1 was Finnish and one of their working languages was English, which was also their strongest foreign language. Table 4 shows also the participants' other languages skills, as they were asked to write down all language skills.

	L1	L2	L3	Other (B=basic, IM=intermediate)
Tr1	Finnish	English		Swedish, French and Spanish (B)
Tr2	Finnish	English, Swedish	German	
Tr3	Finnish	English	Swedish	Russian and French (B), German, Latin
Tr4	Finnish	English	Swedish	French (IM), German and Russian (B)
Tr5	Finnish	English	German	Spanish and Russian (B)

Table 4. Participants' language skills.

In terms of the work experience, which was asked about in question 17 of the BGQ, there was more variation, as was expected based on the age range. Table 5 (below) shows that two of the translators, Tr3 and Tr4, had the longest work experience, over ten years as full-time translators, the former as a freelancer or self-employed and the latter as an in-house translator or an employee of a translation agency. Tr2 had the third longest work history as part-time self-employed translator. Tr1 and Tr5 had both worked 4-6 years as full-time translators, but Tr1 also had some years of part-time translation experience. In question 18, the translators reported on how many hours per month they had worked as a translator during the last year. Tr1 and Tr2 reported their average work time as less than 20, Tr3 and Tr4 as over 100 and Tr5 as 21 to 40 hours per month. In addition to these aspects of their professional life, the

	Freelancer/self-employed		As employee/translation agency	
	part-time	**full-time**	**part-time**	**full-time**
Tr1	under 3 years	4-6 years	-	-
Tr2	7-10 years	-	-	-
Tr3	4-6 years	over 10 years	-	-
Tr4	under 3 years	-	-	over 10 years
Tr5	-	4-6 years	-	-

Table 5: Participants work experience as translators

	Fields of expertise as translator
Tr1	proofreading, medicine and biology, music, literature and culinary texts
Tr2	military, technology, scientific texts and law&administration
Tr3	translating into Finnish, documents or expository texts
Tr4	corporate communication, documents and publications; insurance texts, public sector texts
Tr5	education, law, cultural history, biology, audiovisual translations

Table 6: Answers to question 20 "Which are your areas of expertise as a translator?"

participants were also asked to state their perceived field or fields of expertise as translators in question 20 of the background questionnaire, shown in table 6 (above).

In questions 21 to 28, the participants were asked about their internet use and how often they performed various actions in the Web, including looking for information. All five stated that they used the internet on a daily basis, but there was variation in the total hours spent using the Web. Tr1 reported spending approximately five to ten hours, Tr2 and Tr3 10 to 20 hours per week using the internet, whereas Tr4 and Tr5 reported usage of over 20 hours per week. All five also stated that they used the web often or all the time to do research as part of translation, which indicated that they were fairly accustomed to using the Web as a resource. On the other hand, only Tr1, Tr2 and Tr5 said they had participated on a course concerning internet usage or information-seeking methods. Tr3 could not recall taking any such course and Tr4 was certain of never having participated in this type of education. This is not surprising information, because translation training does not include separate courses on information-seeking skills. The translators have probably only taken an introductory course offered by the university library as a compulsory part of general studies. This type of course teaches merely the use of basic search tools and methods, and introduces usually only the databases and other information sources most commonly used in the realm of academic education. Thus, it is unlikely that such course would suffice to provide professional translators the information-seeking skills they need.

To conclude, the participants differ from each other mainly in terms of worklife experience as translators. It remains unclear, which skills they have acquired during their translator training and which afterwards in order to succeed as professionals or to meet the demands stemming from the needs of the clients or translation agencies. In this study, the only aspect that can be observed is the actual information searching habits these translators present while translating.

4.3 Experimental design

The experimental design of this study involved several steps, starting from the technological aspects. As it proved too challenging to acquire the desired set of data collecting tools to be used in a computer readily available in the facilities of the University of Turku, a new laptop was acquired for the research purposes only. The purchase provided more freedom of choice for the location where the experiment was executed, but also an additional level of security against data corruption, as explained in section 4.1.1. Moreover, in this way the data could be collected and analysed with one computer. The needed licence software, Camtasia, was installed after it was purchased from Techsmith and downloaded to the laptop via an email link sent by Techsmith. Translog-II, on the other hand, was downloaded from the web page which is mentioned in section 4.2.1, where it is available for anyone free of charge for research purposes. In addition, Open Office was downloaded for the purpose of offering the translators a medium for making notes, should they need one, whereas Google Chrome and Mozilla Firefox were downloaded to give them a choice of web browsers besides Internet Explorer which came pre-installed to the laptop.

The ST used in the experiment was chosen so that its level of difficulty was sufficient to elicit information needs in translators functioning at the professional level. Also, the domain of the ST was selected intentionally from outside the fields of expertise the participants stated as theirs in question 20 of the BGQ. Table 6 on page 33 shows that only one translator listed technical texts as one of their strengths, which was the only area mentioned pertaining to the domain of the ST at least at some aspects. On the other hand, as mentioned in section 4.1.1, three of the

professionals had taken at least one course of authorised translation which can also include translating texts from domains related or with terminology similar to that of the chosen ST. Thus, the participants were deemed experienced enough to be able to handle also a more technical ST.

The chosen ST (Appendix 3) was a text excerpt adapted from an abstract written for a scientific article, *Piezoelectricity of single-atomic-layer MoS_2 for energy conversion and piezotronics*, published in the international weekly journal *Nature*. The original abstract as well as the full article can be accessed online via the hyperlink Source text origin [2]. The content of the abstract was modified by removing the topic line as well as few other sections within the body of the abstract. This was done to limit the number of characters in the ST and to ensure that it would fit into the Translog source text window so that it could be viewed fully at once. The length of the ST impacted also the font size chosen for the ST in Translog, which was set large enough for the ST to be easily legible during the experiment.

The Gradu project was created in the Supervisor mode of the Translog-II and the selected ST was copied into it during configuration. A copy-paste function was allowed as the ST contained super- and subordinate characters which are not quickly produced in general, much less with a unfamiliar computer. Thus, the translators could use the ST to copy these characters into the target text. There was also one feature in the computer itself that could have affected the data and needed to be addressed. Touchpads are a common feature of laptop computers and can be used instead of a mouse, but their location on the laptop's surface may be problematic, as was in the case of the laptop purchased for the experiment. Consequently, the touchpad was deactivated and replaced with a USB mouse to ensure there would be no unwanted cursor activity induced by the translator unintentionally brushing the touchpad while typing.

The experiment itself was conducted in a classroom which is located in the Signum building of the Turku University's School of Languages and Translation Studies. The classroom is designed for the purposes of interpreting classes and for this reason

2 Direct address: www.nature.com/nature/journal/v514/n7523/full/nature13792.html

contains a set of three booths, or mini-rooms within the large one. Thus it was ideal for the experiment as the aim was to give the translator as much privacy as possible. The test computer was set up in one of the booths to ensure a degree of privacy for the participant and to create separation between the subject and the researcher without the latter needing to leave the room. The internet connection was opened using the researcher's personal access to the Turku University network. In addition to the internet connection, the Translog project created for the experiment and the screen recorder were activated in advance of the participant's arrival.

After the participant had arrived, two papers were given to them to read: one with a short translation brief and the other with instructions for the following experiment, both in Finnish (see Appendix 4) The participant was asked to read them through and ask if there was anything unclear regarding the experiment. They were verbally instructed to translate the ST using whatever resources they could access via internet. In addition, they were instructed to follow the brief which indicated the status and original function of ST and the commissioner. Basically the task was to translate the ST keeping as close to the original style and function as possible. Phones were naturally not allowed and were asked to be turned off or silenced for the duration of the experiment. Then the participant was escorted to the booth were the computer was set up.

To start the experiment, the participants only needed to click 'Start logging' in the Translog-II User control window, which then prompted the program to open the actual test environment window. As explained in section 4.1.1, this is a split window with the ST shown in the upper part and a blank space in the lower part of the window, in which the translation was written (see Figure 4 on page 41). After initiating the process by clicking 'Start logging', the subjects were able to read the ST and translate it according to the instructions given to them. When they were finished with the translation, they were instructed to end the Translog experiment by clicking once on the 'Stop logging' text in the upper right corner of the test environment window, and then summon the researcher to secure the data. Each session's datasets were saved in files identified by respective participant's name.

The last part of the experiment session consisted of the participant answering the FQ directly after finishing their translation. Another computer was made available on which they accessed their personal email where the Webropol link had been sent to them while they were performing the translation task. They were given a copy of the ST to help elicit retrospection and also to be used when they answered question 5 where they were asked to underline specific part of the ST. All but one translator completed this final part of the session as requested, as this translator was not able to access her email at that time due to not remembering her password. In this case, the ST was sent to her via email and she completed the FQ as soon as she had access to her own home computer that day. She then sent the ST with the requested notes back to the researcher via email as soon as she had completed the FQ.

The experiment was designed to produce one file of Translog data and one video file from Camtasia from each translator's session. In two of the five experiments, however, something went wrong and the Translog-II data could not be saved, that is, the recording of the Translog session was lost. The reason of this was not discovered. Nevertheless, the experiment sessions produced five Camtasia video files in addition to the three Translog files. The internet histories were not part of the originally planned data collection, but because a researcher can never be sure which piece of data can become vital or provide extra information, and as the browsing history is automatically collected by the browser, also this data was saved. The web browser activity of each participant was copied by taking screen capture images from the browser's internet history and saved as JPG files. Then the internet history of the browser used in the session was cleared, so there would be no traces of previous internet searches present when the next participant was using the computer.

In addition to the technical problems explained above, there was one further complication with the experiment. All in all, six sessions were scheduled with six translators, but the third session ended in abortion as the participant in question expressed concerns over the purpose and design of the experiment. It was determined that there had been a miscommunication in this regard, which led to the result that this particular translator was not a suitable participant after all. Thus, the sixth translator produced no translation and was removed from the sample. Based on the

information given by the said translator, it seems that this could have been avoided if the selection process was conducted as originally planned, as the replies on the internet usage indicated that this translator did not use internet as much as the others. In fact, the translator in question described her translation process and revealed that it involved the use of pen and paper more that a computer. In the end, this did not hinder the data collection as there were more participants available than was needed for producing a sufficient amount of data.

4.4 Data

In the present study, the data consists of three primary datasets: three Translog-II log files, five MP4 video files and the answers from two questionnaires. The internet histories mentioned in section 4.3 are used only as part of the preliminary analysis explained in section 5.1. Examples of the primary data are presented next to help the reader understand what was actually analysed in this study. Then the data analysis methods are reviewed in subsection 4.4.3.

4.4.1 Examples of Translog-II and Camtasia data

As mentioned in Section 4.1.1, Translog records several types of information from the translation session which includes all keyboard and mouse activities as well as the inactivity that occurs between them or as result of actions outside of Translog. For the purposes of this study, both a linear plot and a pause plot was elicited from

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Figure 3: Excerpt of a linear plot elicited from Translog-II data.

each of the three translation sessions where Translog data was successfully saved, but only the linear plots were used in the end. Figure 3 is an excerpt of a linear plot elicited from one translator's process data, and represents the Translog data analysed in this study. It is a linear view of a completed translation session, which can be viewed in Translog-II Supervisor mode as a video showing the progression of the writing process. The contents of the linear view depend on the settings chosen for the temporal resolution. In figure 3, pauses in the writing process recorded by Translog are shown in either red numbers or dots, where one dot represents 5 seconds. This setting was chosen in the beginning to shorten the plot and highlight the longer pauses in the process, which were suspected of representing most if not all of the information-seeking contexts.

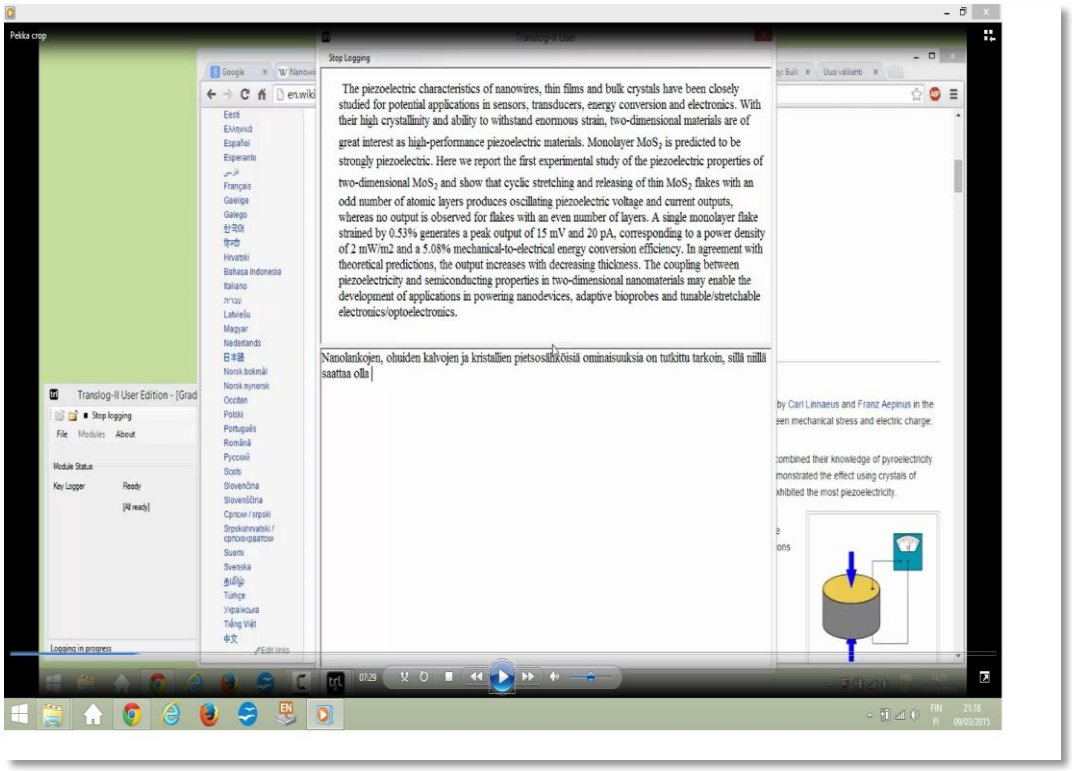

Figure 4: Example of Camtasia data

Later, another more detailed linear view was elicited in which also the shorter pauses could be examined to ensure all pauses caused by web searching were observed. The meanings of the other markings are explained in detail in Translog-II documentations, such as the manuals available online at bridge.cbs.dk.

While Translog-II recorded the writing aspect of the translation process, Camtasia

was used to record the entire computer screen. Thus, the data shows all windows and tabs opened and closed during the translation sessions as well as all movements to and from the Translog window, where the translation was typed. Figure 4 (previous page) is a screen shot taken from one translation session video as it was replayed in MP4 HD format. This example shows a Translog window as the active window, and behind it a Google Chrome window can be seen with several open tabs for various accessed resource pages. In the lower left hand corner, the window of Translog-II User is also visible, which was used by the translator only when they initiated the translation session. At the bottom of the screen shot two tool bars can be seen. The smaller one, in the background and under the Windows Player's control bar, is the tool bar of the test computer's screen during the test. The bigger tool bar is from the laptop screen when the recording was viewed and is not part of and the recording. The Camtasia data used in this study is available for research purposes by email[3].

4.4.2 Data analysis methods

Several methods were used to render the raw datasets into a form that could be analysed. As mentioned above, linear plot views were elicited from three translation sessions, as this is available in Translog as a semi-automated analysis feature. The temporal resolution had been set to show pauses lasting a minimum of 5 seconds and the maximum number of dots shown to be shown in the plot was set to 10. The pause plots were then used to identify pauses deemed long enough to contain online activities, starting first with all pauses represented in the linear plot in a numerical form which included all pauses longer than 50 seconds. Because the Camtasia videos had been cropped to the same length as the corresponding Translog recordings, the temporal location given to each pause in the key logging data, along with the actions shown to precede and follow each pause, was used to locate the pauses in the Camtasia videos. As the video was played to observe the content of the pauses, the online actions of the translators were transcribed and coded using mainly the same categorisation Enríquez Raído used in her study (see Appendix 5). This coded data was collected into spreadsheets, but contrary to Enríquez Raído's study, only the long, over 50 second pauses containing IS actions were included. This was done

[3] Contact information: sainvo@utu.fi

instead of coding the entire process to limit the amount of analysed data to fit the focus and scope of the present study. For the same reason, only the three video files that had corresponding Translog files were subjected to this thorough and time-consuming method of analysis. These spreadsheets were then analysed qualitatively as well as quantitatively. An example of the spreadsheets is included as Appendix 6.

The aligned data from Camtasia and Translog-II was tabulated in several ways as part of the qualitative and quantitative analysis. The temporal aspects of the process, for example, were collected into excel sheets as numerical data. Excel functions were then used to calculate the total duration of each translators IS contexts as well as the mean time of their individual IS context. This data was also used to identify each pause by formulating an index code based on their order of appearance as well as a letter representing the translator. Indexes, e.g. Tr1P3 referring to translator 1 and pause number 3, are used in chapter 5 to refer to specific pauses as they are discussed as examples.

In addition to the data provided by the main collection tools, Translog-II and Camtasia, the survey data produced by the two questionnaires is used to enhance and complement qualitative analysis. Mainly, it is used similarly to the Enríquez Raído (2011) study, that is, to explain the behaviour observed in the main datasets in respect of contributing aspects such as the effect of translation experience in general and in terms of previous knowledge relating to the ST topic. The retrospective answers given to the FQ are used primarily when the results of this study are discussed in section 5.4 and chapter 6.

4.5 Research questions

As this study is exploratory in nature, no hypothesis was made and the research questions of this study are very general. This study aims to shed light on the information-seeking behaviour of professional translators in terms of online resources, which so far has been studied very little. In addition, it tries answer whether professionals see a future where only online resources are used for translation. Moreover, this study is methodogically an exploratory endeavour of

combining two data collection tools which have not been used together in research before.

5. EXPLORING THE ISB OF PROFESSIONAL TRANSLATORS

The aim of this case study is to examine the information-seeking behaviour of professional translators during a translation process where the sole reference material source is the Internet. The following sections will present the findings of this study. First, the terminology used in this study is reviewed in section 5.1. Then, in section 5.2, a preliminary analysis is made on the various internet sources and query terms the professional translators used during the process. More specific instances and aspects of ISB will be examined through examples from each translator's process data in section 5.3, which will focus on the three translation sessions from which both Translog and Camtasia data was successfully collected, and in section 5.4 the data from the background and final questionnaire will be included in the analysis.

5.1 Terminology

Before presenting an analysis of the data, it is necessary to take a moment to review some terminological aspects of this study. In section 3.3, two concepts used by Nord, usage action and usage context, were introduced. The definition for the latter is given in Nord (2009) and here on page 17. Enríquez Raído, on the other hand, used the term *search session*, which she defines as "temporal series of interactions with the Web" (2014,125). In this study, a new term, *information-seeking context* or *IS context* is used. The term chosen for this study is defined based on the concepts used by Nord and Enríquez Raído, but also includes a reference to the Information Sciences or, more specifically, to the main theoretical concept of this study, information-seeking behaviour or ISB. Thus, an IS context is a chain of actions performed online. Later, they are also referred to as IS pauses, because they were identified based on the pausological data provided by Translog, as described above. However, the term IS pause is superordinate to IS context: IS pause is used as a general term to describe all the pauses in the translation process visible in Translog, i.e. inactivity within the writing process linked to ISB, whereas the term IS context

refers to the content of the pauses which include search queries. A search query is one type of *IS action* which is used here to refer to any action the translator performs during an IS pause. In this study, IS actions include all individual actions made by the translator while searching information on the Web, i.e. all query-related actions, such as writing or modifying a query, as well as reading the content of chosen reference page or text, and browsing the search results. In contrast, Enríquez Raído used the term online action to refer to all actions performed online, including translating and reporting actions done with the OSR tool (2011:220-221). Here, these two can be excluded from the definition of IS action, because the translation is written in the Translog program, which is not online, whereas the reporting action was eliminated by modifying the OSR used by Enríquez Raído into the final, retrospective questionnaire.

5.2 Preliminary analysis

As the preliminary level of analysis, the internet history logs saved after each translator had finished their translation session were studied. Thus, the data analysed in this section includes only the JPG files. The logs provided readily available, time coded lists of all the websites the translator had accessed during the translation process. Solely on the basis of the internet histories, the websites the translator had visited while looking for resources could be listed along with a partial collection of the queries they had performed. The source sites are shown in Table 7 with the number of visits to each resource page, and the total number of visits per translator as well as per resource. In this case, the category Dictionary includes naturally only online dictionaries, as printed ones were not available. Topic specific pages include all PDF's, articles and other web pages that contained information from the domain of the ST topic. The last category, Other, contains only one page visit which did not fit any of the other categories as it was made to Ebay.

Table 7 (next page) shows that all five translators relied mostly on Google searches ranging from 20 visits made by Tr2 to 155 visits by Tr4 the total proportion being around 75 per cent of all page visits. The second most visited resource (11.5 %) is some type of online dictionary, such as Merriam-Webster, Sanakirja.org and

Linguee, whereas the total number of visits to Wikipedia puts this resource at third place but with only 10 per cent of the number of Google visits and about 7.5 per cent of all visits. Topic specific resources were visited 28 times, which is approximately only 5.6 per cent of all web page visits. This resource was most used by Tr4 who accessed, or at least opened, ten different pages or documents linked to the ST domain, whereas Tr1 used seven, Tr2 and Tr5 used five and, surprisingly, Tr3 used

	Tr1	**Tr2**	**Tr3**	**Tr4**	**Tr5**	**TOTAL**	**%**
Google	61	20	93	155	44	*373*	75.2
Wikipedia	4	16	5	3	9	*37*	7.5
Dictionary	7	8	35	5	2	*57*	11.5
Topic specific	7	5	1	10	5	*28*	5.6
Other	0	0	1	0	0	*1*	0.2
TOTAL	*79*	*49*	*135*	*173*	*60*	***496***	**100**

Table 7. Recurrently used web sites by number of visits based on the translators' internet history.

only one parallel text. This preliminary result is in contrast with the findings of Enríquez Raído (2011) who, confirming the findings of Prassl (2011) stated that professional translators mostly use parallel texts as external resources. This suggests that the amount of parallel texts used is not as large as assumed based on research mentioned above. However, the result should be verified by using multiple ST's to determine how strongly this phenomenon depends on aspects such as the ST domain, the language pair and translation direction or the translator's personal translation style in addition to his or her level of expertise in web searching.

The internet histories also provided some information on the terms the translators had used in their search queries, but they do not contain terms entered into, for example, MOT dictionary's or term banks' search fields. These query terms can be observed only in the Camtasia video data. Nevertheless, the internet histories show that the amount and type of the queries varies considerably from translator to

translator. The types are examined in more detail in the following sections.

Table 8 (below) shows a summary of the languages of the queries found in the internet histories. A preliminary analysis of the languages of the queries revealed that this behaviour also varied considerably from one translator to another. The language use was colour-coded in the transcribed internet histories (Table D in Appendix 7) where English keywords are marked in blue, Finnish in red and mixed use in green. Terms that could not be categorized as either language as they were abbreviations were left black and included in the category Other. Full lists of query terms were compiled from Tr1-3 and are included as tables A-C in Appendix 7. According to Prassl (2011) and Enríquez Raído (2011), professional translators use mostly the target language to write their queries. Table 8 shows that this claim is confirmed by the data in this study, as 165 out of total 340 queries, or 48.5 per cent, were written in Finnish. English was used in 24.7 per cent of the queries, and in 25.3 per cent of the queries the translators combined Finnish and English terms in one query. However, the mixed language use was mostly exhibited by one translator, Tr4, who made almost 53 per cent of her queries using Finnish and English together. Table 8 clearly shows that this behaviour was unique to this one translator, as the others made no or only a few queries containing both Finnish and English query terms.

	Tr1	**Tr2**	**Tr3**	**Tr4**	**Tr5**	**TOTAL**	**%**
English	8 (21%)	9 (56.2%)	46 (42.2%)	10 (0.7%)	11 (31.4%)	84	24.7
Finnish	26 (68.4%)	7 (43,8%)	53 (48.6%)	57 (40.1%)	22 (63.9%)	165	48.5
Mixed	2 (5.3%)	0	9 (8.3%)	75 (52.8%)	0	86	25.3
Other	2 (5.3%)	0	1 (0.9%)	0	2 (5.7%)	5	1.5
Total	38	16	109	142	35	**340**	100

Table 8. Query terms visible in the internet history by language use

Again, in order to determine if and how the language use in online queries is linked to the language direction or pair used in the translation task or, on the other hand, influenced by the topic of the ST, this experiment should be repeated with same subjects in both language directions and using multiple ST's of different levels of difficulty. Only then it could be observed, how much the ST affects the ratio of English and Finnish query terms and whether the translator's choice of language used to make a query depends on the translation direction or the language pair more than the ST topic and its level of technicality. Here, it can only be said, based on Table 8, that Tr1 used English approximately in one in four queries and Tr5 one in three, whereas Tr2 and Tr3 used the two languages more equally. Regardless of the high level of mixed language use by Tr4, Table 8 shows that all five translators used Finnish query terms between 40 to almost 70 per cent of their queries.

5.3 Using Camtasia with Translog-II

As mentioned above, studying the internet history does not give us a complete picture of the information-seeking actions (later IS actions) performed by the translator as it cannot record the queries made inside term banks and other institutional web pages. However, if screen recording software is used to record the translation process, the researcher can see all actions on all web pages.

When the screen recordings are combined with data gathered with computer key logging software, such as Translog-II, it is possible to pinpoint all IS actions performed within an IS context. Screen recordings provide us with the full content while Translog-II gives us the location and duration of the IS context, as it presents itself as a pause in the Translog data. When the data from these programs is aligned, it is possible to tell what the translator was looking for when they are not writing the actual translation. It does not, however, reveal moments of total inactivity on the computer although they could be isolated from the screen recording data if necessary, but the scope of this study does not permit such in-depth temporal analysis. Nevertheless, the next subsection discusses the temporal aspects of the ISB of the three main subjects, Tr1-3.

5.3.1 Temporal aspects of professional translators' ISB

Three translation sessions were completed with both Translog and Camtasia data intact. These sessions are analysed in this section in terms of temporal aspects or, more specifically, pauses that are linked to ISB during the translation process. The Translog data was cross-analysed with the Camtasia screen recordings to determine which pauses in the translation process were due to ISB. The linear plot elicited from the Translog data provided the locations of pauses that were long enough to implicate possible IS contexts, when the minimum length of a pause was set to 5 seconds. This information was used to locate the pauses in the screen recording in order to determine what kind of IS actions the translator performed during each pause. The three translators' IS contexts are presented as Appendix 7 which contains tables A-C compiled on the basis of the spreadsheets. These tables list the IS pauses (later ISP's) in their order of appearance and shows the queries related to each pause with notation of the used online source. Pauses that were already initially deemed positive candidates as ISP's because of their duration was more than 50 seconds, were indexed as P0, P1, P2 etc., whereas pauses initially marked as possible and later determined as ISP's were indexed in alphabetical order, excluding letters P and Q. Pauses that did not contain any queries were labelled as reading pauses, which Enríquez Raído (2011: 392) would have included in the category of browse searches, and were marked only with an asterisk and by italicising them.

Table 9 summarises the temporal aspects of each of the three translators' process collected into tables A-C (see Appendix 7). Regardless of there being no given time line, all three translators used around one hour to complete their translation.

	Tr1	**Tr2**	**Tr3**
Total process time (A)	53 min 28 sec	60 min 33 sec	67 min 16 sec
Time spent on IS (B)	32 min 32 sec	23 min 44 sec	48 min 54 sec
Time usage ratio (B/A)	0.608	0.392	0.726
Average duration of IS context	1 min 5 sec	1 min 24 sec	1 min 53 sec

Table 9*:* Temporal aspects of three translators' translation process and ISB.

However, the amount of time they used for ISB varies significantly between the three translators. Tr2 used the least time to search the internet, 39 % of the total translation process time, whereas Tr3 spent more than 70 % and Tr1 about 60 % of their time for seeking information. On average, one IS context lasted 1 minute and 26 seconds, whereas Enríquez Raído (2014: 156) reported that the average search session of her subjects was one minute 51 seconds. This could be taken as an indication that professionals are quicker in fulfilling their information needs, but as this aspect of the translation process is dependent on not only the topic of the ST and its level of complexity but also on the translator's domain knowledge the translator has and level of expertise in performing online information searches, the results are not directly comparable.

The Camtasia data collected into the spreadsheets revealed that all three translators' first IS pauses took place before they started writing the translation, which Jakobsen calls the initial orientation phase (Jakobsen cited in Alves & Liparini Campos 2009). They are indexed as P0's for this reason, and given an additional alphabetic identifier in cases of Tr1 and Tr2 as they had more than one IS pauses of this type. This finding is in contrast with those of Alves and Liparini Campos (2009: 202) who argue that this phase is not a significant factor in analysing what kinds of external support professional translators' use. They based this claim on their previous study (2008) as well as on PACTE (2008: 119) which found that the orientation phase was only 5-7.5 % of the total process time. Alves and Liparini Campos conclude that "a separate orientation phase seldom occurs in the process of professional translators." However, in the present study the orientation phases of the three main subjects, Tr1-3, were clearly observable and took 16, 10 and 7.7 per cent of the total process time, respectively. More importantly, they cannot be excluded from the analysis as they contain IS pauses. The P0's of Tr1 represent 25.9 % of the total time of IS pauses, whereas in case of Tr2 and Tr3 the P0's were 24.4 % and 10.6 %, respectively. Thus they can hardly be considered unimportant. It seems plausible to assume that this behaviour reflects how unfamiliar the translators were with the ST domain. Nevertheless, the reasons for this can only be speculated on because the sample is too small to make any generalizations.

However, when the total IS time is examined in relation to the amount of IS pauses, it seems that the data confirms Enríquez Raído's finding of the correlation between expertise and the amount of ISB. The analysis of tables A-C and table 9 shows that Tr2, who was suspected of having the most background experience in relation to the ST domain based on the BG questionnaire, has the lowest number of IS contexts (16), which include all IS pauses, as well as the smallest total time spent on IS (23 min 44 sec). Tr3, who listed scientific texts as one of her fields of expertise, had 26 IS contexts and spent almost 49 minutes on ISB, whereas Tr1 had 30 IS contexts and spent little over 32 and a half minutes on information searches. The number of IS contexts increases as the level of expertise drops, but it seems that the amount of time spent on ISB does not show the same tendency. However, the reasons for this can only be speculated on as they can be anything from technical, such as a slow internet connection, to personal.

Nevertheless, an examination of tables A-C gives us some insight into the ISB of these three professionals. They show that the 30 IS contexts of Tr1 during the process included four pauses that did not contain any queries but, instead, were produced by the translator returning to review or read a previously opened information source (these pauses are marked with an asterisk in table A). This means that Tr1 had 26 ISB related pauses resulting from actual IS actions, i.e. search queries, with a total of 72 queries. Tr2 had 16 IS contexts including three reading pauses and 13 IS pauses with a total of 46 queries. Lastly, Tr3 had 26 IS pauses in total, of which only two resulted from reading a chosen information source, while 24 were IS pauses containing a total of 113 queries. These numbers mean that, in average, Tr1 had 33 IS contexts per hour, whereas Tr2 and Tr3 had 16 and 23, respectively. If this is compared to the result reported by Nord (2009), it can be said that only Tr2 exhibited the same level of IS contexts than the professionals in Nord's study, which was approximately 17 IS contexts per hour. However, in Nord (1997/2009) the translators were performing translations of their own choosing, on topics that they normally worked on, which means that these results are not fully comparable. Nevertheless, it is an interesting to find that Tr2's previous experience seems to have allowed him to perform in the test situation very close to his true potential as professional translator.

5.3.2 Types and complexity of online queries

Enríquez Raído (2011) performed a detailed analysis on how her subjects formulated and performed their search actions along with analysing various aspects of their online queries, such as their complexity and possible modifications. Here, a similar analysis is discussed with examples on a smaller scale. The spreadsheets collected from the process data of the three main subjects of this study, Tr1-3, and tables A-C are the basis of this analysis.

In her study, Enríquez Raído (2014: 123-124) examined the initial search actions performed by the subjects and found that direct address searches were conducted in almost 74 per cent of the cases as the student translators' initial search action. The most experienced subject, however, executed primarily search engine queries as the first action of his IS contexts, which Enríquez Raído (2011: 359) considered as evidence of the subject choosing to initiate their IS actions from the unknown rather than what he already knew. Table 10 (next page) shows the initial actions of the three professionals in the present study, and reveals that only Tr3 exhibited the type of behaviour Enríquez Raído describes (2011: 475). In respect of the expertise aspect, this result seems to support her finding as Tr3 is the most experienced translator of these three in terms of work history, which can be confirmed by table 6. In contrast, Tr1 initiated the majority of her searches (18 from 26) from a dictionary, namely MOT, and most interestingly, Tr2, who was assumed to have most experience on the ST domain or close to it, started nine out of the total 13 queries by searching the Wikipedia.

Initial action	**Tr1**	**Tr2**	**Tr3**	*TOTAL*
Google query	8	3	20	*31*
Dictionary query	18	1	4	*23*
Wikipedia	-	9	-	*9*

Table 10: Initial IS actions.

Based on the classification by Kudashev and Pasanen, viewed in section 3.1, this

means that Tr1 searched primarily for linguistic information and Tr2 for topical or encyclopaedic information, whereas the Google searches performed by Tr3 could be either. Enríquez Raído (2011:360) found that students relied mainly on dictionaries as their initial information source. On the basis of this finding and Table 10, Tr1 is closer to the level of a student translator than a professional compared to Tr2 and Tr3, who searched for thematic information and used mainly search engine queries as their initial action, respectively.

Enríquez Raído (2014: 173) stated that in her study the subjects that had more professional experience used a wider range of online resources than the student subjects. In addition, based on the research reviewed in section 3.3, professional translators usually cross-check information with multiple sources rather than rely on one resource only. An examination of tables A-C shows whether these professionals actually used a range of resources, and cross-checked their information or not. A comparison of the IS contexts shows that Tr2 was the only translator who routinely used two to four different sources to make the same query. For example, in Tr2P1 he used the query term transducer first in Wikipedia and then in the TEPA term bank, in Tr2P2 the QT was chrystallinity (sic) and the sources used were Merriam-Webster, Google and TEPA, in that order. Tr3, on the other hand, used the QT 'bulk crystal' and its modifications both in English and Finnish in Tr3P1, and used Google and Sanakirja.org. Similarly, in Tr3P2 she used the query terms 'transducer', 'transducer+muuntaja' and 'transducer' to make searches in Google, Google and Sanakirja.org, respectively. Likewise, Tr1 searched information with these QT's: in Tr1P0b she first searched in MOT dictionary with QT bulk, then in Google with QT's 'bulkkikristallit', 'bulkki+kristallit -lego' and 'kemia+bulkki'. In her next IS pause, Tr1A, she used a near synonym to crystal in Finnish, 'kide' in MOT, then modified her QT to 'bulkkikide' and 'bulkki+kide' in the following Google searches. Tr1 used the QT 'transducer' only in MOT dictionary. Similar behaviour is seen in other IS pauses. In general, Tr1 relied heavily on her two main resources, MOT dictionary and Google, using them both in eight IS pauses. In her study, Enríquez Raído concluded that student translators usually performed Google searches after an unsuccessful dictionary look-up (2011: 389), which further implies that Tr1 is closer to the student's than professional translator's level of ISB. In the rest of the IS pauses

Tr1 used either Google or MOT dictionary, and only in Tr1P5 she used three sources within one IS pause. This pause was the only one where she used a topic-specific source combined with Google search and Linguee dictionary search.

A closer look at what Tr3 actually did during most of the IS contexts examined, reveals that googling is part of her IS style. Table 10 revealed that 93 out of 135 queries made by Tr3 were Google searches. Tr3P12 (next page) is an example of one IS context. This example shows how Tr3 accesses a previously opened tab which contains Google search results (SR page), writes a new query and then scrolls down looking through the results given by Google (in this case 319k hits), then modifies the query by deleting one term from it with a backstroke (BS) before she adds a new one. Then she repeats the actions of making a query and browsing the results. Tr3 exhibited this type of behaviour in most of the IS pauses in her process. However, she only opened nine SR links in total from all SR's that resulted from the 93 queries she made in Google (approximately 9.7 %), which suggests that her main style of

Tr3P12 01:09.078

Time	Win/ Tab	Action	
48:49	TL2U	stops writing	
48:51	MF	re-access MF	
48:53	Tab7	re-access SR page	
48:55		HL prev. QT	
48:56		replaces QT	muunto mekaanisesta sähköiseen energiaan
		Scroll/ looking at SR's	
49:31		del BS word from QT/Mod	mekaanisesta sähköiseen energiaan
49:33		adds word to QT	muuntaminen mekaanisesta sähköiseen energiaan
		Scroll/ looking at SR's	
49:57	TL2U	reaccess TR	
50:00		resumes writing	

information searching is based on only browsing the Google results. This fits the

search style Enríquez Raído (2014: 140) regarded as shallow online search style or 'check and compare' which, according to her, arises from wanting to access the information fast and as easily as possible. In her study, this type of ISB was linked with students,whereas only one of them, in addition to the more experienced translator among the subjects could be said to have the other style, which Enríquez Raído calls as more interactionalist style (ibid.). In the latter style, the subjects opened more SR links and spent time reading the chosen information sources in order to find background information on the ST topic rather than merely finding suitable equivalents to meet the information need they had that time. In her study, Enríquez Raído concluded that while the students often had success in finding translation equivalents with the shallow searching style, this style did not result in same level of success in terms of finding background information that was both relevant to the ST topic and suitable for translation (2014: 178). In contrast to Tr3, Tr1 opened 10 SR links resulting from the 61 Google queries she made (16.4 %), whereas Tr2 selected eight SR links resulting from 20 Google queries (40 %). This suggests that Tr2 either had previous knowledge on where to find information on the ST topic or that he was more efficient in his use of search engines queries, and thus, the most expert of these three in terms of ISB.

If the fact that Tr2 initiated most of the IS contexts with Wikipedia queries instead of using Google, which is evident in table 9, is taken into consideration, it seems that his style undoubtedly resembles what is described above as the more involved, interactional style of ISB. Tr2 clearly focused on thematic information, as the primary information source used by Tr2 was either Finnish or English Wikipedia, which, according to Kudashev and Pasanen's classification, are topical resources. Tr1, on the other hand, clearly depended foremost on linguistic information, that is dictionaries, when initiating the IS contexts, and used Google mostly as the second action. This may be seen as a result of reverting back to student-like IS behaviour when the ST domain was too far out of the translator's comfort zone, as many studies have shown that translation students rely on either dictionaries in general (Enríquez Raído 2014: 84) or bilingual dictionaries as their main translation aid (e.g. Jääskeläinen 1989, Atkins & Varantola 1997).

The complexity of the queries made by these three translators was also examined. Table 11 shows that the translators mainly performed simple search queries (95 %) and only 12 (5 %) of them were what Enríquez Raído (2011: 279) defines as advanced searches, i.e. searches that include search operators such as a minus sign, quotation marks or other limiters. In most cases, the latter included the use of quotation marks (9 times) which constitutes a phrase search, whereas search

	Simple queries	**Complex queries**	**Cotext searches**
Tr1	70	2	-
Tr2	45	1	9
Tr3	113	9	-
TOTAL	**228**	**12**	**9**

Table 11. Complexity of online queries.

operators were rarely used (5 times). Tr2 used the operator *site:fi* once and Tr1 used a restrictive minus modifier in one instance, but Tr3 used this query type three times. One of such queries by Tr3, however, was a misformulated query as she wrote a co-ordinated noun phrase in Finnish, *ulostulojännite ja -sähkövirta,* which the search engine would read as *ulostulojännite* plus *ja* minus *sähkövirta*, as there were no quotation marks to make it a phrase query. This indicates that some queries are formulated with a so called natural language, in which case the rules of a query formulation are not kept in mind and used to plan the queries. It is probable that these kinds of queries do not yield the results expected by the translator, as Tr3 only got 45,000 hits with the query given above as an example and spent only 16 seconds making the query, to which she made no modifications, and viewing the SR's before returning to the translation task.

The most interesting finding was that Tr2 exhibited one type of search behaviour which was not found in Enríquez Raído's study. When the IS contexts of Tr2 were examined, they revealed that this translator, in addition to using Wikipedia more than the two other translators, used it to make queries not only within the encyclopaedia

but also within the individual pages in Wikipedia. This basically means that Tr2 performed cotextual searches with Crtl+F command inside the Wikipedia articles to see how many times or in which modulations certain terms were used in the article. No other translator in this study exhibited this behaviour which would indicate that this is an ISB characteristic unique to this translator, or at least one that is not commonly employed. Further research would be needed to determine the reasons behind this behaviour as well as the frequency of this type of ISB among translators.

5.4 Results in light of retrospection

As explained in chapter 4, a retrospective questionnaire was used in this study instead of introspective data collection tool, such as the OSR used by Enríquez Raído (2011). The goal was to gain some insight in how the professionals viewed the translation task and using only online resources, where the internet resources fell short and which resource they would have used to confirm or supplement the online information they could find.

Questions 2-6 in the FQ enquired about the professionals' general level of knowledge on the ST domain and the topic. According to their answers, four of the five had previously translated scientific articles, but none of them had translated any text on the topic of the chosen ST. Still, four of the translators said that they recognised or already knew some terms in the text. These terms included basic terms that can be considered as part of what should be common knowledge, such as ampere, voltage or current. Other terms mentioned were more specific to the ST topic, such as thin films, piezoelectricity, nanodevices, and semiconductors. Only one of the professionals stated that they did not recognise any terms based on their previous knowledge. Thus, it is not surprising that only two of the five,Tr2 and Tr5, said they had some previous knowledge on the ST topic, whereas Tr1,Tr3 and Tr4 said they did not, and thus did not understand the topic-specific terminology in the ST. Enríquez Raído (2014: 179-180) concluded in her study that the amount and type of information needs were affected by the translator's perceived level of ST domain knowledge together with factors related to the task itself. She found that translators, who reported their domain knowledge to be high, had less information needs which

concerned mainly general vocabulary items. In this study, all five translators declared to have a little to no domain knowledge, which means that the differences in the amount of information needs between them results from other factors.

As mentioned before, in question 7 the translators were asked to indicate some terms they would have wanted to check from some other resource besides the Web and tell which one. Table 12 (next page) shows terms or individual words that the five professional translators indicated as terms they would have checked from some other source besides the Web, and the alternative source they would have used in each case. Tr1, who had translated scientific text but not on the ST topic and recognised some of the more basic terms but none of the topic-specific ones, stated that she would have asked at least two persons who worked or had education in a field related to the ST domain. Likewise, Tr3, who had no previous knowledge on the ST topic, would have consulted either expert sources but mentioned domain-specific literature, too. Tr2 had misunderstood the question and had only copied the underlined terms into the questionnaire. Tr4 was the only one who named specific resources, MOT's Finnish- English dictionary of technology and commerce and a translation memory to which she referred to as VTT translation memory. Thus, is it assumed here that it has been compiled by VTT, Technical Research Centre of Finland. The questionnaire does not reveal the reason why she did not use these resources, but it is possible that they are licensed resources which she has access to only on her own work computer and not via the internet. Similarly to Tr1 and Tr3, the fifth professional would also have used expert sources or other reliable resources known to her.

In questions 9-11 the translators were asked to evaluate the target text in light of having to rely on online resources only, and to give their opinions on translating in this manner. Only one of the professionals, Tr2, rated his translation performance with only online resources to rely on, as good and reported being satisfied with their target text. On the other hand, three professionals, Tr1, Tr4 and Tr5, considered their performance as satisfactory, and Tr3 assessed it as average. Thus, none of them rated their task success rate as weak nor considered the target text quality as publishable, which was included in the criteria of the highest possible success rate option in this question. Enríquez Raído (2014: 180) concluded that the quality of the translation

	ST term	Alternative resource
Tr1	bulk crystals	a expert in chemistry
	cyclic stretching and releasing	
	current outputs	known person who's an engineer
	power density	
	powering nanodevices, adaptive bioprobes and tunable/strechable electronics/optoelectronics	
Tr2	crystallinity	-
	two-dimensional	-
	a single monolayer flake	-
	powering nanodevices	-
	adaptive bioprobes	-
Tr3	bulk crystal	domain-specific literature or an expert in this field
	crystallinity	
	oscillating piezoelectric voltage	
	current outputs	
	a power density	
Tr4	piezoelectric	VTT translation memory
	nanowires	
	thin films	
	bulk crystals	
	transducers	
	energy conversion	
	high crystallinity	
	monolayer	
	cyclic stretching and releasing	
	atomic layer	
	oscillating piezoelectric voltage	
	current outputs	
	peak output	
	power density	
	mechanical-to-electrical energy conversion efficiency	
	nanodevices	
	adaptive bioprobes	
	tunable/stretchable electronics/optoelectronics	
Tr5	bulk crystals	expert source
	flakes	
	cyclic stretching and releasing	
	mechanical-to-electrical energy conversion	expert source or other reliable source

Table 12: Source text terms the translators would have checked from a source other than the Web.

seemed to be affected by how much time the translator used searching information online as well as the type of searches performed. She found that higher amount of time spent on online research together with searching both linguistic and ST topic-related information led to better translation quality. The quality of the translations was not assessed in the present study, but the above answers reveal the professionals perceived their translation quality. However, the findings of this study suggest that, in professional translators case, the amount of time spent on web searching does not correlate with the perceived translation quality as much as Enríquez Raído found it to correlate in the student translators' case. Tr2, who assessed his target text quality the highest, spent the least amount of time on web searches, whereas Tr3, who assessed the TT quality second highest, over two times as much time on information seeking.

Lastly, the professionals were asked whether they could possibly abandon printed resources altogether. Three of the five professionals answered yes, one no, and one stated that they did not use them at the moment either. The translator who did not use online resources was Tr4 who had mainly worked in a translation agency, where it is more common to use translation memories instead. In the case of the three who saw this change as possible, the open answers reflected the impact of ICTs and the rise of the Web. Two of them referred to the easy accessibility as they already use computers as well as how quick online resources are to use in place of printed source materials. One of them mentioned that the most current parallel texts are published online as is also the case with dictionaries and encyclopaedias. Another translator pointed out that electronic materials allow searches to be formulated in other forms than mere keywords, and that they are easier to keep updated. Additional reason mentioned was that language changes. However, one of the five stated that they do not see themselves forsaking the printed resources as they deemed it necessary to occasionally review what has been written earlier on a certain topic, which another translator saw necessary only when translating older source texts. Interestingly enough, one of the less experienced professionals mentioned one aspect related to using online sources, which no-one else brought up. Tr1 remarked that "kirja ei tilttaa" which translates as 'a book is never out of order', whereas there are moments when the internet is down and resources in the Web cannot be accessed. It presents a valid rebuttal for reminding future translators to keep printed materials available, if

not for no other purpose than insurance and backup in case the internet cannot be used.

6. DISCUSSION

This study aimed to reveal some aspects of professional translators' information seeking behaviour by examining the IS pauses within their translation process. Similarly to previous studies, the present study analysed the types of online resources used by the translators, but it also observed their IS actions. In addition, retrospection was used to give some insight into the professionals' perceived translation performance level and their opinions on using only online resources.

It must be pointed out that the data represents only a small sample of professionals and a translation task performed in an experimental situation. Thus, the answers in the FQ reflect not only the aspect of having to use only online resources but also the difficulties imposed on the translation task by the experimental setting itself. In question 8 of the FQ, when asked how hard the translators found the task in various aspects, the aspects that affected the process the most according to the answers were either due to having to use an unfamiliar computer or some other aspect on which the translators were asked to elaborate. Table 13 is taken from the Webropol and shows the division of the answers rated 1-5, 1 indicating that the task was considered very

	1	**2**	**3**	**4**	**5**	**Mean value**
a) without printed dictionaries	2	1	2	0	0	2
b) without a preformed TM	0	2	1	2	0	3
c) without other translation tools	1	1	1	1	1	3
d) with an unfamiliar computer	0	1	2	2	0	**3,2**
e) in a strange situation	0	3	1	1	0	2,6
f) something else, what?	0	0	2	2	1	**3,8**

Table 13. Aspects affecting the translation process.

easy with regard to the aspect in question and 5 that it was very hard. In item f) the

translators were asked to give an open answer. The translator who rated this item as very difficult (5) stated that she would not have accepted this type of commission due to the unfamiliarity of the topic. Two translators rated the aspect they mentioned in item f) as 4. One of them mentioned the inability to use expert resources for the special terminology and another mentioned the unfortunate technical oversight of having the computer set on English rather than Scandinavian keyboard settings, which resulted in not being able to use certain characters and symbols. The last two translators who gave the rating 3 in this item mentioned the experimental setting itself as a factor and not knowing what the intended quality of the translation was. It was, however, explained to all subjects during the briefing that the quality of the target text was not a factor in this study as it was considered unnecessary to ask for high-quality translation in these conditions.

In general terms the experimental setting proved to be successful as both data collections performed as anticipated, regardless of the technical problems resulting in lost data in two of the sessions. None of the participants mentioned being affected by either of the data collection tools, which indicates that they were not considered as distracting or obtrusive elements. Based on this study, it can be concluded that Camtasia is compatible with Translog-II and that, when used together, they provide data sets which complement each other in a manner suitable for triangulation purposes. Nevertheless, this study also showed that a pilot study should have been conducted in order to foresee and act on the technical problems that ensued, as well as to perfect the experimental settings. Furthermore, as stated in section 4.1, the participant selection could have benefited from using the BG questionnaire more carefully. It would be advised especially if the sample were bigger than in this study, or if there is need for more careful control of the variables.

This type of study benefits most of all the development of translation training as it reveals true, information related translation behaviour instead of suspected or theoretical one. Future translators do not need theoretical models as much as they need concrete examples and advice on how to employ the Web as a resource. Here, the study of professionals would be invaluable, but nevertheless hard to realize. Hopefully, more professionals will participate if similar studies are conducted in the

future. As stated before, it would be beneficial to conduct this type study using multiple ST's and both language directions. It would also be interesting to conduct a longitudinal study similar to Nord (2009) on how professionals conduct their information searching in their normal work environment in contrast to the test environment used here. Camtasia would be a useful tool not only in such a study, but also in pedagogic environment as it can be used retrospectively to heighten the students perception and understanding of their ISB and web searching skills in general.

7. CONCLUSIONS

This study aimed at exploring the information searching behaviour of professional translators and their use and views on online resources. The previous chapters introduced a number of issues related to this topic as well as previous research with a similar or related focus as the present study. Firstly, the findings were discussed from perspectives adopted from the model study conducted by Enríquez Raído (2011), then from more specific perspectives that rose from the retrospective answers given by the subjects of this study.

The temporal aspects of the subjects' ISB were discussed in section 5.2.1. The main finding on this aspect was that professional translators used, on average, less time on information searching per individual IS context than translation students. The data suggests that they are more efficient in their information seeking in general, because they possess more knowledge on the ST topic or merely on the available online resources. This in turn lead them to spend less time on IS but also to rely more on their pre-existing knowledge when they possess such knowledge. Lehtinen and Palonen (2011: 27) concluded that the main characteristic which sets experts apart from novices is their ability to focus on and to choose the essential information. They also state that formal training can only create a basis on which expertise can be developed (2011: 34), as it takes at least 10 000 hours of methodical practise to become an expert (Ericsson et al. cited in Lehtinen and Palonen 2011). This may explain the differences between the professionals in this study, as they had different amounts of work history and some only translated part-time. As it requires thousands

of hours to reach the level of expertise, its development takes longer in terms of years if one translates only part-time. Thus, also the web searching skills needed for translation develop slower if they are not practised routinely. Also Mikhailov and Suppanen (2013) concluded that there is room for improvement in terms of translators' ICT skills. On the basis of their survey, translator training has not offered sufficient education on ICT skills in the past, which means that most translators that were in translator training between 1990's to 2000's are mainly self-taught in this respect or have seeked additional education (2013: 28). Majority of the respondents thought that ICT skills are very important for translation practise today. Interestingly, based on the findings of Mikhailov and Suppanen, most translators are good in text processing and Web surfing, and assess their ICT proficiency to be satisfactory (2013:20).

On the other hand, the results of the present study show that even professionals revert back to the more basic strategies of IS when faced with an unfamiliar topic. They, too, rely on the resources most familiar to them, whether it is for topical or linguistic information. This suggests that professionals mainly stay within their so called comfort zone when translating. This includes both translating texts pertaining only to a narrow domain of expertise and getting accustomed on working only in certain environment and with certain tools. When these tools and resources are not available, they may exhibit novice-like ISB if they have not developed their web searching skills along with their translation skills. In light of the findings of this study it seems obvious that, as Pym (2013) claimed, learning to learn and learning to trust of mistrust data have become translation competences that translators should not ignore as translation has undeniably become more a technical profession than before.

The present study, albeit being a small and exploratory study into the topic, aimed also to find out whether professionals could or would rely only on online resources when translating. The findings suggest that this depends on the translators' usual work environment and on the type of commissions they normally accept, which, in turn, affected their ISB and the success of the online queries they performed. The data revealed, for example, that the translator with most online queries was in fact

Tr4 who did not work as a freelancer but as an in-house translator used to having translation memories as reference material. The other four, having more experience as freelance translators and being younger, were clearly more familiar with web searching in general although also they would have used other resources besides the Web resources to confirm terminological issues. The sheer number of slightly modified queries visible in the internet history of Tr4 revealed how unfamiliar this translator was with having to use only online resources. In addition the alternative resources she mentioned showed that the translator in question usually relied mainly on other types of resources. In fact, some studies have shown that proficiency can even decline as work experience increases (Ericsson et al. cited in Lehtinen and Palonen 2011: 34). Lehtinen and Palonen (2011: 35) concluded that this results from becoming accustomed to the task which then becomes routine and automatic, which, in turn, leads to the illusion of a high level of performance. Thus, also a translator with a long working history can falsely have the notion that they do not need to develop their skills further.

In regard of the types of resources used by translators, the findings are in line with previous studies. However, the present study offers a window in how differently the individual translators use these resources. It also confirms that by far the most used online resource is Google. For this reason, if they wish to employ the internet as a information resource, it is important for translators to understand how search engines work and how to perform web searches efficiently. This is a rather alarming finding: Google employs an algorithm that chooses the search results shown according to what it has learned about the users' past queries and online sessions. Thus, translators especially should remember this and understand how using a search engine affects their information search results, if their use mainly online resources. First of all, they should not rely only on Google, and they should also remember to delete their search histories, at least occasionally. Furthermore, they should be fluent and very perceptive in terms of information literacy, as evaluating the validity of online resources is a key factor in using them correctly without negative effects on the quality of the translation. Even resources that most translators would deem reliable, such as MOT dictionaries, can fail at some instances. If the translator does not have the routine of always checking the information from more than one resource, they

can fall prey to less than reliable information sources which are among the Google results. For this reason alone, it can be concluded that information literacy, and information searching skills in general, should be taught already in translation training. Without knowing how to evaluate the reliability of online resources as well as more than basic knowledge on how to formulate online queries, future translators are, indeed, looking for the needle in the haystack, with a tooth pick no less, as the results they receive can be anything but helpful or reliable. The present study has shown that even more experienced translators need to update and uphold their skills in this regard, especially if they work as freelancers whose main resources do not always include translation memories and resources that involve paying expensive license fees, but perhaps even more so if they are accustomed on relying on translation memories. According to Lehtinen and Palonen (2011: 35), most people who use computer programs as work tools tend to use only a small part of the functions these programs offer, that is, they never learn to use the more advanced features which could enhance their work performance. The rapid pace in which language changes in addition to the demands of the translation market seems reason enough to point out that translators cannot rest on their laurels, but need to practise all of the translation competences including web searching skills, or what EMT (2009) called data mining, in order to stay proficient and keep their competitive edge.

The present study explored professional translators' web searching behaviour which is a largely uncharted area of study. As the use of information has changed profoundly in the age of the internet, the issues raised and the aspects discussed in this study need more research in the future. It has been argued here that not only future translators who have grown up as the generation Y, in the midst of technological advances and the rise of the social media, but also established translators need to be educated in information literacy as well as information-seeking skills and information management. Thus, more research is in order to find out how professionals actually use the internet, what skills they have learned and where, and which of the skills are most useful, to determine which of them should be taught already in translation training.

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APPENDIX 1

Gradututkimuksen taustakyselylomake

Vastaajaryhmä

Vastaan tähän kyselyyn *

- ◯ aktiivisena kääntäjänä
- ◯ käännöstieteen loppuvaiheen opiskelijana
- ◯ aloittelevana opiskelijana/noviisina

YLEISTÄ

Osallistujan tiedot

Etunimi * _____

Sukunimi * _____

Kansalaisuus (jollei Suomi) _____

Ammatti/Opiskelija * _____

Yritys / Organisaatio _____

Sähköposti * _____

Mitä ikäryhmää edustat? *

- ◯ alle 20
- ◯ 21-30
- ◯ 31-40
- ◯ 41-50
- ◯ 51-60
- ◯ yli 60
- ◯ En halua sanoa.

Merkitse alle kielitaitosi taitotason mukaan (A=vahvin jne.)

A-kieli/Äidinkieli *

_____

B-kieli *

_____

C-kieli

_____

Muu kielitaito ja kommentit

(esim. alkeet tai kaksikielisyys kielet mainiten)

_____

_____

_____

Mikä on koulutustaustasi? Valitse alta sopivat vaihtoehdot. Merkitse tekstikenttään valmistumisvuosi ja tiedekunta/laitos/linja. *

- [ ] Kansakoulu
- [ ] Peruskoulu
- [ ] Ammattikoulu tai -kurssi
- [ ] Lukio tai ylioppilas
- [ ] Opistotason ammatillinen koulutus

  _____
- [ ] Ammattikorkeakoulu

  _____
- [ ] Korkeakoulu, alemman asteen tutkinto

  _____
- [ ] Korkeakoulu, ylemmän asteen tutkinto

  _____
- [ ] Tutkijakoulutus (lisensiaatti/tohtori)

  _____

KÄÄNNÖSKOULUTUS JA -KOKEMUS

Kääntämiseen liittyvä koulutus

Kurssien nimet on otettu Turun yliopiston käännöstieteen laitoksen opetussuunnitelmasta 2013-2014.

Oletko suorittanut käännösharjoituskursseja? *

◯ En

◯ Kyllä

Jos olet, niin mitkä seuraavista käännösharjoituskursseista (tai jonkun vastaavan) olet suorittanut yliopistossa tai jonkun muun ammatti-/ erikoistumiskoulutusta antavan tahon järjestämänä (esim. SKTL tai KAJ)?

	EN-SU	SU-EN	Muu kielipari	En ole suorittanut
Käännösviestintä 1 (perustaso) *	☐	☐	☐	☐
Käännösviestintä 2 (jatkotaso/syventävä) *	☐	☐	☐	☐
Eu-tekstien kääntäminen *	☐	☐	☐	☐
Laki ja hallinto *	☐	☐	☐	☐
Lääketiede ja biologia *	☐	☐	☐	☐
Kauppa *	☐	☐	☐	☐
Tekniikka *	☐	☐	☐	☐
Teminologia ja sanastotyö *	☐	☐	☐	☐
Auktorisoitu kääntäminen *	☐	☐	☐	☐
Käännösprojekti, mikä: _____	☐	☐	☐	☐
Joku muu, mikä _____	☐	☐	☐	☐
Joku muu, mikä _____	☐	☐	☐	☐
Joku muu, mikä _____	☐	☐	☐	☐
Joku muu, mikä _____	☐	☐	☐	☐
Joku muu, mikä _____	☐	☐	☐	☐

Oletko suorittanut käännösteoriaan liittyviä kursseja? *

◯ En ◯ Kyllä

Jos olet, niin mitkä seuraavista käännösteoriaan liittyvistä kursseista (tai jonkun vastaavan) olet suorittanut yliopistossa tai jonkun muun ammatti-/erikoistumiskoulutusta antavan tahon järjestämänä (esim. SKTL tai KAJ)?

	Kyllä	Ei
Käännösviestinnän esittelykurssi A: Johdatus ammatteihin ja tutkimukseen *	◯	◯
Kääntämisen teoriat ja tutkimus *	◯	◯
Käännöstutkimuksen metodit *	◯	◯
Auktorisoidun kääntämisen perusteet *	◯	◯

Käännöstutkimuksen suuntauksia *	◯	◯
Joku muu, mikä _____	◯	◯
Joku muu, mikä _____	◯	◯
Joku muu, mikä _____	◯	◯

Oletko suorittanut käännösteknologiaan liittyviä kursseja? *

◯ En

◯ Kyllä

Jos olet, niin mitkä seuraavista käännösteknologiaan liittyvistä kursseista (tai jonkun vastaavan) olet suorittanut yliopistossa tai jonkun muun ammatti-/erikoistumiskoulutusta antavan tahon järjestämänä (esim. SKTL tai KAJ)?

	Kyllä	Ei
Kieli- ja käännösteknologia *	◯	◯
Korpuslingvistiikka *	◯	◯
Joku muu, mikä _____	◯	◯
Joku muu, mikä _____	◯	◯
Joku muu, mikä _____	◯	◯

Oletko osallistunut koskaan kääntämiseen liittyvään seminaariin tai workshopiin? *

◯ En

◯ Kyllä

_____

_____

_____

Jos vastasit kyllä, mainitse niistä 1-3 viimeisintä ja osallistumisvuosi.

Kääntäminen

Mitä seuraavista käytät tai olet joskus käyttänyt? *

☐ painetut sanakirjat

☐ sähköiset sanakirjat

☐ termipankki

☐ tietosanakirja

☐ Wikipedia

☐ käännössivustot (esim. Google Translate)

☐ joku muu kääntämisen apuväline; mikä

_____

Jos kohtaat vieraskielisessä tekstissä ilmaisun, jota et ymmärrä, mitä teet tai käytät yleensä apuna ensimmäiseksi? Laita alla olevat järjestykseen (1=ensimmäinen valinta jne.)

	1	2	3	4	5
Kaksikielinen sanakirja *	○	○	○	○	○
Yksikielinen sanakirja *	○	○	○	○	○
Yritän päätellä merkityksen muusta tekstistä. *	○	○	○	○	○
Teen Google-haun (tms.) *	○	○	○	○	○
Jos jotain muuta, niin mitä: _____	○	○	○	○	○

Oletko koskaan tehnyt käännöksiä muuten kuin yliopistokursseilla (tai muussa vastaavassa koulutuksessa)? *

○ En

○ Kyllä

Kuinka kauan olet työskennellyt kääntäjänä? *

	En lainkaan	alle 3 vuotta	4-6 vuotta	7-10 vuotta	yli 10 vuotta
Freelancerina/yrittäjänä					
Osa-aikaisesti	○	○	○	○	○
Päätoimisesti	○	○	○	○	○
Vakityösuhteessa (toimistossa)					
Osa-aikaisesti	○	○	○	○	○
Päätoimisesti	○	○	○	○	○

Jos olet tehnyt käännöstöitä kuluneen vuoden aikana, valitse se vaihtoehto, joka on lähimpänä keskimääräistä tuntimäärääsi kuukaudessa.

	0-20	21-40	41-60	61-80	81-100	yli 100
Työtunnit/kk:	○	○	○	○	○	○

Listaa lyhyesti viimeksi tekemiesi 2-5 käännöksen ***tekstin aihe, tekstilaji, kielipari, toimeksiantaja*** (yritys, yksityishlö, käännöstoimisto jne.) ja ***työskentelytapa*** (Word, Wordfast, Trados jne). Jos olet tehnyt paljon käännöstöitä, listaa sellaisia, joita olet tehnyt eniten.

Käännös 1

Kuvaus (esim. kosmetiikka, mainos, su-en, yritys, Wordfast)

_____

Käännös 2

Kuvaus

_____

Käännös 3

Kuvaus

_____

Käännös 4

Kuvaus

_____

Käännös 5

Kuvaus

_____

Mitkä katsot erikoisaloiksesi kääntäjänä? Mainitse 1-5. *

_____

_____

_____

INTERNET

Kuinka usein käytät internetiä? *

- ◯ En koskaan
- ◯ Harvoin
- ◯ Satunnaisesti
- ◯ Viikottain
- ◯ Päivittäin

Kuinka monta tuntia viikossa käytät internetiä keskimäärin? *

	Alle 5 h	5-10 h	10-20 h	Yli 20 h
Tuntia/viikko	◯	◯	◯	◯

Mitä alla oleviin liittyvistä toimista suoritat internetissä ja kuinka usein?

	En koskaan	Harvoin	Joskus	Usein	Jatkuvasti
Akateeminen taustatyö (esseet, esitelmät yms.) *	○	○	○	○	○
Kääntämiseen liittyvä taustatyö (määritelmät, vastaavuudet jne.) *	○	○	○	○	○
Omaehtoinen opiskelu tai tiedonhaku *	○	○	○	○	○
Sosiaalinen verkostoituminen *	○	○	○	○	○
Uutiset *	○	○	○	○	○
Sää *	○	○	○	○	○
Viihde *	○	○	○	○	○
Muu, mikä: _____	○	○	○	○	○

Oletko koskaan osallistunut internetin käyttöön tai tiedonhakuun liittyvälle kurssille? *

Oletko koskaan osallistunut internetin käyttöön tai tiedonhakuun liittyvälle kurssille? *

- ○ En
- ○ Kyllä
- ○ En tiedä

Jos vastasit edelliseen kyllä, kirjoita kurssin nimi tai muu lyhyt kuvaus:

_____

_____

Mitä hakukoneita tiedät ja olet käyttänyt? Listaa 2-5.

1. *

_____

2. *

_____

3.

_____

4.

_____

5.

_____

Mitä sähköisiä tietokantoja tiedät tai olet käyttänyt? Listaa 1-5.

Sähköisiä tietoja ovat esimerkiksi Nelli ja EUR-Lex.

1.

_____

2.

3.

_____

4.

_____

5.

_____

Kun etsit tietoa internetistä, kuinka usein tallennat ne sivut tai tietokannat, joista löysit hakemasi tiedon? *

	En koskaan	Harvoin	Joskus	Usein	Aina
Tallennan	◯	◯	◯	◯	◯

SUOSTUMUS

Annan luvan käyttää tämän kyselylomakkeen sisältöä anonyymisti tutkimustarkoituksessa. *

◯ Kyllä ◯ En

APPENDIX 2

Loppukysely

1. Koehenkilö *

Etunimi _____

Sukunimi _____

2. Oletko aiemmin kääntänyt tieteellisiä artikkeleita tai niiden osia? *

◯ Kyllä

◯ En

3. Oletko koskaan aiemmin kääntänyt mitään tähän aihepiiriin liittyvää tekstiä? *

◯ Kyllä

◯ En

4. Oliko tekstissä termejä, jotka tunnistit tai tiesit entuudestaan? *

4. Oliko tekstissä termejä, jotka tunnistit tai tiesit entuudestaan? *

◯ Ei

◯ Kyllä

Jos vastasit kyllä, niin mainitse lähdetekstiä ensimmäistä kertaa lukiessasi tunnistamasi termit.

_____

_____

_____

_____

_____

_____

5. Kuinka paljon sinulla oli aiempaa tietoa lähtötekstin aiheesta ennen sen kääntämistä? *

◯ En tiennyt aiheesta mitään, joten en ymmärtänyt tekstin erikoissanastoa.

◯ Minulla oli hieman pohjatietoa aiheesta, mikä auttoi minua ymmärtämään tekstin erikoissanaston osittain.

○ Minulla oli tarpeeksi pohjatietoa, jotta ymmärsin suurimman osan tekstin erikoissanastosta.

○ Minulla oli runsaasti tietoa aiheesta ja ymmärsin tekstin erikoissanaston lähes kokonaan tai kokonaan.

6. Alleviivaa saamastasi lähtötekstin paperiversiosta ne sanat, termit tai ilmaisut, jotka olisit halunnut kääntäessäsi tarkistaa jostakin sellaisesta lähteestä, jota sinulla ei ollut nyt käytettävissäsi. Numeroi ne esiintymisjärjestyksessä ja kirjoita alle vastaavan numeron kohdalle se lähde/lähteet, jota olisit halunnut käyttää (vähintään viisi).

Voit tarvittaessa jatkaa paperin alaosaan.

1. *

_____

2.*

_____

3. *

_____

4. *

_____

5. *

_____

7. Millaiseksi koit tekstin kääntämisen asteikolla 1-5 (1=hyvin helppoa, 5=hyvin vaikeaa) *

		1	2	3	4	5
a) ilman painettuja sanakirjoja		○	○	○	○	○
b) ilman valmista käännösmuistia		○	○	○	○	○
c) ilman käännöstyökaluja		○	○	○	○	○
d) vieraalla tietokoneella		○	○	○	○	○
e) vieraassa ympäristössä		○	○	○	○	○
f) jokin muu prosessin aspekti, mikä?	_____	○	○	○	○	○

8. Miten mielestäsi onnistuit käännöstyössä pelkkien internetin kautta saatavilla olevien resurssien avulla? *

◯ Heikosti, en ole lainkaan tyytyväinen lopputulokseen.

◯ Kohtalaisesti, lopputulos on siedettävä.

◯ Keskinkertaisesti, lopputukos on ihan ok.

◯ Hyvin, olen tyytyväinen lopputekstiin.

◯ Loistavasti, lopputeksti on julkaisukelpoinen.

9. Voiko kääntäjä mielestäsi tehdä työtään nyt tai tulevaisuudessa kokonaan sähköisten lähteiden ja internetin kautta saatavissa olevien resurssien avulla eli ilman perinteisiä sana- tai tietokirjoja ja muita fyysisiä referenssimateriaaleja? *

◯ Kyllä voi tehdä jo tällä hetkellä, mutta se vaikuttaa käännöksen laatuun.

◯ Kyllä voi tehdä jo tällä hetkellä, ilman vaikutuksia käännöksen laatuun.

◯ Ei voi tällä hetkellä, mutta tulevaisuudessa mahdollisesti.

◯ Ei voi vielä, mutta tulevaisuudessa varmasti.

◯ Ehkä voi, mutta riippuu aina lähtötekstin vaativuudesta.

◯ Ehkä voi, mutta riippuu kääntäjän omista mieltymyksistä.

10. Näetkö mahdollisena, että luovut tulevaisuudessa kokonaan painettujen referenssimateriaalien, kuten perinteisten sana- ja tietokirjojen käytöstä? *

◯ Kyllä. Miksi?

_____

◯ En. Miksi et?

_____

◯ En käytä niitä tälläkään hetkellä.

11. Oletko kiinnostunut saamaan sähköpostitse linkin valmiiseen graduuni, kun se on julkaistu?

◯ Kyllä

◯ En

◯ Ehkä

12. Anna palautetta, ruusuja, risuja - sana on vapaa!

APPENDIX 3

Lähtöteksti loppukyselyä varten

The piezoelectric characteristics of nanowires, thin films and bulk crystals have been closely studied for potential applications in sensors, transducers, energy conversion and electronics. With their high crystallinity and ability to withstand enormous strain, two-dimensional materials are of great interest as high-performance piezoelectric materials. Monolayer MoS_2 is predicted to be strongly piezoelectric. Here we report the first experimental study of the piezoelectric properties of two-dimensional MoS_2 and show that cyclic stretching and releasing of thin MoS_2 flakes with an odd number of atomic layers produces oscillating piezoelectric voltage and current outputs, whereas no output is observed for flakes with an even number of layers. A single monolayer flake strained by 0.53% generates a peak output of 15 mV and 20 pA, corresponding to a power density of 2 mW/m^2 and a 5.08% mechanical-to-electrical energy conversion efficiency. In agreement with theoretical predictions, the output increases with decreasing thickness. The coupling between piezoelectricity and semiconducting properties in two-dimensional nanomaterials may enable the development of applications in powering nanodevices, adaptive bioprobes and tunable/stretchable electronics/optoelectronics.

APPENDIX 4

TOIMEKSIANTO

- Lähtöteksti on eräässä arvostetussa, brittiläisessä tiedejulkaisussa ilmestyneen artikkelin abstrakti.
- Käännöksen toimeksiantaja on suomalaisen Tiede-lehden päätoimittaja.
- Säilytä tekstin tyyli ja funktio mahdollisimman lähellä alkuperäistä tekstiä.

OHJEISTUS KOETILANNETTA VARTEN

1. Ruudulla on auki pieni ikkuna.
2. Kun haluat aloittaa kokeen, napsauta ikkunan ylälaidassa näkyvää tekstiä Start logging.
3. Ruudulle ilmaantuu isompi ikkuna, joka on jaettu kahteen osaan - yläosassa näet käännettävän lähtötekstin kokonaisuudessaan.
4. Kirjoita käännös tämän ikkunan alaosassa olevaan tyhjään kenttään saamaasi toimeksiantoa noudattaen.
5. Internetselaimet Google Chrome, Internet Explorer ja Mozilla Firefox löytyvät tietokoneen ruudun alapalkista pikakuvakkeina. Niiden jälkeen on OpenOfficen kuvake, jos haluat tehdä muistiinpanoja prosessin aikana.
6. Pikakuvakkeiden jälkeen palkissa näkyy kaksi tutkimusta varten avattua ohjelmaa kuvakkeina. Ethän koske niihin, kiitos!
7. Kun olet saanut käännöksesi valmiiksi, napauta lähtötekstin yläpuolella palkissa näkyvää tekstiä **Stop logging.**
8. Nyt on rankin osuus takana ja voit kutsua minut paikalle. Pyydän sinua

APPENDIX 5

Category Types of Information and Online Actions used by Enríquez Raído (2011: 222-223)

1. Time

The exact time at which a given online task-related action was performed.

2. URL Web pages accessed and/or re-accessed for information-seeking purposes.

Web pages resulting from search queries are referred to as "search results pages" in the spreadsheets.

All other Web pages are simply referred to as "pages."

3. Query

Queries typed in a search engine (such as Google) or an internal site engine (such as theones found in online dictionaries or newspaper archives), including words, prepositions, punctuation symbols (e.g. commas, brackets, and hyphens), Boolean operators and/or any other advanced search operators (e.g. quotation marks). Search queries performed in search engines are simply referred to as "queries," while those performed in internal site engines are coded as "site queries" in the spreadsheets.

4. Link/Tab Text

The exact text of either a clicked text link or browser tab. Links are classified into three main types: "search results links," "site links," and "off-site links." The first type refers to page links resulting from a search query performed in either a search engine or an internal site engine. The second type refers to within-site links (i.e. links to Web pages within the same site), and the third type to links to pages outside a given Web site. A distinction is also made between "textual," "graphical/image," and "pop-up window" links where appropriate.

5. Button Text

The exact text of a clicked text button, including the "option buttons" of the online search report, browser buttons and/or Web page buttons.

6. Select/Highlight

Select refers to "pull-down menus," "menu commands," "menu options," and/or "context menu options" used to perform specific operations such as setting the language in MS Word. Highlight refers to "letters," "characters," "punctuation," "words" and/or text strings (the latter simply referred to as "text" in the spreadsheets) selected to perform different text-related actions such as cutting, copying, pasting, deleting, replacing, applying, formatting information (e.g. font type, size, and colour), etc.

7. **OSR**

Textual input of the OSR window. Online actions in this window include specifying "search needs," "search goals," the rationale for a given search need ("search need rationale") "search results," the rationale for a selected search result ("search result rationale"), the rationale for the overall perceived

degree of search success ("success rationale") as well as clicking "option buttons" to rate perceived levels of "search success," "search satisfaction," and "search difficulty." Text-related actions include cutting, copying, pasting, deleting, adding, replacing, and applying format.

8. Translation

TL textual input of the Translation window. In addition to the text-related actions described above, two additional online actions are distinguished under this category: translate and re-translate. The first refers to any given ST unit of whatever length that was translated without any interruption. This type of action was taken to represent relatively uncontrolled/automatic processing. The latter refers to any modifications done to existing translation units as a consequence of translation revisions. Revisions, pauses, and Web search tasks performed for translation problem solving, among others, were taken to indicate relatively controlled/non-automatic processing (see Chapter 3 for details on indicators of problem solving).

9. Error

Web pages neither found nor loaded correctly.

10. Autocomplete

Words, text strings and/or URLs that the participants wanted to type, but which were predicted and completed by a Web browser, search engine (or any other query tool), word processor, etc., based on text elements previously typed.

11. Comments

Additional contextual information aiming at facilitating a better understanding of an online action or series of actions.

APPENDIX 6

Tr1 P0a 04:52.593

Time	Win/ Tab	Action	URL	Query	Link/Tab text	Button text	Select/ Highlight	Translation	Comments
		reading the ST							
01:21		clicks MF icon in TB							
	MF	resizes and repositions MF window							
01:44	Tab1	writes QT		piezo(electric)					autocompleted suggestion
		Scroll/ looking at SR's							8,3M hits
01:57		Right clicks 1SR link			Piezoelectricity - Wikipedia, the free encyclopedia				
01:58		clicks Menu command					Open Link in New Tab		creates Tab2
		Scroll/ looking at SR's							
02:06		R clicks 5th SR link			Piezoelectricity - HyperPhysics				
02:07		clicks Menu command					Open Link in New Tab		creates Tab3
		Scroll/ looking at SR's							
02:18		R clicks 8th SR link			Piezoelectric materials				
02:19		clicks Menu command					Open Link in New Tab		creates Tab4
		Scroll/ looking at SR's							
02:26		Opens new tab Ctrl+T							creates Tab5
02:27	Tab5	Writes new QT in URL bar	sanakirja.fi						
02:58		logs in to MOT							

Time	Win/ Tab	Action	URL	Query	Link/Tab text	Button text	Select/ Highlight	Translation	Comments
03:32		resizes MF window to full screen							
03:38		accesses MOT							
03:41		resizes MF window							
03:42		writes QT in MOT		piezo					
03:47		click autosuggested QT		piezoelectric					
03:53		Opens new tab Ctrl+T							creates Tab6
03:54	Tab6	writes in URL bar		pietsosähköinen nanojohdot					
		Scroll/ looking at SR's							1 hit
04:20		R clicks SR link			[PDF] URN_NBN_fi_jyu-20 - JyX - Jyväskylän yliopisto				
04:21		clicks Menu command					Open Link in New Tab		creates Tab7
04:25		modifies QT/BS		pietsosähköinen					
		Scroll/ looking at SR's							18.9k hits
04:46		R clicks 3rd SR link			Mikä pietsosähkö? - Tekniikka&Talous				
04:47		clicks Menu command					Open Link in New Tab		creates Tab8
04:52	TL2U	repositions TR window							

P0b 03:33.735

Time	Win/ Tab	Action	URL	Query	Link/Tab text	Button text	Select/ Highlight	Translation	Comments
04:54	Tab6	reaccess MF/clicks Tab6			pietso...				
04:55	Tab 5	reaccess MOT			MOT				

Time	Win/ Tab	Action	URL	Query	Link/Tab text	Button text	Select/ Highlight	Translation	Comments
04:56		replaces prev QT		bulk					
05:14	Tab8	accesses page	www.tekniikkatalous.fi/incoming/article40555.ece		Mikä...				
05:17		Crtl+T							creates Tab9
05:18	Tab9	writes QT in URL bar		bulkkikristallit					no hits
		Scroll/ looking at SR's							196k hits for bulkki+kristallit
05:41		clicks Goooogle to access SR page 2							
		Scroll/ looking at SR's							
05:53		clicks Goooogle to access SR page 3							
		Scroll/ looking at SR's							
06:08		clicks Goooogle to access SR page 4							
		Scroll/ looking at SR's							
06:20		clicks Goooogle to access SR page 5							
		Scroll/ looking at SR's							
06:22		Clicks Operation button/ modifies search settings				Hakutyökalut			
06:24		clicks Mod. menu link				Kaikki kielet			
06:25		selects only Finnish pages				suomenkieli-siltä sivuilta			

APPENDIX 7

Table A: Tr1 Total QT list per IS pause

P. ID	Time	Query terms	Source
P0a	04:52.593	piezo(electric)	Google
		piezo	MOT
		piezoelectric	MOT
		pietsosähköinen nanojohdot	Google
		pietsosähköinen	Google
P0b	3:33.735	bulk	MOT
		bulkkikristallit	Google
		bulkki kristallit -lego	Google
		kemia bulkki	Google
A	37.000	kide	MOT
		bulkkikide	Google
		bulkki+kide	Google
*)	*28.797*	*Lukutauko: Pietsosähkö*	*Tekniikk a& talous*
B	16.468	transducer	MOT
C	30.375	elektroniikka	MOT
		electronics	MOT
D	34.125	crystallinity	MOT
		kiteisyys	MOT
E	23.469	high-performance	MOT
F	28.610	"hyvin kiteinen"	Google
G	36.015	MoS2	Google
		MoS2+yksikerroksinen	Google
P1	1:37.875	MoS2 hiutale	Google
		MoS2 hiutale venytys	Google
		stretch	MOT
		MoS2 hiutale pidentää	Google
		MoS2 hiutale jännittää	Google
		MoS2 hiutale venyminen	Google
		MoS2 hiutale syklinen	Google
P2	00:58.453	cyclic	MOT
		MoS2 hiutale jaksollinen	Google
		cyclic stre	Google
		cyclic stretching	Google
P3	00:50.781	release	MOT
		cyclic stretching and release	Google
H	27.187	atomic layer	MOT
		atomikerros	Google
I	12.406	oscillate	MOT
J	07.578	voltage	MOT
P4	01:19.875	cirta	MOT
		virta	MOT
		output	MOT
		virtalähde	MOT
		current (loop)	MOT
		output	MOT
P5	05:10.187	current output virta	Google
		outpu	Schneider Electric Suomessa
		current output	Linguee
K	40.422	peak output	MOT
		peak	MOT
		peak output	Linguee
*)	*08.48*	*peak output*	*Linguee*
L	32.969	coupling	MOT
*)	*05.735*	*pietsösähkö*	*Google*
*)	*11.125*	*coupling*	*MOT*
M	25.781	application	MOT
P6	02:38.218	nanolaite	Google
		bioprobe	MOT
		bioprobe	Google
		bioprobe bioproo	Google
		prone	MOT
		probe	MOT
		biosondi	Google
		bioanturi	Google
N	13.703	adaptive	MOT
O	36.687	tunable	MOT
		tune	MOT
R	27.125	joustava	MOT
		stretchable	MOT
		stretchablity	MOT
P7	02:21.187	pA	Google
		pA sähkö ampeeri	Google
		petaa	Google
		petaampeeri	Google
		peta-ampeeri	Google
P8	01:05.141	millivoltti	Google
TOT.	32:32.10		

Table B: Tr2 Total QT list per IS pause

P. ID	Time	Query terms	Source
P0a	02:09.266	merriam	Google
		merriam webster	Google
		tepa ts	Google
P0b	01:30.922	nanowi	Wikipedia
P0c	02:07.875	bulk chrystal	Wikipedia
		bulk chrystal	Google
		pie	Wikipedia
P1	01:36.188	transducer	Wikipedia
		transducer	TEPA
P2	01:52.984	chrystallinity	Merriam-Webster
		chrystallinity	Google
		chrystallinity	TEPA
		chrystal	TEPA
A	21.953	väliaine	FI Wikipedia text search
		väli	FI Wikipedia text search
P3	01:30.047	chry	EN Wikipedia text search
		crys	Wikipedia text search
		crystallini	Wikipedia text search
		crystalli	Wikipedia text search
		krista	FI Wikipedia text search
		k	FI Wikipedia text search
		crystallinity	Merriam-Webster
P4	01.14:297	MoS2	Wikipedia
		yksikerroksinen molybdeenisulfidi	Google
		molybdeenisulfidi	Google
*)	*20.610*	*Lukutauko: Molybdeenidisulfidi*	*FI Wikipedia*
*)	*42.828*	*Lukutauko: Pietsosähköinen ilmiö*	*FI Wikipedia*
P6	01.14:312	power density	EN Wikipedia
		energiatiheys	Google
B	42.297	puolijohde	FI Wikipedia
		ominaisu	FI Wikipedia text search
*)	*20.516*	*Lukutauko: Puolijohde*	*Fi Wikipedia*
P7	01:19.875	powering nano	Google
		powering nano	EN Wikipedia
		powering	
P8	03:51.125	bioprobe	EN Wikipedia
		chrystal	TEPA
		bioprobe	TEPA
		bioprobe	Google
		probe	EN Wikipedia
		probe	Merriam-Webster
		bioprobe site:fi	Google
		bio	Google
		bioprobe site:fi	Google
P9	01:37.454	lääketieteen	Google
		bioprobe	Sanakirja.org
		probe	Sanakirja.org
		bioanturi	Google
TOTAL 23:44.47			

Table C: Tr3 Total QT list per IS pause

P. ID	Time	Query terms	Source
P0	05:12.06	pietsoelektrinen	Google
		nanowire	Google
		nanojohto	Google
		nanowire	Sanakirja.org
		nanowire	Google
		nanowire nanojohto	Google
		nanowire nanolanka	Google
		pietsosähköinen	Google
P1	02:41.093	bulk crystal	Google
		"bulk crystal"	Google
		bulk	Sanakirja.org
		bulk crystal	Sanakirja.org
		bulkkikristalli	Google
		bulkkikide	Google
		bulkki+kide	Google
A	42.547	transducer	Google
		transducer+muuntaja	Google
		transducer	Sanakirja.org
P2	01:43.125	energy conversion	Google
		convert	Sanakirja.org
		energy conversion	Sanakirja.org
		energiakonversio	Google
P3	03:01.766	chrystallinity	Sanakirja.org
		crystallinity	Sanakirja.org
		kiteytyminen	Google
		helppo kiteytyvyys	Google
		vahva kiteytyvyys	Google
		"vahva kiteytyvyys"	Google
		"helppo kiteytyvyys"	Google
		helposti kiteytyvä	Google
		"helposti kiteytyvä"	Google
P4	01:57.688	"korkea kiteytyvyys	Google
		"korkea kiteytyvyys"	Google
		crystallinity	Google
		crystallinity suomeksi	Google
		korkea kiteisyys	Sanakirja.org
		korkea kiteisyys	Google
P5	01:08.297	high performance	Google
		high performance tehokkuus	Google
		performance	Sanakirja.org
		high performance	Sanakirja.org
P6	02:39.890	yksikerroksinen mos2	Google
		mos2	Google
		yksi kerros atomeja	Google
		mos2	Google
		molybdeenidisulfidi	Google
P7	03:44.953	syklinen venytys	Google
		syklinen venytys ja vapautus	Google
		cyclic	Sanakirja.org
		toistuva venytys ja vapautus	Google
		toistuva venytys ja vapautus nanotekniikka	Google
		toistuva venytys nanotekniikka	Google

		toistuva venytys nanotekniikka - lihakset	Google
		syklinen venytys nanotekniikka - lihakset	Google
		syklinen venytys	Google
P8	01:41.016	syklinen venyttäminen	Google
		"syklinen venyttäminen"	Google
		"toistuva venyttäminen"	Google
		nanotekniikka testaus	Google
		nanotekniikka testaus rasitustestaus	Google
		nanotekniikka rasitustestaus	Google
		nanotekniikka rasitustesti	Google
P9	10:53.844	oscillating piezoelectric voltage	Google
		molybdeenidisulfidi-hiutale	Google
		oscillating	Sanakirja.org
		värähtelevä	Google
		värähtelevä pietsosähköinen	Google
		voltage	Sanakirja.org
		värähtelevä pietsosähköinen jännite	Google
		pietsosähköinen jännite	Google
		pietsojännite	Google
		pietsosähköinen värähtelevä jännite	Google
		pietso värähtelevä jännite	Google
		current	Sanakirja.org
		ouput	Sanakirja.org

		output	Sanakirja.org
		current output	Sanakirja.org
		output	Sanakirja.org
		current output	Google
		current output suomeksi	Google
B	22.953	ulostulojännite	Google
P10	01:18.578	jännite ja virta	Google
		ulostulojännite ja sähkö	Google
		ulostulojännite ja -sähkövirta	Google
*)	*32.656*	*Lukutauko Jännite*	*Wikipedia*
*)	*14.282*	*Lukutauko Jännite*	*Wikipedia*
P11	01:40.890	power density	Google
		power density	Sanakirja.org
		power density suomeksi	Google
P12	01:09.078	muunto mekaanisesta sähköiseen energiaan	Google
		mekaanisesta sähköiseen energiaan	Google
		muuntaminen mekaanisesta sähköiseen energiaan	Google
C	19.593	prediction	Sanakirja.org
D	14.296	coupling	Sanakirja.org
P13	01:53.407	powering nanodevice	Google
		adaptiivinen bioanturi	Google
		bioanturi	Google
		bioprobe bioanturi	Google
		probe	Sanakirja.org
E	42.671	tunable	Sanakirja.org

F	36.797	tehotiheys	Google
		tehotiheys power density	Google
P14	00:59.906	jännite ja virta	Google
		ulostulovirta	Google
P15	02:09.203	bulkkikide	Google
		bulk crystaös	Google
		bulk crystals	Google
		"bulk crystals"	Google
		bulk	Sanakirja.org
		massakide	Google
		bulkki kide	Google
G	26.281	pietsosähköinen materiaali	Google
H	47.047	optoelektroniikka	Google
TOTAL 48:53.92			

Table D

Tr1	Tr2	Tr3	Tr4	Tr5
piezoelectric	merriam webster	pietsoelektrinen	piezoelectric pietsoelektrinen	painesähköinen
piezoelectricity	tepa ts	nanowire	piezoelectric pietsosahkoiset	nanojohdin
pietsosähköinen nanojohdot	nanowire	nanojohto	pietsosahkoominaisuudet	nanowire
pietsosähköinen	nanolanka	nanowire nanojohto	pietsosahko ominaisuudet	thin film
bulkkikristallit	bulk chrystal	nanowire nanolanka	pietsosahkoiset ominaisuudet	ohutkalvo
bulkki kristallit	piezoelectricity	pietsosähköinen	nanowire nanosensors ...	bulk crystal
bulkki kristallit -lego	pietsosähköinen ilmiö	bulk crystal	nanowire nanolangat	bulkkikristalli
kemia bulkki		"bulk crystal"	nanowire suomeksi	"bulk crystala"
bulkkikide	kemia bulkki	bulkkikristalli	nanowires vtt.fi	" bulk crystals"
bulkki kide	energiatiheys	bulkkikide	"ja nanokristallit" vtt.fi	modern aspects of bulk crystal and thin film preparation
"hyvin kiteinen"	power density	bulkki kide	nanokristallit vtt.fi	twodimensional materials
MoS2	energiatiheys	transducer	nanokristallien vtt.fi	mos_2
MoS2 yksikerroksinen	puolijohde	transducer muuntaja	nanolangat	mechanical-to-electrical energy conversion
MoS2 hiutale	powering nano	energy conversion	nanolangat "nanowires"	energian muuntaminen mekaanisesta sähköiseksi
MoS2 hiutale venytys	powering	convert	nanolangat "thin films"	energian muuntaminen
MoS2 hiutale pidentää	bioprobe	conversion	ohutfilmit "thin films"	bioprobes
MoS2 hiutale jännittää	probe	energiakonvertio	ohutfilmit "thin films" vtt	kristallit
MoS2 hiutale venyminen	bioprobe site:fi	chrystallinity	"bulk crystals" vtt	kristalli wikipedia
MoS2 hiutale syklinen	lääketieteen sanakirja	crystallinity	"bulk crystals" suomeksi	kide
MoS2 hiutale jaksollinen	bioanturi	crystallization	"bulk crystals" ~kristallit	pietsosähköinen ilmiö
cyclicstreching		kiteytyminen	"bulk crystals" kristallit	nanolevy
cyclic streching and release		kiteyttäminen	epäorgaaniset kristallit	nanoliuska
atomikerros			epäorgaaniset kristallitvtt	ulostulo
current output virta			epäorgaaniset kristalli tvtt	current output
pietsosähköinen ilmiö			monikristallit vtt	energisointi
output current			monikristallit bulk crystal	mos_2 flakes
current output			monikristallit site vtt.fi	mos_2 hiutale
peak output			nanokristallit site vtt.fi	nano hiutale
nanolaite			bulkkikristallit site vtt.fi	korkea kiteisyys
bioprobe			bulk crystals site vtt.fi	"korkea kiteisyys"
bioprobe bioproo			"bulk crystals" site vtt.fi	"suuri kiteisyys"
biosondi			"bulk crystal" site vtt.fi	"kiteisyys"

bioanturi			bulkkikristallien	bioanturi
pA			sensors anturit	
pA sähkö ampeeri			sensor anturi	
petaampeeri			transducer suomeksi	
peta-ampeeri			"energy conversion" suomeksi	
millivoltti				
			(+ 104 more not listed here)	

SUOMENKIELINEN LYHENNELMÄ

1. JOHDANTO

Kääntäminen on toimintaa, joka yksinkertaisimmillaankin vaatii tietämystä lähde- ja kohdekielistä, käännettävän tekstin aiheesta ja tyylilajista sekä mahdollisesti lopputekstin kohdeyleisöstä. Ammattikääntäjälle voi olla mahdollista kääntää kaikein yksinkertaisimmat ja yleiskielisimmät sekä hänelle tutuimpien aihepiirien tekstit käyttämättä ulkoisia referenssimateriaaleja, mutta useimmiten hän tarvitsee olemassa olevan tietämyksensä lisäksi muuta informaatiota. Näin kääntäjälle siis muodostuu tarve löytää lisätietoa, joka kirjallisuuden perusteella useimmiten löytyy sanakirjan avulla.

Kääntäjän työ on kuitenkin muuttunut valtavasti iime vuosikymmenien aikana, ja useimmat käyttävätkin nykyään tietokonetta kynän ja paperin sijaan sekä elektronisia tietolähteitä perinteisten sanakirjojen sijaan. Sähköposti ja käännösmuistit ovat arkipäivää, moni nyt valmistuvista kääntäjistä voi enää vain haaveilla saavansa niin kutsutun in-house -kääntäjän paikan. Kääntäjän osaamisen on ollut näin ollen pakko mukautua teknologian mukana, ja kääntäjän työkaluihin kuuluvatkin nykyään erottamattomasti niin tietojenhakutaidot kuin informaatioteknologian käytön vaatimat tekniset taidot.

Tiedonhakutaitojen keskeisyys on noussut entistä tärkeämmäksi nyt, kun internet on arkipäivää, koska oikean tiedon löytäminen internetin syövereistä voi joskus muistuttaa lähinnä neulan etsimistä heinäsuovasta. Kääntäjiä voikin ensisijaisesti kutsua tietotyöläisiksi, koska kääntäminen on läpi koko käännösprosessin riippuvainen informatiosta. Ei siis enää riitä, että kääntäjä on asiantuntija tiedonhaussa, vaan hänen on osattava arvioida käsittelemäänsä ja löytämäänsä tietoa niin omalla äidinkielellään kuin työkielilläänkin. Tämä tutkimus pyrkii selvittämään ammattikääntäjien tiedonhaun piirteitä, kun heillä on käytössään ainoastaan internetlähteitä. Tutkimus pyrkii kuvaamaan miten he etsivät tietoa internetistä eikä pelkästään luettele heidän käyttämiään tietolähteitä. Tarkoituksena on osoittaa, että myös ammattikääntäjien on tarpeen ylläpitää tiedonhakutaitojaan sekä näyttää, että he eivät voi rakentaa tiedonhakuaan ainoastaa verkosta löytyvien tietolähteiden varaan. Tämän lisäksi tutkimuksella haluataan muistuttaa, miten tärkeä

osa kääntäjäkoulutusta on kriittinen lukutaito, sillä kääntämisestä on tulossa entistä vahvemmin internetiin sidottu ammatti.

2. KÄÄNTÄMINEN, TIETO JA INFORMAATIO

Kuten johdanossa jo todettiin, kääntämisessä ei riitä pelkästään jo omaksuttu tieto , ja sekä lähde- että kohdekielen tuntemuksen on oltava erinomaista. Useimmiten kääntämisen apuna käytetyt ulkoiset informaatiolähteet ovat sanakirjoja, joiden käyttöä on ensisijaisesti tutkittu informaatio- ja kirjastotieteissä. Tämä luku keskittyy kuvaamaan kääntämisen, tiedon ja informaation välisiä suhteita sekä luomaan katsauksen informaatiotieteissä (IT) ja tiedonhallinnan alalla mutta myös käännöstieteissä tehtyihin tutkimuksiin.

Kääntäjä tietoasiantuntijana

Tieto ja informaatio ovat kääntämisen keskiössä, sillä ilman niitä kääntäjän ona mahdotonta suorittaa tehtäväänsä. Risku (2013:4) onkin todennut, että kääntäjän on ehdottoman tärkeää kyetä käyttämään niin sisäisiä kuin ulkoisiakin tietovarojaan. Hänen mukaansa kääntäjät ovat riippuvaisia niin omasta osaamisestaan, tietopääomastaan ja luovuudestaan kuin mahdollisuudesta käyttää hyväkseen teknisiä ja sosiaalisten suhteiden mahdollistamia tietolähteitään. Risku, Dickinson ja Pircher (2010:88) puolestaan sanovat kääntäjien olevan erinomaisia hallinnoimaan tietoa. Kirjallisuudessa esitettyjen mallien pohjalta voidaankin todeta Riskun väitteen olevan totta, ja kääntäjien todellakin lukeutuvan tietoasiantuntijoiden joukkoon.

Kääntäminen, teknologia ja käännöskompetenssit

1990-luvun alussa sellaiset termit kuten tietokoneavusteinen kääntäminen tai konekääntäminen eivät vielä kuuluneet kääntäjien arkisanastoon. Nyt näiden teknisten kehitysaskelten mukanaan tuomien käsitteiden lisäksi käännösala on kokenut globalisaation, mikä näkyy niin kääntämisen ammatinkuvassa kuin itse prosessitasollakin. Siksi onkin katsahdettava myös siihen, millaisia kompetensseja kääntäjiltä nykyään vaaditaan.

2000-luvulla käännöstieteen saralla on ollut käynnissä useampi suuri tutkimus, joka on liittynyt käännöskompetenssiin yleensä, sen osa-alueisiin ja myöhemmin myös sen kehittymiseen. Esimerkiksi PACTE ja EMT -asiantuntijaryhmä on

julkaissut oman teoreettisen mallinsa käännöskomptensseista, mutta näiden lisäksi aihetta ovat tutkineet muun muassa Anthony Pym ja Birgitta Englund-Dimitrova. 2003 julkaistussa PACTEn mallissa yksi käännöskompetenssin osa-alueista on nimetty *välineelliseksi kompetenssiksi (*instrumental sub-competence), joka viittaa tietotaitoon informaatio- ja tietokoneteknologian sekä dokumentteihin liittyvien resurssien käytössä. EMT-ryhmän 2009 rakentama malli puolestaan pohjautuu ammattikääntäjiltä vaadittuihin taitoihin ja pyrkii toimimaan apuvälineenä kääntäjäkoulutuksen suunnittelussa tarjoamalla niin kutsutun minimivaatimuslistan. EMT:n mallissa edellä mainittua välineellistä kompetenssia vastaa lähinnä siinä mainittu *tiedonlouhinnan* osatekijä (info mining), joka sisältää mm. tietotyökalujen kuten hakukoneiden ja termityökalujen käytön osaamisen, informaatiotarpeiden tunnistamisen sekä oleellisen tiedon löytämisen ja käsittelyn suoritettavana olevan tehtävän vaatimalla tavalla. Edellä mainittujen lisäksi tähän osa-alueeseen kuuluu myös taito arvioida tietolähteiden luotettavuutta.

Molemmat esitellyt mallit osoittavat, kuinka moninaisia taitoja kääntämisessä tarvitaan ja kuinka monimutkaista prosessia niissä mallit yritetään kuvata. Jälkimmäisenä esitelty EMT-malli soveltuu selkeästi paremmin kuvaamaan nykypäivän kääntämistä, koska siinä on otettu huomioon myös teknisen kehityksen aiheuttamat muutokset tietolähteissä ja työvälineissä, kun taas PACTEn mallissa välineellinen osaaminen kuvaa lähinnä ATK-taitoja ja painettujen referenssimateriaalien käyttöön liittyviä taitoja. Tätä kehitystä tapahtuu koko ajan ja käännöstyökalut muuttuvat, joten myös kääntäjien on kehitettävä itseään jatkuvasti.

Käännösalan ammatilliset vaatimukset

Käännöskompetenssien teoreettinen mallintaminen ei kanna hedelmää, jos ne eivät kuvaa todellista käyttäytymistä. Chodkiewicz (2012) teki kyselytutkimuksen, jolla hän selvitti, miten oleellisina ammattikääntäjät ja käännöstieteen opiskelivat pitivät edellisessä jaksossa esitellyn EMT-mallin eri osia. Hän selosti tuloksiaan Journal of Specialised Translation -lehteen kirjoittamassa artikkelissa, jossa hän kertoo molempien ryhmien pitäneen tärkeimpinä käännöskompetenssin osatekijöinä kielitaitoa, kulttuurien väliseen viestintään sekä tiedonlouhintaan liittyviä taitoja. Muita työelämän vaatimuksiin keskittyviä tutkimuksia ovat tehneet muun muassa Suojanen (2009), Hänninen (2007) ja Laurila (2012). Kaikkein tuoreinta tutkimusta tästä aiheesta edustavat kuitenkin Toivanen (2013) ja Uppa (2014), jotka molemmat

tekivät kyselytutkimuksen, mutta eri kohderyhmille. Toivanen kartoitti käännösalan koulutuksen ja työelämän ammattilaisten näkemyksiä tämän hetkisistä ja tulevista vaatimuksista, kun Uppa puolestaan lähestyi kyselyllään yhtä kääntäjiä työllistävää toimijaa eli käännöstoimistoja. Toivasen mukaan tiedonhaun taidot olivat etualalla tarkasteltaessa kääntäjien ammatin vaatimuksia nykyään. Molemmissa tutkimuksissa teknologiset taidot sijoittuvat korkealle ja niiden lisäksi mainittiin myös yrittäjyyteen liittyvät taidot.

Uusia kompetensseja

Riskua mukaillen kääntäjien on siis osattava nykyään arvioida tietolähteensä laatua sen lisäksi, että hän osaa käyttää niitä luovasti (2013:5). Sähköisessä muodossa käytetävät tietolähteet ovat usein kopiota aiemmin julkaistuista painetuista alkuperäislähteistä, mutta kaikki verkosta löytyvä tieto ei suinkaan ole kääntäjän kannalta käyttökelpoista. Siksipä lähdekritiikki on entistä tärkeämpää, minkä on ottanut huomioon esimerkiksi Pym (2013). Hänen mukaansa kääntämisessä on internetin valtakaudella enemmänkin kysymys siitä, kuinka kääntäjä valikoi oikean vastineen kaikista tarjolla olevista kuin siitä, että hän itse keksisi ratkaisun kohtaamaansa käännösongelmaan. Pym ottaakin artikkelissaan kantaa siihen, millaisia kompetensseja kääntäjillä tällä hetkellä tulisi olla, kun työ vaatii yhä useammin käännösmuistien ja jopa konekäännösten käyttöä. Hän jakaa ne kolmeen ryhmään, joista ensimmäinen on jatkuvan oppimisen omaksuminen, toinen liittyy siihen, että kääntäjän on osattava sekä luottaa saamaansa dataan, kuten esimerkiksi käännösmuistiin, että katsottava sitä kriittisesti, ja kolmas siihen, että kääntäjien on opittava editoimaan käännöksiä teksteinä. Pymin toinen ryhmä korreloi suoraan Upan tutkimuksessa paljastuneen työelämän vaatimuksen kanssa, koska käännöstoimistot useimmiten vaativat kääntäjiltä käännösmuistityökalujen käytön osaamista.

Vaikka käännöstyökalujen käyttöä opetetaankin jossain määrin kääntäjäkoulutuksen aikana, itse tiedonhakuun ja tietolähteiden arviointiin liittyviä kursseja ei koulutukseen sisälly, kuten Kudashev ja Pasanen (2005) huomauttavat. Näitä taitoja opetetaan heidän mukaansa vain käännöskurssien oheissisältönä, minkä he väittävät johtavan siihen, että valmistuvilla kääntäjillä on vain erinäisiä tiedonhaun taitoja kattavan osaamisen sijasta. Näiden tutkimustulosten perusteella onkin aiheellista väittää, että tiedonhakuun liittyviä taitoja tulisi opettaa

kääntäjäkoulutuksessa entistä enemmän. Tiedonhausta ja varsinkin internetin vaikutuksista tiedonhakuun on kuitenkin tehty tähän mennessä vain muutamia tutkimuksia. Sen vuoksi tarvitaan lisää tutkimusta siitä, miten internet on vaikuttanut käännöstyöhön ja miten kääntäjät etsivät, valikoivat ja käyttävät verkosta löytämiään tietolähteitä.

3. INFORMAATIO JA TIETO KÄÄNNÖSPROSESSISSA

Edellä on käyty läpi tiedon, informaation ja kääntämisen yhteyksiä. Tässä luvussa siirrytään tarkastelemaan, millaista tutkimusta tähän mennessä on tehty näistä aiheista ja esitellään kolme erilaista tapaa luokitella kääntäjien tiedonlähteitä.

Informaatiolajit ja kääntäjän apuvälineet

Kääntäjien käyttämää informaatiota lähdetään kirjallisuudessa useimmiten jakamaan kahteen yleisryhmään, jotka ovat informaation laji ja sen fyysiset edustumat eli representaatiot. Risku, Dickinson ja Pircher (2010, 89) ovat jakaneet kääntäjien tarvitseman tiedon seuraaviin lajeihin: 1) kieleen ja kääntämiseen liittyvä tieto, 2) kulttuuriin ja yhteiskuntaan liittyvä tieto, 3) yleistieto ja aiheeseen liittyvä tieto, 4) asiakassuhteisiin ja käännösalaan liittyvä tieto sekä 5) tietotekniset taidot. Nord (1997/2009) on puolestaan muodostanut oman typologiansa ammattikääntäjien käyttämistä tiedonlähteistä - tai kuten hän itse niitä nimittää kääntäjän apuvälineistä - jotka hän jakaa karkeasti kolmeen ryhmään: esineet, tekstit ja ihmiset. Kudashev ja Pasanen (2005) taas ovat luokitelleet kääntäjän tietolähteitä niiden eri piirteiden mukaan viiteen ryhmään, jotka ovat lähteen tyyppi, sen käyttötarkoitus, lähteen laajuus tai kattavuus, sen laatu ja viimeisenä sen ajankohtaisuus. Vaikka Nordin typologia sisältää kaikki kääntäjien tietolähteiden lajit, ei se tee eroa fyysisten ja sähköisten tietolähteiden välille kuten Kudashev ja Pasanen. Riskun, Dickinsonin ja Pircherin luokittelu on puolestaan vain yleisluontoinen eikä kohdistu ollenkaan varsinaisiin tietolähteisiin.

Kudashevin ja Pasasen mukaan kaikkein tärkein edellä mainituista ominaisuuksissa on kääntäjän kannalta tietolähteen laatu, mihin liittyvänä he nostavat esiin jo aiemmin käsitellyn aiheen eli lähdekritiikin. Kudashev ja Pasanen

korostavat tietolähteen ajankohtaisuutta, ja toteavat sen olevan olennainen tekijä tietolähteiden valinnassa.

Tietolähteiden käytön tutkiminen käännöstieteessä

Risku, Dickinson ja Pircher (2010, 10) tutkivat kääntäjien tietolähteiden lajeja myös siltä näkökannalta, kuinka helposti niiden käyttö voidaan esittää systemaattisessa muodossa. Heidän mukaansa yleistiedon ja lähtötekstin aihealueen osalta parhaiten voitiin operationalisoida referenssimateriaalien käyttö, kun taas koulutuksen tuomaa tietoa tai yleistä elämänkokemusta ei voitu systemaattisesti kuvata. Tästä syystä sanakirjojen ja muun painetun referenssimateriaalin käyttö käännösprosessissa on ollut yksi kääntämisen eniten tutkituista aiheista niin käännöstieteessä kuin kirjasto- ja informaatiotieteissä, vaikka Kudashev ja Pasanen huomauttavatkin, että painetut lähteet sisältävät useimmiten jo vanhentumutta tietoa, kun ne julkaistaan. Seuraavassa kappaleessa esitetään siitä huolimatta yleiskatsaus sanakirjojen käyttöön liittyvistä tutkimuksista ennen kuin siirrytään käsittelemään itse tutkielman varsinaista aihetta eli verkkolähteiden käyttöä käännöstyössä.

Painetut lähteet käännöstutkimuksen kohteena

Painettujen lähteiden, kuten sanakirjojen käyttöä on tutkittu usein ensisijaisesti kirjastotieteissä ja leksikografiassa 1990-luvulta asti. Muun muassa Atkins ja Varantola (1997) tutkivat käännöstieteen opiskelijoiden sanakirjan käyttöä ja havaitsivat, että käännöskoulutuksessa olevat koehenkilöt olivat tietoisempia siitä, millaisia ongelmia sanakirjojen käyttöön kääntämisen tietolähteinä liittyy kuin ns. noviisikääntäjät. Sánchez Ramos (2005) puolestaan havainnoi toisen ja viidennen vuoden käännösopiskelijoita ja totesi, etteivät opiskelijat olleet tottuneita elektronisten sanakirjojen käyttöön tietolähteinä. Lisäksi hänen mukaansa opiskelijoille tulisi opettaa myös muiden tietolähteiden kuin sanakirjojen käyttöä.

Käännöstieteen puolella yhden varhaisimmista tutkimuksista tässä aiheessa on tehnyt Riitta Jääskeläinen (1989), joka tutki ammattikääntäjien ja noviisikääntäjien tiedonhakua painetuista lähteistä. Hänen mukaansa kaikki koehenkilöt käyttivät ensisijaisena lähteenään sanakirjoja, mutta ammattikääntäjät valitsivat useimmiten yksikielisen sanakirjan, kun taas noviisit käyttivät enimmäkseen kaksikielistä sanakirjaa. Jääskeläisen tärkein tutkimustulos on kuitenkin se, että ammattikääntäjät käyttivät useita tietolähteitä yhden sijaan varmistaakseen löytämänsä tiedon

paikkansapitävyyden. Tässä tutkimuksessa on kuitenkin huomioitava, että Jääskeläisen ammattikääntäjien ryhmä koostui todellisuudessa viidennen vuoden käännöstieteen opiskelijoista eikä jo ammatissa toimivista kääntäjistä. Lisäksi tutkimustulosten laatuun käännösprosessin kuvaamisen kannalta on vaikuttanut siinä käytetty menetelmä (*think-aloud protocol),* jota on kritisoitu, koska se häiritsee käännösprosessia ja lisää kognitiivista kuormaa. Esimerkiksi Jakobsen (2003:79) on havainnut, että TAP-metodin käyttö johtaa käännösprosessin hidastumiseen.

Edellä mainituissa tutkimuksissa kohteina ovat olleet pääasiassa käännöstieteen opiskelijat, kun taas Nord (2009:210-215) tutki jo ammatissa toimivia kääntäjiä heidän normaalissa työympäristössään. Hän esitteli tutkimuksensa pohjalta tässä tutkimuksessa käytetyt käsitteet käyttötapaus (usage action) ja käyttökonteksti (usage context). Nordin mukaan on kyse käyttötapauksesta, kun kääntäjä käyttää yhtä tietolähdettä yhtä tarkoitusta varten, kun taas käyttökonteksti sisältää useamman peräjälkeen tapahtuvan käyttötapauksen, jotka liittyvät saman päämäärän saavuttamiseen. Nordin tulosten mukaan ammattikääntäjät keskeyttivät käännösprosessinsa tiedonhakua varten keskimäärin 17 kertaa tunnissa eli toisin sanoen kolmen ja puolen minutin välein. Tämän lisäksi Nord toteaaammattikääntäjien käyttävän sanakirjojen lisäksi myös paljon rinnakkaistekstejä, joiden käytön hän havaitsi lisääntyvän, mikäli lähtötekstin vaativuus kasvoi.

Domas White, Matteson ja Abels (2008) tutkivat samaan tapaan ammattikääntäjien tiedonhakua. Heidän mukaansa ammattikääntäjät suosivat ensisijaisesti sellaisia tietolähteitä, jotka olivat käyttäjäystävällisiä ja korkealaatuisia mutta ennen kaikkea käsillä olevaan käännöstyöhön sopivia. Heidän tutkimuksessaan kartoitettiin myös elektronisiin tietolähteisiin liittyviä käyttöongelmia, mutta näitä seikkoja ei ole käsitelty tässä tutkimuksessa, koska elektroniset tietolähteet kehittyvät nopeasti. Elektronisten tietolähteiden ja elektronisten sanakirjojen käyttöä on tutkttu myös viime vuosina(ks. Lew 2013, Lew ja de Schryver 2014 sekä Verlinde ja Binon 2010).

Internetin aikakausi: verkkolähteiden käyttö käännöstyössä

Verkkolähteiden käyttöä kääntämisen tiedonlähteinä on ryhdytty tutkimaan vasta 2000-luvulla. Esimerkiksi Kiukkonen (2006), Lahtinen (2013) ja Alonso (2015) ovat

tutkineet tätä aihetta yhdistäen käännöstieteen käsitteisiin informaatiotieteen teorioita ja käsitteitä, kuten tiedonhaku (*information seeking)* ja ja informaatiotarve (*information need)*. Lahtinen keskittyi tutkimuksessaan vain yhteen verkosta löytyvään tietolähteeseen eli Wikipediaan, kun taas Kiukkonen tarkasteli verkkolähteiden käyttöä yleensä. Siinä missä Lahtisen tutkimuskohteena olivat jo aiemmista tutkimuksistakin tutuiksi käyneet käännöstieteen opiskelijat, osallistui Kiukkonen kyselytutkimukseen yhteensä 158 kääntäjää, joihin lukeutui opiskelijoiden lisäksi myös ammattikääntäjiä. Myös Alonso kohdensi kyselynsä ensisijaisesti ammatissaan kääntämistä tekeville tai käännösalaan suoraan sidoksissa oleville ammattilaisille.

Kaikkien kolmen saamien tulosten mukaan verkkolähteiden ja varsinkin Wikipedian käytön ensisijainen syy oli niiden helppokäyttöisyys ja nopea saatavuus. Kiukkonen tarkasteli lähemmin, miten kääntäjät toimivat verkossa ja havaitsi, että suurin osa tiedonhausta tapahtui käyttämällä hakukoneita, joista tärkeimmäksi nousi Google. Muita tunnettuja verkkolähteitä olivat Kiukkosen tutkimuksessa jo mainittu Wikipedia, Encyclopaedia Britannica sekä verkkotietokannat Finlex ja Fennica. Kiukkonen toteaakin, että internetistä on tullut kääntäjien tärkein tietolähde.

Kääntäjien tiedonhaun toimintamallit

Edellä mainitut tutkimukset ovat keskittyneet lähinnä kartoittamaan, mitä kaikkia tietolähteitä kääntäjät käyttävät internetin kautta. Tähän mennessä on tehty ainoastaan muutama tutkimus, jossa on itse tiedonlähteiden lisäksi tarkasteltu sitä, kuinka kääntäjä oikeastaan suorittaa tiedonhaun verkossa. Vuonna 2011 Vanessa Enríquez Raído tutki lisensiaatintyössään, miten käännöstieteen opiskelijat suorittavat tiedonhakunsa verkossa ja kirjoitti vuonna 2014 aiheesta tutkimuksensa pohjalta myös kirjan, *Translation and Web searching.* Vuonna 2014 on tehty myös samankaltainen tutkimus, jonka aiheena oli tiedonhaussa käytetyn kielen vaikutus itse tiedonhakuun. Salmi ja Chevalier (2014) tarkastelivat, miten ranskaa äidinkielenään puhuvat ja toisaalta sitä vieraana kielenään puhuvat opiskelijat suoriutuivat tiedonhausta verkossa. Kolmannen aiheeseen liittyvän tutkimuksen ovat tehneet Alves jad Liparini Campos (2009), jotka puolestaan tarkastelivat, millä eri tavoilla kääntäjät yhdistelivät ulkoisia tietolähteitä omaan tietopohjaansa, kun käännösprosessiin sisällytettiin joko käännösmuisti, aikarajoite tai molemmat.

Enríquez Raídon (2011) pääväite on, että kääntäjien osaamistaso ja lähtötekstin vaativuustaso vaikuttavat suoraan heidän käyttämiinsä verkkolähteisiin. Hänen mukaansa opiskelijoiden tietolähdevalikoiman laajuutta rajoittaa ensisijaisesti niihin liittyvän tiedon ja koulutuksen puute, kun taas ammattikääntäjät käyttävät kääntäessään laajasti erilaisia verkkolähteitä. Aiempi tietopohja lähdetekstin aiheesta näkyi Enríquez Raídon mukaan pienempänä määränä informaatiotarpeita ja erityisesti lähtötekstiin liittyviä tiedonhakutapauksia. Alves ja Liparini Campos (2009:203) raportoivat vastaavasti, että ammattikääntäjät käyttivät pääasiallisesti jo omaksumaansa tietoa hyväkseen ratkaistessaan käännösongelmia. Salmi ja Chavalier (2014) puolestaan havaitsivat, että tiedonhakussa käytetty kieli saattaa vaikeuttaa tuloksellista tiedonhakua, jos se on joku internetissä vähemmän käytetyistä kielistä. Heidän mukaansa koehenkilöt pyrkivät useimmiten kompensoimaan tätä seikkaa joko etsimällä tietoa englanniksi tai pyrkimällä löytämään lähteitä, joissa sisältö olisi saatavana useammalla eri kielellä.

4. TUTKIMUSKOHTEENA AMMATTIKÄÄNTÄJIEN TIEDONHAKU

Kääntäjien tiedonhakua on Suomessa tutkittu tähän mennessä vain kyselytutkimuksien avulla. Tämä tutkimus on sen sijaan tehty prosessintutkimuksen lähtökohdista ja se keskittyy kuvaamaan ammattikääntäjien tiedonhakua, kun se perustuu ainoastaan verkkolähteisiin. Tämän tutkimuksen mallina ja innoittajana on toiminut edellä käsitelty Enríquez Raídon tutkimus. Sen lähtökohta on kuitenkin hieman erilainen kuin mallitutkimuksensa, sillä toinen käännösprosessiin liittyvistä kielistä on ns. vähemmistökieli internetiä hallitsevan englannin kielen rinnalla. Tämän tutkimuksen ensisijainen tarkoitus on kuitenkin omalta osaltaan tuottaa lisää tempiiristä utkimusta mainitusta aiheesta.

Koehenkilöt

Tämän tutkimuksen koehenkilöiksi valikoituivat ammattikääntäjät, sillä koehenkilöitä etsittäessä heitä ilmoittautui halukkaiksi osallistujiksi enemmän kuin oli alun perin odotettu. Heidät saatiin mukaan kahdella eri lähestymistavalla: kolme kääntäjää vastasi Facebookin Hei me käännetään! -ryhmässä esitettyyn kysymykseen, jossa etsittiin Turun alueella asuvia ryhmän jäseniä. Neljä muuta ammattikääntäjää löytyi SKTL:n postituslistalle lähetetyn kirjeen avulla. Kaikki seitsemän kääntäjää vastasivat heille lähetettyyn taustatietokyselyyn, mutta

lopulliseksi otokseksi muokkaantui heistä viisi. Kaikki osallistuvat olivat valmistuneet pääaineenaan joko käännöstiede tai filologia ja heidän äidinkielensä oli suomi. Englanti sen sijaan oli heidän kaikkien toinen työkielensä. Työkokemuksessa koehenkilöiden välillä oli kuitenkin jonkin verran hajontaa, koska tutkimuksessa asetettiin kriteereiksi ainoastaan se, että koehenkilöt toimivat aktiivisesti kääntäjinä joko osa-aikaisesti tai päätoimisesti. Taustatietolomakkeella kerätyn tiedon perusteella kaikilla heistä oli kuitenkin vähintään neljä vuotta kokemusta ammattimaisesta kääntämisestä. Myös koehenkilöiden erikoistumisalat vaihtelivat, mutta niiden pohjalta lähtötekstin aihepiiri valittiin sellaiseksi, ettei se ollut suoranaisesti kenenkään erikoisalaa. Jo mainitulla taustatietolomakkeella kerättiin tietoa koehenkilöiden kielitaidosta, koulutuksesta sekä siitä, miten paljon he käyttivät internetiä tai mihin.

Metodit

Tässä tutkimuksessa käytettiin kolmen tutkimusmetodin yhdistelmää kuten mallitutkimuksessakin. Sen on myös osoitettu olevan oiva tapa saada enemmän tietoa tutkimuskohteesta kuin vain yhtä metodia käyttäen olisi mahdollista saada. Tämä pätee erityisen hyvin prosessintutkimuksessa. Tässä tutkimukseen valitut tiedonkeruun välineet olivat Translog-II näppäimistön seurantaohjelma, Camtasia näyttövideointiohjelma sekä kaksi Webropolin avulla toteutettua kyselylomaketta. Näistä kahta ensimmäistä käytettiin aineistonkeruuseen koetilanteessa, kun kyselyt taas toimivat lisäaineistona. Koetilanteiden aikana kerääntyneet internethistoriat otettiin myös talteen.

Translog-II ja Camtasia ovat molemmat tietokoneohjelmia, joista ensimmäisen on kehittänyt Arnt Lykke Jakobsen jo 20 vuotta sitten, ja toinen on TechSmith -nimisen yrityksen lisenssituote. Molempien ohjelmien vahvuus tiedonkeruun välineinä on se, että ne mahdollistavat käännösprosessiin suoran havainnoinnin ilman, että ne vaikuttavat merkittävästi itse prosessiin.

Translog rakentuu kahdesta komponenetista, Translog Supervisorista ja Translog Userista. Supervisor mahdollistaa Translog-projektien luomisen, muokkaamisen sekä kerätyn aineiston analysoinnin. Ohjelman User-osaa käyttää lähinnä itse koehenkilö aktivoidessaan käännöstestin sen avulla. Translogin tuottamia tiedostoja voidaan käsitellä ja toistaa ainoastaan Translog-ohjelmalla, mistä syystä

tällä ohjelmalla kerätty aineisto tallennettiin kokeessa käytetylle tietokoneelle ja säilytettiin siinä analysoimista varten.

Camtasia on puolestaan tietokoneohjelma, jolla voidaan tallentaa joko kaikki tietokoneen näytöllä näkyvä toiminta tai vain osa siitä. Myös Enríquez Raído käytti tätä metodia omassa tutkimuksessaan ja totesi sen olevan erinomainen tutkimusväline. Camtasian hyötyihin lukeutuu myös se, että sen tuottamat erikoistiedostot voidaan editoida ja muuntaa useaan eri tiedostoformaatiin, kuten esimerkiksi MP4-tiedostoiksi, niin kuin tässä tutkimuksessa tehtiin. Näin ollen kerättyä aineistoa voidaan tarkastella myös itse ohjelmaa käyttämättä useilla eri videontoisto-ohjelmilla sekä myös jakaa tarvittaessa muille.

Molempia edellä mainittuja ohjelmia käytettiin siis yhtä aikaa saman käännösprosessin tallentamiseen. Näin saatiin talteen enemmän informaatiota kuin kumpikaan ohjelmista pystyy yksin keräämään: Translog-II ei kerää tietoa oman ikkunansa ulkopuolella tapahtuvista toiminnoista, joihin lukeutuu myös tiedonhaku internetistä. Tätä varten käytettiin rinnakkaisvälineenä Camtasiaa, jolla saatiin talteen kaikki tiedonhakuun liittyvät toimet käännösprosessin aikana. Camtasia ei kuitenkaan kerää tarkkaa aikakoodattua dataa kuten Translog, joten sitä ei voida käyttää tiedonhaun ajallisen keston tarkkailuun yhtä luotettavasti kuin Translogia, joka kerää vastaavan informaation sekunnin sadasosien tarkkuudella. Näin ollen ohejlmien yhteiskäyttö loi vahvemman aineiston kuin olisi ollut mahdollista kerätä käyttäen vain jompaa kumpaa.

Tutkimuksessa käytettiin myös kyselytutkimusta, joskin pienimuotoisesti. Koehenkilöt täyttivät ennen itse käännöskokeeseen osallistumista taustatietolomakkeen ja kokeen jälkeen toisen kyselyn, jonka tarkoitus oli kerätä retrospektiivistä tietoa käännösprosessista. Molemmat kyselyt luotiin mallitutkimuksessa käytettyjen kysymyspatterien pohjalta muokkaamalla niitä tähän kyselyyn sopiviksi. Taustakyselyn sisältö otettiin pitkälti Enríquez Raídon (2011) käyttämästä kyselystä, kun taas loppukysely muokattiin hänen käyttämästään introspektiivisestä kyselystä (ks. Enríquez Raído 2011: 519-532).

Koeasetelma

Tutkimusta varten hankittiin kannettava tietokone, jolle asennettiin käännöskokeessa käytettävät aineistonkeruuvälineet eli Translog-II ja Camtasia. Näistä ensimmäinen on vapaasti saatavilla osoitteessa bridge.cbs.dk, ja toinen on maksullinen

lisenssiohjelma, joka ostettiin TechSmithiltä ja ladattiin koneelle sähköpostiin saadun linkin kautta. Näiden ohjelmien lisäksi koneeseen asennettiin jo siinä olleen IE-selaimen lisäksi Google Chrome ja Mozilla Firefox sekä Open Office.

Koetta varten luotiin Translogissa uusi projekti, joka nimettiin Graduksi. Valittu lähtöteksti oli tieteellisen artikkelin abstrakti, jota hieman lyhennettiin kokeeseen sopivaksi. Artikkeli ja lähtötekstin alkuperäinen versio löytyvät osoitteesta www.nature.com/nature/journal/v514/n7523/full/nature13792.html.

Itse koejärjestelyt toteutettiin Turun yliopiston tiloissa luokassa, joka on alunperin suunniteltu tulkkausharjoittelua varten. Tämä mahdollisti sen, että koehenkilö voitiin sijoittaa erilliseen työtilaan, joka soi hänelle keskittymisrauhan huolimatta siitä, että tutkija ei poistunut samasta tilasta kokeen ajaksi. Tietotekniset jätjestelyt kuten aineistonkeruuohjelmien aktivointi ja internetyhteyden avaus suoritettiin jokaisen koetilanteen alussa ennen koehenkilön saapumista paikalle.

Koehenkilöt saivat paikalle tultuaan kaksi paperia, joista toisessa annettiin lyhyt toimeksianto ja toisessa taas ohjeistus koetilanteessa toimimiseen. Lisäksi heitä ohjeistettiin suullisesti noudattamaan toimeksiantoa sekä käyttämään mitä tahansa tietolähteitä, joihin he internetiä käyttämällä pystyivät hyödyntämään. Käännösprosessin aloittamiseksi koehenkilöiden tuli aktivoida Translog-istunto klikkaamalla Translog User -ikkunassa näkyvää tekstiä *Start logging*. Tämän jälkeen he käänsivät uuteen Translog-ikkunaan avautuneen lähtötekstin toimeksiantoa noudattaen ja ainoastaan nettilähteitä käyttäen. Kun koehenkilö katsoi olevansa valmis, hän lopetti Translog-istunnon klikkaamalla tekstiä *Stop logging* Translog-ikkunan ylälaidassa. Tämän jälkeen tutkija lopetti Camtasia-videoinnin ja tallensi kerätyn datan. Kokeen jälkeen koehenkilöt täyttivät loppukyselyn toisella tietokoneella.

Aineisto

Tutkimuksen aineisto koostui kolmesta osa-aineistosta: kolmesta Translog-tiedostosta, viidestä MP4 tiedostosta sekä kahden kyselyn vastauksista. Näiden lisäksi alustavan analyysin tekemiseen käytettiin koetilanteista syntyneitä internethistorioita.

Aineistoa käsiteltiin sekä laadullisin että tilastollisin menetelmin. Translog-II sisältää puoliautomaattisia analyysivälineitä, joita käyttäen Translog-aineistosta otettiin lineaarinen kuvaus, joka sisälsi kaikki yli viisi sekuntia kestävät tauot. Tämän

kuvauksen avulla paikannettiin aineistosta sellaiset tauot, joiden voitiin niiden pituuden perusteella olettaa johtuvan tiedonhausta. Camtasian tuottamia näyttövideoita editoitaessa ne siivottiin vastaamaan Translogin tallentaman prosessin pituutta. Näin ollen lineaarikuvauksessa näkyvät tauot voitiin helposti paikantaa videosta. Näyttövideot käytiin läpi tiedonhakua sisältävien taukojen osalta ja kääntäjien suorittamat toiminnot kerättiin taulukkomuotoon käyttämällä samaa luokittelua (ks. liite 5) kuin Enríquez Raído (2011). Tämän jälkeen aineistosta eroteltiin muun muassa tiedonhaun ajallisia ja kielellisiä ominaisuuksia sekä käytettyihin tietolähteisiin liittyviä seikkoja omiin taulukkoihinsa.

5. Ammattikääntäjien tiedonhakutoiminnot

Tämän tutkimuksen tarkoituksena oli selvittää ja tarkastella, miten ammattikääntäjät suorittavan tiedonhakunsa, kun käytettävissä on vain internetlähteet. Alustava analyysi suoritettiin tallennettujen internethistorioiden pohjalta ennen varsinaista Translog- ja Camtasia-aineistoja koskevaa analyysia.

Alustavassa analyysissä paljastui lähinnä aiempien tutkimustulosten mukaisia seikkoja kuten se, että ammattikääntäjät käyttivät pääasiassa Google-hakuja tiedonhaussaan. Toiseksi eniten tehtiin verkkosanakirjahakuja ja kolmanneksi eniten käytetty lähde oli Wikipedia, kun taas aihekohtaisten rinnakkaistekstien käyttö oli suhteellisen vähäistä. Kielellisiä seikkoja tutkittaessa paljastui hakusanoissa eniten käytetyksi kieleksi suomi, mikä vastaa Enríquez Raídon (2011) saamia tuloksia. Toisaalta aineistosta löytyi myös hakuja, joissa oli käytetty suomea ja englantia yhdessä.

Kun käännösprosesseja tarkasteltiin lähemmin näyttövideointien ja Translogin keräämän datan avulla, voitiin kolmen ammattikääntäjän tiedonhakua analysoida tarkemmin kuin pelkkien internethistorioiden pohjalta. Ajallisten piirteiden analyysissä paljastui, että kaikki kolme käyttivät keskimäärin tunnin käännöksensä tekemiseen. Heidän välillään oli kuitenkin suuria eroja siinä, kuinka paljon aikaa he käyttivät tiedonhakuun. Tr1 käytti siihen noin 60 prosenttia koko prosessiajasta, kun taas Tr2:en kohdalla vastaava luku oli noin 40 prosenttia ja Tr3:sen kohdalla lähes 73 prosenttia. Aineisto paljasti myös sen, että osa tiedonhausta sijoittui myös niin kutsuttuun orientaatiovaiheeseen, joka on se aika, jonka kääntäjä käyttää lähtötekstin lukemiseen ja muuhun vastaavaan toimintaan ennen itse kirjoitusprosessin

aloittamista. Tämä tulos poikkeaa Alvesin ja Liparini Campoksen havainnosta, jonka mukaan ammattikääntäjillä ole yleensä erillistä orientaatiovaihetta, mistä syystä se ei heidän mielestään ole analyysin kannalta oleellinen tarkastelun kohde. Tämän tutkimuksen tulokset osoittavat muuta, sillä koehenkilöiden orientaatiovaiheessa tekemät tiedonhaut olivat Tr1:llä 25,9 %, Tr2:lla 24,4 % ja Tr3:lla 10,6 % kaikesta tiedonhakuun käytetystä ajasta. Tr1 pysäytti käännöksen kirjoitusprosessin tiedonhakua varten yhteensä 30 kertaa, Tr2 piti 16 tiedonhakutaukoa ja Tr3 26, mikä tarkoittaa, että he pitivät keskimäärin 33, 16 ja 23 tiedonhakutaukoa tunnissa tässä järjestyksessä. Kun tätä tulosta verrataan Nordin (2009) raportoimaan tulokseen, 17 tiedonhakukontekstia tunnissa, voidaan todeta vain Tr2:n suoriutuneen käännöskokeesta vastaavalla tasolla.

Ammatikääntäjien yleisin tiedonhaun ensitoiminto poikkesi Enríquez Raídon (2011) saamista tuloksista, sillä vain yksi kolmesta tarkastelun kohteena olleesta ammattikääntäjästä eli Tr3 aloitti suurimman osan hauistaan Googlella, kun taas Tr1 aloitti tiedonhakunsa useimmiten sanakirjalähteistä ja Tr2 puolestaan Wikipediasta. Tr1:n toiminta muistuttaa Enríquez Raídon tulosten valossa siis lähinnä käännöstieteen opiskelijan toimintamallia, kun taas Tr3 olisi lähempänä sitä toimintaa, minkä Enríquez Raído tulkitsi ammattimaiseksi. Tr2 ei sovi näistä kumpaankaan, vaan hänen käytöksensä paljasti toimintamallin, jota Enríquez Raído ei ollut havainnoinut opiskelijoiden käyttävän ollenkaan. Tr2 aloitti nimittäin useimmat hakunsa suoraan Wikipedian omassa hakukentässä.

Tr3:n toimintamalliksi paljastui lopulta lähinnä Google-hakujen tekeminen ja niistä saatujen tulosten selailu, jota Enríquez Raído kutsuisi pintapuoliseksi tiedonhakutoiminnaksi (*shallow online search style)*. Sen päämääränä on lähinnä nopea tiedonhaku, jonka Enríquez Raído totesi olevan yleinen opiskelijoiden tiedonhakustrategia. Ammattikääntäjien tiedonhakuun hän liitti interaktionaalisen eli vuorovaikutteisen tiedonhaun, jossa kääntäjä syventyy tarkemmin tietolähteiden sisältöön ja etsiin kielellisen tiedon lisäksi myös runsaasti taustatietoa lähtötekstin aiheesta.

Loppukyselyssä kartoitettiin koehenkilöiden aiempaa tietotaustaa lähtötekstin aihepiiristä ja tarkasta aiheesta. Vain muutamalla viidestä koehenkilöistä oli sellaista aiempaa tietoa tai kokemusta LT:n aiheesta, josta oli heille hyötyä käännöstä tehdessä. Sen avulla he pystyivät tunnistamaan joitakin tekstissä esiintyneitä termejä. Kun heitä pyydettiin nimeämään, mitä muita lähteitä he olisivat halunneet käyttää

joidenkin tekstissä esiintyneiden termien selvittämiseksi, useimmiten mainittu tietolähde oli joku alaa tunteva tuttava. Toiseksi useiten mainittiin joku aiheeseen lähemmin liittyvä tietolähde, kuten esimerkiksi alan sanastosta kerätty käännösmuisti tai joku sellainen tietokanta, johon heillä ei kokeen aikana ollut pääsyä.

Lopuksi koehenkilöitä pyydettiin arvioimaan oman kohdetekstinsä laatua. Heiltä myös tiedusteltiin, kuinka todennäköisenä he näkivät sen, että luopuisivat tulevaisuudessa kokonaan painettujen tietolähteiden käytöstä. Vaikka kolme heistä näki nettilähteiden käytön olevan painettuja lähteitä helpompaa ja nopeampaa, ja siksi suosivat niitä, nosti neljäs kääntäjä esiin sen seikan, että netti voi joskus olla myös pois käytöstä, kun taas kirja ei. Viides kääntäjä ei käyttänyt työssään paljoakaan nettilähteitä, mikä johtui ensisijaisesti siitä, että hän työskenteli käännöstoimistossa eikä omalla toiminimellä kuten muut neljä.

6. Pohdintaa

Tässä tutkielmassa on tarkasteltu ammattikääntäjien tiedonhakutaitoja verkossa, jota on käännöstieteellisessä tutkimuksessa tutkittu tähän mennessä hyvin vähän. Internet on muuttanut tapaamme käsitellä informaatiota siinä määrin, että tässä tutkimuksessa esiin nostettujen seikkojen, kuten krittisen lukutaidon tutkimusta tarvitaan lisää. Niin jo alalla toimivat kuin sille valmistuvat kääntäjät tarvitsevat lisäkoulutusta informaatiolähteiden kriittisessä arvioimisessa, tiedonhaussa sekä tiedonhallinnassa. Tutkimalla ammattikääntäjien tiedonhakua voidaan selvittää, miten ja missä he ovat taitonsa hankkineet, mitkä niistä ovat todellisuudessa toimivia sekä mitä taitoja tuleville kääntäjille tulisi kääntäjäkoulutuksessa opettaa. Empiirinen tutkimus paljastaa, miten kääntäjät todellisuudessa etsivät tietoa sen sijaan, että se loisi vain teoreettisia malleja kääntäjien tiedonhausta. Tästä syystä olisi tärkeää, että useampi ammattikääntäjä osallistuisi vastaaviin tutkimuksiin, jos sellaisia tulevaisuudessa tehdään. Tällaisesta tutkimuksesta on hyötyä ennen kaikkea kääntäjäkoulutuksen suunnittelulle, sillä se antaa tietoa todellisista käännöstoimintamalleista. Tulevat kääntäjät tarvitsevat ensisijaisesti oikeita esimerkkejä siitä, miten verkkolähteitä tulisi käyttää käännöstyön apuna. Siksi tulisikin toistaa tämä tutkimus käyttämällä useita eri lähtötekstejä sekä molempia käännössuuntia. Lisäksi olisi mielenkiintoista, jos pystyttäisiin tekemään samanlainen pitkittäistutkimus kuin Nord (1997/2009) ja tarkastelemaan ammattikääntäjien tiedonhakua heidän normaaleissa

työolosuhteissaan. Camtasiaa olisi mahdollista hyödyntää sekä tällaisessa tutkimuksessa että opetusympäristössä, jossa sen retrospektiivinen käyttö auttaisi opiskelijoita havainnoimaan ja kehittämään omaan tiedonhakuprosessiaan ja verkkolähteiden käyttöä yleensä.

Metodien arviointia

Loppukyselyssä kääntäjiä pyydettiin arvioimaan käännöstehtävästä suoriutumiseen vaikuttaneita seikkoja asteikolla 1-5. Eniten prosessiin vaikuttaneiksi seikoiksi mainittiin vieras tietokone ja joukko vapaissa vastauksissa mainittuja muita seikkoja, joihin sisältyi muun muassa asiantuntijalähteiden käytön poissulkeminen, itse koetilanne sekä se, ettei kääntäjällä ollut selkeää käsitystä, mikä tasoinen lopputekstin tuli olla. Kaikille koehenkilöille oli kuitenkin kerrottu alkuohjeistuksessa, ettei kohdetekstin laatua tarkastella.

Koejärjestely osoitti toimivuutensa, vaikka kahdessa koetilanteessa Translog-dataa ei saatu tallennettua. Kukaan koehenkilöistä ei maininnut ohjelmien häirinneen suoritustaan, joten niiden voidaan katsoa toimineen huomaamattomina tarkkailuvälineinä, mitä kirjallisuudessa pidetään tärkeänä. Teknisten ongelmien ennakoimista varten olisi kuitenkin suotavaa toteuttaa ensin pilottitutkimus, jonka pohjalta koeasetelmaa voidaan tarvittaessa parantaa. Myös tarkemmasta koehenkilöiden valintaprosessista olisi hyötyä varsinkin isomman otoksen kohdalla.

7.

Yhteenvetoa

Tässä tutkimuksessa tarkasteltiin sitä, miten ammattikääntäjät suorittavat tiedonhakunsa pelkkien internetlähteiden varassa. Tutkimuksessa paljastui, että ammattikääntäjät käyttävät keskimäärin vähemmän aikaa yhteen tiedonhakukontekstiin kuin opiskelijat, mikä viittaisi siihen, että heillä on joko yleisesti laajempi tietopohja tai erilaisia saatavilla olevia nettilähteitä koskeva tietopohja. Lehtinen ja Palonen (2011) ovatkin todenneet, että suurin eri noviisien ja eksperttien välillä on yleensä siinä, että ekspertit osaavat keskittyä olennaiseen tietoon. Lisäksi he toteavat, ettei muodollinen koulutus voi kuin luoda lähtökohdan asiantuntijuuden kehittämiselle, sillä Ericssonin (Lehtinen ja Palonen 2011) mukaan tämän tason saavuttaminen vie tuhansia tunteja aikaa ja vaatii järjestelmällistä

harjoittelua. Tästä syystä myös tiedonhaun taidot kehittyvät hitaasti, jollei niitä harjoiteta jatkuvasti.

Tulokset osoittavat kuitenkin myös, että ammattikääntäjäkin turvautuu tiettyihin perusstrategioihin sekä parhaiten tuntemiinsa tietolähteisiin, kun hänellä ei ole käytössään käännöstyökaluja ja kun lähtötekstin aihepiiri ei kuulu hänen erikoisosaamiseensa. Tästä syystä myös ammattikääntäjien tulisi ylläpitää tiedonhakutaitojaan ja tietämystään eri tietolähteistä sen sijaan, että he tottuvat liikaa luottamaan vain tiettyihin tietolähteisiin, kuten valmiisiin käännösmuisteihin. Lisäksi Lehtinen ja Palonen (2011) totesivat, että tottumus johtaa toiminnan automatisoitumiseen, mikä puolestaan aiheuttaa illuusion hyvästä suoritustasosta ja siitä, ettei taitojen kehittämiselle ole enää tarvetta. Pymin (2013) mainitsemien uusien käännöskompetenssien tulisi kuitenkin kuulua myös ammattikääntäjien taitoihin, eikä vain alaa opiskelevien, tulevien kääntäjien kehityskohteisiin.

Tässä tutkimuksessa on myös otettu kantaa lähdekritiikkitaitojen tärkeyteen. Kääntäjän on oltava tietoinen verkkolähteitä käyttäessään muun muassa siitä, miten hakukoneet toimivat. Lisäksi jokaisen kääntäjän tulisi osata arvioida kriittisesti internetistä löytyviä lähteitä, mutta suhtauduttava myös epäillen luotettaviksi katsomiinsa lähteisiin. Useassa aikaisemmassa tutkimuksessa kuin tässäkin tutkimuksessa hyväksi toimintamalliksi on havaittu informaation paikkansapitävyyden varmistus käyttämällä useaa lähdettä. Tämäkään toimintamalli ei kuitenkaan takaa onnistunutta tiedonhakua, jollei kääntäjällä ole myös kriittistä silmää käyttämilleen lähteille.