Translation as Human-Computer Interaction

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Abstract

This paper seeks to characterise translation as a form of human-computer interaction. The evolution of translator-computer interaction is explored and the challenges and benefits are enunciated. The concept of cognitive ergonomics is drawn on to argue for a more caring and inclusive approach towards the translator by developers of translation technology. A case is also made for wider acceptance by the translation community of the benefits of the technology at their disposal and for more humanistic research on the impact of technology on the translator, the translation profession and the translation process.

Keywords

Human-computer interaction; translation memory; machine translation; translation technology; cognitive ergonomics

1.1. Introduction

The field of professional translation is, without a doubt, a form of human-computer interaction (HCI). In a period of less than thirty years, technology has radically transformed the way in which professional translators work (Folaron 2011: 429). Among other technologies, translation memory (TM) tools are now standard in many professional translation domains and recent successes in Machine Translation (MT) have led to a significant increase in usage and commercial implementation, which is in turn touching on the lives of professional translators.

The objective of this paper is to characterise translation as a form of HCI and to explore the benefits and challenges that the interaction between translation, translator, and the computer present. I wish to expand on the discussion on how computers have changed the translation landscape over time and how, perhaps more importantly, the current landscape is changing radically and speedily and how we, translation researchers, trainers and practising translators, are reacting to this change. I will raise some important questions throughout, and will offer some potential answers, but I do not pretend to have all the answers.

A discussion about translation as a form of human-computer interaction requires a statement about the concept of 'translation' being reflected upon. Tymockzo (2007) argues that the narrow English-language Western European concept of 'translation' as a form of transfer between a written source language text and a target language one must be broadened into a concept of '*translation' as cross-cultural understanding that is not reliant on dominant Western European views nor on restricted notions of what constitutes a text.[1] I agree in principle with Tymoczko's appeal for broadening the concept within translation studies, while, at the same time, I defend the legitimacy of the concept of translation I mainly refer to here, i.e. bilingual, text-based translation in a specialised domain destined for public consumption for which the translator is paid (though exceptions to this latter qualifier are now emerging). While this may be a restricted concept of translation, it constitutes a significant *global* economic activity and is, in my experience, the type of translation from which many translation studies graduates earn their livelihoods. My concept of translation as human-computer interaction is one in which varying levels of repetition are characteristic, making the task suitable for translation memory tools. High volume is also a typical feature, as is the need to complete the translation task under significant time pressure, making Machine Translation a potentially suitable translation aid.

These features largely characterise the translation we refer to here. However, other types of translation or even *translation, in Tymoczko's sense, are not explicitly excluded: for example, we might also include collaborative volunteer translation or subtitling and dubbing of audio-visual material, which are both also characterised by interaction with computers. Literary translation is not explicitly included in our discussion, but I acknowledged that translation of literary text can also be a form of human-computer interaction. Nor are we referring to the act of

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[1] Tymoczko deliberately uses the asterisk to differentiate the two concepts.

interpreting spoken discourse, though again, interpreters use computer resources in their work and that can therefore also be considered a form of human-computer interaction.

The paper is structured along the following lines: First, I provide a brief overview of human-computer interaction with the aim of establishing what is meant by this concept. A discussion follows on how translation is a form of human-computer interaction and on the evolution of translator-computer interaction (TCI). I then explore the benefits of this evolution and the challenges and round off with some thoughts (or, rather, questions) on the future of translation, given the increasing role of computers.

1.2. What is Human-Computer Interaction?

Human-Computer Interaction (HCI) is defined as "the study of the interaction between people, computers and tasks" (Johnson, 1992: 1). It draws on the disciplines of science, engineering and art and has as a core concern the demands made by the computer on people's knowledge, tasks and learning. HCI is not just about the user interface of a software product. Two terms that are commonly used in the HCI domain are 'human factors' and 'ergonomics'. Human factors focuses on how people interact with tools and technology. While the term 'ergonomics' traditionally referred to the ease with which hardware, such as keyboards, could be used, it seems to have evolved to also include the 'ease' with which software products can be used. A sub-domain within ergonomics is termed 'cognitive ergonomics'. This sub-domain concerns itself with the cognitive demands placed on users by the design and complexity of computer programs. In a description of the scope of a recent European Conference on Cognitive Ergonomics, it was stated that "[r]ecent trends of cognitive ergonomics indicate that human interaction with IT-based systems is increasingly complex and thus needs more sophisticated social, cognitive and affective support, and that diverse user groups should be considered from system requirements analysis and initial design stages, paying attention to personalisation, care and complexity".[2] The focus of that conference was on *caring technology*. This phrase can mean very different things. For example, caring technology might refer to the use of robots or virtual reality programs to treat human illnesses, such as Autism Spectrum Disorders (Arendsen et al. 2010) or Post-Traumatic Stress Disorder (Wiederhold 2010), but it can also mean designing computer

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[2] European Conference on Cognitive Ergonomics, University of Delft, 25-27 August 2010, http://mmi.tudelft.nl/ecce2010/?page_id=13 [accessed 20/10/2010].

programs that effectively support tasks such as translation. As we will argue below, translation requires ever-increasing interaction with computers and this has been both enabling and a source of malcontent in the translation profession.

1.3. Translation as Human-Computer Interaction

Having defined what I mean by 'translation' above, I find myself in a better position to make the claim that, today, translation is a form of human-computer interaction. Not only is it a form of HCI, but the task of translation is dependent on computer resources, sometimes to a great extent. By characterising translation as HCI, I do not intend to dehumanise translation or translators, nor do I intend to humanise the computer. Equally, I do not intend to deprofessionalise translation, but rather wish to show that the profession has changed over time and has become almost symbiotic with the 'machine' (used synonymously here with 'computer') and to demonstrate that there are benefits and significant challenges emerging from this development, which ought to be the focus of more discussion and research within the translation community.

TCI is not a new phenomenon. Already with the introduction of the electronic typewriter, with only two lines of memory, and the use of dictaphones, translation became a computer-interactive task. This was followed by the introduction of word-processing software. Although the origins of word processing date to before the mid-seventies, word processing only started to become known globally in the mid-seventies and early eighties (Haigh, 2006). This was a development that would have required some translators to interact with a computer for the first time. Not long after the mass embracing of word processing, came the introduction of Translation Memory tools. In conjunction with this development came terminology management programs, which are ostensibly used to store terms and their corresponding translations in one or multiple languages, though it is well known that such programs are not restricted to the storage of terms, but also store phrases and sometimes even sentences or larger chunks of text, therefore creating a fuzzy line between TM and terminology management tools.

The IT industry and, in particular, the software localisation sector were the first to embrace TM tools. It is not surprising that TM tools grew out of IT companies (TM2 in the case of IBM) or out of technical translators who worked for IT companies (e.g. Trados Translator's Workbench) since this industry produces large volumes of repetitive text that is updated on a

regular basis. Prior to the introduction of TM tools, content repetition was identified using compare features in word processors. Content that was identical was marked up by the word processor. The translator then had to locate that content in the previously translated document and copy and paste the relevant translated section into the new document. Needless to say, this was a tedious, time-consuming and error-prone task. The IT industry therefore had a problem and TM tools were developed to solve it. Similarly, the IT industry deals in specialised terminology that is reproduced across different content types: it is important that the menu name in a program is reproduced consistently in the online help and again in the documentation so as not to confuse and frustrate the user. Therefore, terminology management tools were introduced to solve another problem related specifically to terminology. A special form of TM tool has also emerged from the IT industry, i.e. the visual localisation tool. This can also be categorised as a TM tool, but it is much more besides (leading to a new designation of Translation Environment Tool or 'TEnT', cf. Zetsche 2010) and was also developed to solve a specific problem. When translating user interface text, the translator was often faced with incomplete error messages, hard-coded strings whose syntactic structures could not be changed, single-word items with no context, and special programming characters that should not be altered in any way, lest they introduce bugs into the translated software. The translator was not given information about the context in which error messages might appear or what the incomplete error message might say when it was shown in its completed form to the end user, thus making translation especially difficult. In addition, the number of characters allowed in the translated text was often limited, forcing the translator to create a less-than-ideal translation. Visual localisation tools help to solve these issues (at least to some extent) by providing translators with a WYSIWYG (What You See Is What You Get) view of the software. The tools also provide engineers with a means to 'protect' special strings or codes that should not be altered or deleted and they include automatic test functionality for locating items that have been accidentally changed. As mentioned, the visual localisation tool also acts as a TM and terminology management program.[3]

Access to the Internet and to personal computers grew in the early to mid-nineties, and this also impacted on translators who now had electronic dictionaries, encyclopedias and information at their fingertips. Purchasing of heavy tomes of specialised dictionaries or

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[3] Examples of current visual localisation tools are Alchemy Catalyst, www.alchemysoftware.ie and SDL Passolo, www.sdl.com [accessed 20/10/2010].

encyclopedia was no longer necessary as information resources became available through the World Wide Web. This development also contributed to the level of translator-computer interaction. In the early nineties, translation students were easily identifiable in any university faculty by the large tomes of dictionaries they carried with them. Today, the translation students cannot be told apart from the students of journalism, science or medicine because the tools of the trade are now mostly electronic and have to be accessed via a computer.

Not only has translation become a HCI task, but so has the task of running a translation business. E-mail and instant messaging have mostly replaced telephone conversations. Faxes have mostly become redundant. Where once large-scale translation projects were delivered on disks or CD-ROMs in boxes, they are now downloaded from web sites or accessed via specially designed workflow management tools.[4] Project team meetings are now done via online conferencing systems and training is done via Webinars. Purchase orders and invoicing are managed through ERP (Enterprise Resource Planning) systems.

The developments described above can be categorised as technology that *aids* the human translation process. Initially, there was some resistance to the introduction of TM technology (and, I imagine, also to word processing), and, although not all translators use it, it has become relatively standard in many professional domains.

Machine Translation was first introduced in the 1950s in the U.S.A. In 1952, there was a conference on 'Mechanical Translation' at M.I.T. However, by 1966, the dream of 'Fully Automatic High Quality Translation' had been stopped in its tracks due to a damning report on the lack of progress. A report by Howard Taubman in the New York Times in 1967 stated: "If you have begun to fear that there is no stopping the machine in its march to take over human duties, cheer up -- at least for a while. A learned National Academy of Sciences has found that in one area, translation, man is not obsolescent."[5] For a while, MT was relegated. However, systems were still developed and implemented with some limited success.

In the last decade, MT has been resurrected thanks to three key developments: first, a new MT paradigm was born because MT developers turned to statistics and probabilities to

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[4] A recent example of this is the GlobalSight product, www.globalsight.com [accessed 20/10/2010].
[5] Reported by Andrew Joscelyne, at the Translation Automation User Society (TAUS) conference, Portland, Oregon, October 3-6, 2010.

generate translation. This paradigm is known as the data-driven model or statistical MT. Second, the World Wide Web provides a massive database of text from which MT systems can *learn* and some of this text is parallel translated text so MT systems can not only model a specific language statistically but can also calculate the probability that a phrase A in one language is translated as phrase B in a second language. Third, large repositories of translated data have become available, thanks to the use of TMs for over 15 years. These TMs can be used to *train* data-driven MT systems in how to translate. These key developments have led to a situation where the quality of machine translated text is now at a level where it can be taken quite seriously as a realistic aid to human translators, as an enabler of translation where translation would not normally occur due to low demand, or even as a replacement for human translation.[6]

Interaction between a translator and a computer is perhaps most pronounced in the case of machine translation. A human, using a computer, sends a sentence to the MT system and, within milliseconds, the sentence has been translated by a program into another language. Where high-quality published material is required, translators are called upon to fix the still existing errors in the often imperfect computer-generated translation (we refer to this task as 'post-editing'). Often, their corrections are channelled back to the MT system so it can 'learn' from its mistakes and from the human's corrections. But in the case of MT, human interaction is not just between translators and the machine, but also between end users who have an information need and the machine or volunteer translators, such as 'fan-subbers' (O'Hagan 2009), and the machine. Therefore, the recent improvements in MT systems and their ease of access via the Internet have only increased the level of interaction between computers and the act of translating.

1.4. Translation-Computer Interaction – The Benefits

The development of translation as a HCI task has undoubtedly brought with it many challenges for humans. Before delving into these, however, I would first like to enumerate the benefits. I can identify at least three groups who benefit from HCI in translation: translation clients, end users (otherwise known as recipients of translation), and translators themselves.

The often recited benefits of translation technology include speed, quality and cost. For clients and end users, the use of translation technology theoretically speeds up the process

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[6] Vashee (2010) estimates that between 10 and 20 million people use free online MT engines daily to translate a word, phrase, sentence or text.

because a sentence does not need to be retranslated. This in turn improves quality through consistency and reduces the cost of translation since the client does not have to pay to retranslate text. Few experienced translators would deny the productivity increases brought about by the use of TM tools, assuming of course that the contents of the TM are of a high quality to begin with. Some have, however, questioned the contribution tools make to increased consistency and, ultimately, quality (e.g. Bowker 2005). Nonetheless, it is mostly accepted that a quality-controlled deployment of terminology management and TM tools will contribute to translation consistency and quality. The third general advantage, reduced cost, is obviously a contentious one with professional translators initially being very resistant to the reduction in word rates. However, given that TM tools have now become mainstream there is little doubt that cost advantages have been accrued and these have not been limited to translation clients and end users.

In addition to the three main advantages discussed above, there are more subtle, process-based advantages for translators who interact with computer tools. For example, TM technology relieves a translator from having to translate the same sentence over and over again (which is quite tedious, especially if the sentence is in a restricted domain relating to an IT product or automotive servicing, for example). Even when only a part of the sentence can be reused (as with a Fuzzy Match), the translator is saved from having to retype certain words or phrases. It has also replaced the error-prone and mind-numbing manual task of copying and pasting by a more intelligent and automatic search and replace tool. Thus, a TM tool could be seen as having relieved the human translator of a repetitive and boring task.

Terminology management tools provide the translator with instant access to an approved term list, saving the translator from the effort of trying to remember how she translated a term before, or having to look it up in several dictionaries. If used correctly, both of these tool types help contribute to professionalism by supporting consistency.

Machine Translation systems translate sentences at a speed that is significantly faster than a human translator. Even when post-editing is necessary, research has shown that reasonable quality raw MT output[7] can enable the translator to work at speeds beyond what might otherwise

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[7] "Reasonable quality" is of course a subjective concept. Put generally, I mean a rendition that is not completely non-sensical, that can be recognised as mostly conforming to the grammatical rules of the target language and as

be achievable and to translate a higher number of words per hour (O'Brien 2007, Guerberof 2009). The downward pressure on payment rates has somewhat been compensated for by higher throughput, supported by technology. Early research also suggests that novice translators, such as students and recent graduates who are at the starting line with regards to their accumulation of professional experience, might benefit from MT, while professionals with long-term experience might not benefit as much (or at all) (Garcia 2010). Machine translation is also a useful tool for end users of translations – it can be used to decide if the content of a document is interesting or important enough to have it either post-edited or translated by a human translator. Users can also use MT to get the gist of the message in a text written in a language they do not (fully) understand.

The uptake in Machine Translation also means that now even more information can be translated. This not only creates more translation-related work, but it can potentially have a positive impact on human rights. In the context of an explosion in user-generated content, it was recently suggested that only 0.5% of the content being created today is translated (Vashee 2010). Much of the translation done today is from English (content from multinationals who want to sell products) into the languages of the richest countries in the world. Very little content is translated into (or from) the many languages of Africa or India, for example. It has been suggested that Machine Translation can be the enabler of 'Translation as a Human Right' (Van Der Meer 2010), that it will allow linguistic communities who do not have access to information, to attain that access.

In summary, the use of computers to aid translation creates a number of potential and realistic benefits including faster throughput, increased consistency, lower costs for clients, possibly leading to higher volumes being translated, as well as increased access to information in languages not normally seen as being commercially important.

1.5. Translator-Computer Interaction – The Challenges

Any person involved in translation, whether as a student, academic, professional translator, project manager, client or tools developer will be only too aware, however, of the challenges that TCI introduces. While the introduction of technology to support translation has brought about

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conveying the meaning of the source text and requiring only a few edits to turn it into something acceptable to an end user who is in search of accurate information about a product, for example.

many advantages, it has also introduced a number of significant challenges and raises some important questions about the future of the translation profession.

1.5.1. *Dehumanisation and Devaluation*

How the increasing use of technology impacts on the status of the translation profession has and continues to be of considerable concern. Some translators feel dehumanised by the technology they are required to use. Having to fix the errors created by a machine translation system (or created by a human translator and propagated by a TM system) understandably irks some translators to such a degree that they refuse to interact with the technology. In the context of MT, not only can translators feel replaced by the machine, but the machine generates fundamental linguistic errors that a trained human translator would rarely generate. The professional translator is then demoted to the status of a fixer (cf. Krings 2001 – "Repairing Texts") of seemingly unintelligent errors. That they are paid lower rates to fix such errors than to create their own translation adds to the feelings of negativity.

There are, however, other dimensions to this complex debate. Cooper argues that:

[i]t doesn't require sophisticated tools to dehumanise your fellow human – a glance or a kick does it as well. It is not the technology that is dehumanising. It is the technologists, or rather the processes that technologists use, that create dehumanizing products.

(2002: 120)

Cooper's first point is peripheral, i.e. it is not just technology that can dehumanise, humans can too. The more relevant point here is that it is how the technology is created, or implemented, that has a dehumanising effect. Technology created without consideration for the task or end users removes those end users from the equation. Karamanis et al. (2011) touch on this issue in their contextual-inquiry based research into translators in the workplace. On the topic of Machine Translation, they note how translators see MT as a black box, something they do not quite understand and which removes them further from the task of translation, which, according to their observations, is a highly collaborative task, at least in the context they investigated. The lack of possibilities to collaborate with a machine (on the surface at least – but more about this later) leads to a level of mistrust and sometimes also to rejection of the technology. Although no formal research has been done on the criteria necessary for the acceptance of MT in the

translators' workplace, personal experience would suggest that the more the professional translator in *involved* in the testing, implementation and execution of translation technology, the more ownership she feels over the technology and the more likely it is to be seen as an aid rather than a dehumanising threat.

On the flipside of the dehumanising debate, claims that translator-computer interaction actually results in humanising, or socialising, translation have been made (Pym 2011a). In the context of collaborative volunteer translation, candidate translations, whether created by a human or generated in some way by a computer program, are collaboratively assessed, negotiated, voted on and, finally, accepted. The many people involved in this process creates a human translating network that is supported by technology. This is an interesting image that stands in quite a stark contrast to the one of machine as master and translator as slave.

Translators can also feel devalued by technology. This sentiment may be somewhat abstract and based on emotion: a person trains for many years to acquire the various competences deemed to be part of the translation process. This training requires an investment in time and effort and incurs varying degrees of expense, but now the machine can perform the task reasonably well having trained on data for a few hours, in the case of MT, or stored translations or terms in databases, in the case of TM and terminology management tools. Or the sentiment can be based on quite concrete and pragmatic concerns: the use of a translation tool effectively causes the amount the translator is paid to decrease and she is expected to demonstrate higher productivity at the same time. Since the introduction of TM tools, the rates per word for translation have come under a consistent downward pressure. With the uptake in MT, this downward pressure is felt even more. Yet again, there is another dimension to be considered – the number of words a translator can process using technology is greater, assuming quality control practices are in place, than if she is translating words without the use of technology.[8] The deficit is therefore corrected and sometimes even balanced in favour of the translator who uses technology to her advantage. Where this equation fails is when quality control fails; when a TM offers exact matches containing errors, the professional translator feels obliged to correct those errors even if she is not being paid to do so. Time and effort are expended without recompense and the translator's work is once again devalued. A failure also occurs when all parties in the

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[8] There are, no doubt, some exceptions to this general claim, but they are probably few.

contract have unreasonable expectations regarding productivity and quality. At risk of stating the very obvious, the solution to this is education and testing: testing assumptions about a new technology and its impact on productivity and quality is sensible, but, it seems, not always done adequately prior to implementation. Education regarding the requirements, potentials, limitations and ramifications of a new technology is also essential, and is the responsibility of all parties involved in the translation process (including, I might add, translators).

The tension between translators and computers is only one of many such frictions to have occurred over time. As Brian Christian observes (2011: 84), the reshaping of job markets through automation and mechanisation is centuries old. One side of the debate argues that machines take human jobs away while the other side argues that increased mechanisation has resulted in an economic efficiency that raises the standard of living for all, releasing humans from unpleasant tasks. The latter is a familiar argument put forward by MT developers, though, incidentally, none seem to go so far as to quantify what those human translators will actually do to earn a living once released from the 'unpleasant' task of translating user documentation, for example. As we well know, not all translators can earn a living translating literature! Interestingly, Christian argues that both sides of the debate have missed the point. In his opinion, the replacement happens when humans start doing a job mechanically, not when artificial intelligence takes over a semi-automated task. In the context of translation, we are well along the continuum of semi-automation. One wonders if resistance is futile at this stage? Christian discusses a scenario that has some interesting parallels with translation. He describes how software programmers work directly on problems while at the same time trying to automate the solution to those problems. So, are software programmers programming their collective way out of a job? Christian concludes:

> No, the consensus seems to be that they move on to progressively harder, subtler, and more complex problems, problems that demand more thought or judgement. They makes their jobs, in other words, more human.

(Christian, 2011: 88)

Can translators make their jobs more human through HCI? Can we allow the machine to take over the boring, repetitive tasks and free ourselves up for the harder, subtler and more complex

problems? And what are those problems that machines cannot solve, but human translators can? These are some of the large questions facing us.

1.5.2. Creativity and Quality

As mentioned previously, TM tools were introduced to solve specific problems in the context of high-volume, high-repetition translation. It is only to be expected then that translators who work in this domain will engage in more revising and editing of other translators' work than in creating their own translations. The increasing use of MT further increases the editing component of the task, only in this case the editing is sometimes (but not always) of seemingly obtuse mistakes. The task of the professional translator then becomes one of proofreading and editing, rather than 'translation proper'. For many, editing is seen as a less creative task than translation (though this is certainly open to debate – can we really argue that improving or correcting what an author has written is 'less creative' than translating another author's words?) and job satisfaction is further diminished by having to correct machine-generated mistakes or human mistakes propagated by the machine. This is exacerbated by a concern that the more one proofreads and edits, the less well one can translate, though no empirical evidence has yet been presented to support such claims.

A significant problem with the creativity argument is that the concept of creativity is very difficult to define and measure and there are various definitions for the term. Recent research on creativity in the translation process has resulted in some operationalisation of the construct in terms of cognitive shifts between source text and target text (Bayer-Hohenwater 2009, 2010). This is useful for the research domain, in particular for the study of the development of translation competence over time. However, in the field of professional translation, creativity is sometimes exactly what the client does not want because it is associated (rightly or wrongly) with requiring more time and introducing inconsistency where consistency is valued more than creative (alternative) solutions. For the translator who sees herself as a working in a creative profession, this is difficult to accept. It is probably true that many professionals would like to think of their daily tasks as requiring some form of creativity, but the reality is that there are a great deal more hum-drum than eureka moments, no matter the profession.

An opposing view to the one where technology is seen as repressing creativity is that creativity is to be found in dealing with the way in which technology brokers translation. In

TEnTs, multiple possible translations are presented from various types of matches with the source sentence, a machine-translated candidate, terms that are found in the glossary and solutions from the concordance feature. Selecting the best candidate within the constraints of the translation brief is surely to be considered a creative task and that is without even considering the creativity involved in finding supporting resources on the Internet. The triaging of candidate translations is just another skill, which tests our intelligence and competence in a different way. Pym has even argued that the technologisation of translation has caused translators to think differently by forcing the paradigmatic on the syntagmatic (Pym 2009). If we accept that the increase in technology has caused a change in how translators work and think, we ought to contemplate the implications of these changes. A possible effect is the standardisation or homogenisation of translated language and text types. By encouraging translators to recycle previously translated segments and sub-segments, we are propagating one mode of expression over alternative ones, potentially leading to a leveling out, defined by Baker as 'the tendency of translated text to gravitate towards the centre of a continuum' (1996: 184), and eventually to a lower level of variability in translated language and text types when compared with non-translated language. For some, this reduced variability is to be lamented; for others, however, variability means higher translation costs, which in turn decides whether or not text is translated in the first place.

Rather than lament a loss of creativity, we could celebrate the alternative ways in which TCI challenges us? Moreover, the argument that post-editing is not creative is predicated on the assumption that editing is not 'translation proper' and is, therefore, not a creative act. This brings us back to our short discussion in the introduction about the concept of translation, which might not only need to be broadened to include much more varied forms of cross-cultural mediation, but also to include working with source and target texts of different status, including machine-brokered ones.

Shifting expectations with regard to translation quality add to job satisfaction woes. For some users of MT, achieving high quality translation, similar to that achieved by a good professional translator, is the aim. For others, 'good enough' quality will do. Having trained and practised for many years to meet high standards of quality, the translator is now faced with a brief where a lower level of quality is acceptable. From a professional point of view, this is hard

to accept. Translators also fear that prolonged exposure to 'good enough' (or, perhaps more appropriately, 'fit-for-purpose') quality will reduce their ability to produce high quality, when it is required, but, again, there is no evidence to support this claim. Pym (2011a: 4) attacks resistance based on the quality argument: "[r]esistance to technological change is usually a defense of old accrued power, dressed in the guise of quality". Although Pym was using the example of on-site conference interpreting vs. video interpreting, his comment also applies to our notion of translation. I feel obliged to ask some hard questions concerning the quality debate: in what professional or private sphere can one pretend to only ever produce the highest quality? Do we not all struggle with time and economic constraints no matter what we engage in and compromise, at least sometimes, on what we deliver to our demanding clients, whether they be multi-nationals, students, or publishers? But, perhaps more important than this 'constant perfection is unrealistic' stance is the following question: is working to the translation brief not a core component in most translator training programmes, meaning if my client wants automation and speed and is willing to accept less than perfect, then that is what I agree to do (or not, if I do not want the job)? As Halverson (1999: 22) remarks, "it seems that professionals acquire their status by virtue of their ability to produce texts which fit the concept of translation which is current in their time and place, at least." So, the pragmatic view is that the ability to produce the translation quality required in the time given is a professional skill. At the same time, it has to be stated that legitimate friction occurs when clients want the highest quality, but are not willing to tolerate the conditions necessary for that quality (higher cost, more time, better quality control over the technologies used etc.).

The 'fit-for-purpose' paradigm usually involves an instruction not to edit exact matches in a TM database and to use as much raw translation as possible generated by the MT system. An additional requirement in the latter scenario is not to make stylistic changes 'for the sake of it'. The instruction to 'use as much of the raw translation as possible' wrap the chains of the source text more firmly around the translator-posteditor. Having most likely taken one or more modules in translation theory during her training, the translator is aware of the debates around equivalence-based and literal translation. She is probably also familiar with the concepts of foreignising and domesticating translation and has been sensitised to translator invisibility (Venuti 2008). Thus, the guidelines for working with TM and MT grate somewhat against her training which *may* have valued creative target-audience, text-type appropriate solutions over

source-text closeness. If we view post-editing of both MT and TM content as similar to monolingual editing, though, then perhaps we can offer a more positive view: Mossop (2007) suggests that, when editing, we should not change things just for the sake of it. The objective is to improve the overall product from a communicative viewpoint, but without making unnecessary substantial changes to the words and syntax used by the original author. The task is *different* from translation; it has its own element of creativity, requires some identical skills to translation and yet some different ones.

1.5.3. *Complexity and Text*

Until quite recently, translators translated texts and some still do. However, in some domains the notion of a text, with a beginning, middle and end, has changed radically. Translators now frequently work with isolated 'chunks', sentences or even 'segments' and 'sub-segments'. This is both a result of how translation tools broker text, but also of the way in which information is now produced – we are moving more and more towards smaller chunks of information delivered in the form of SMS texts, tweets and blogs. Rather than having a simplifying effect on the task of translation, this radical change has resulted in making the task more complex. The linearity of the text, its cohesion, is disrupted (Pym 2011a: 3). Contextual clues are missing. Moreover, core anchor points in the segment can also be missing, for example in the case of user interface messages that use variables at runtime, e.g. '%d has been printed.' Layer on top of this the fact that space limitations can also be imposed and that there is often no forgiveness for languages that happen to take more characters than English to communicate a simple message, or are presented in an alternative layout, and we have before us a rather complex puzzle that requires…*creative* solutions!

In his consideration of man vs. machine, Christian suggests that perhaps the greatest contribution of humans in an age where computers are automating many tasks will be the craft of coherence. Whereas artificial intelligence (AI) machines are successful at the word, phrase and segment level, they are less successful at text and discourse, levels which are, after all, also conduits for meaning. Christian demonstrates how an AI bot programmed to have 'conversation' with a human can give seemingly authentic human responses on a simple question and answer level, but how, when taken as a sequence, sense is lost (2011: 27). Context and perception are clearly imperative and machines are not good at that but humans are. Pym argues that the more

technology is part of the equation, the less easy it is to make decisions about the linearity of the text (2011a: 4). True, but translators are in an excellent position to compensate for the machine's failures in cohesion and coherence.

1.5.4. Interaction and Design

Psychological theories play a major role in HCI research (Johnson 1982). Designers and developers of computer programs are often required to make assumptions about task structure, human behaviour during a task, user experience levels, their ability to learn etc. The assumptions made by designers directly affect the experience of the user. Cooper (2004) and Kolko (2010) both appeal for software to be designed, not by programmers, but by *interaction designers*, suggesting the importance of understanding how the human interacts with the computer and specific task-supporting programs. Cooper talks about cognitive friction between users and devices, which he defines as "the resistance encountered by a human intellect when it engages with a complex system of rules that change as the problem changes" (2004: 19). Cooper also points out that there is a tremendous difference between designing for function and designing for humans (ibid: 90). Olohan (2011), exploring how the sociologist of science Andrew Pickering's concept of the 'mangle of practice' might be applied to translation and TM technology, also draws on the theme of resistance and echoes Cooper's sentiments when she points out:

> One argument to explain why systems sometimes fail is that system development is often regarded as technical change rather than socio-technical change; i.e., the human and organisational aspects are not addressed at all, or only implicitly, or in an ad-hoc fashion, when the system is being developed.

> (2011: 345)

 Unfortunately, there is little evidence to suggest that tools that are proposed as aids to the translation process have been designed from the point of view of the humans who have to use them. That is not to say that all computer aids for translation are flawed. Without a doubt, features in many of the tools are useful and appreciated by translators. However, it is also clear that the tools are not all easy to learn or use, that they are not always stable, and that they have not been designed from the point of view of interaction with translators, as opposed to simply supporting functions within the translation task or supporting the managers of the translation

business. While programmers know a lot about the functional design of software and have their own personal preferences regarding design, they rarely know about designing with the end-user in mind (Cooper, 2004: 22). This is probably true of computer aids for translation. What proportion of the programmers who have designed TM or terminology management tools have ever translated content? What proportion of MT system developers are translators? This goes some way to explaining the friction that sometimes exists between translators and their computer aids.

In recent years, some attention has been given to the impact (cognitive or other) translation tools have on translators and the translation task from within the academic community (for example, Bowker (2005), Dragsted (2004), Garcia (2010), Guerberof (2009), O'Brien (2006, 2007, 2008, 2010), Wallis (2006)), but Pym (2011b) rightly highlights how little humanistic research has been done on the impact of technology on translation and translators. What is also noteworthy is that the attention given to date tends primarily to come from the academic translation community, not from the developers of computer aids for translation.

The academic community has demonstrated an interest in the 'unit of translation', i.e. the nature and size of the 'chunk' dealt with when translators are processing a translation. While in the pedagogical context, some emphasis is placed on developing macro strategies for translating entire 'texts' as units, translation process research has demonstrated that translators (novices and experts) also utilise micro-strategies for processing units of 'words' or 'word strings' (e.g. Kiraly 1995, also Kussmaul 1995). The size of the processing unit is assumed to be driven by limitations in working memory capacity. What impact interaction with technology has on the processing unit has been explored by Dragsted (2004) who was interested in the segmentation of text in TM systems. She found support for the hypothesis that there is disagreement between the way translators segment text and sentence segmentation in TM systems. She also found that while segmentation on a sub-segment level increases the number of matches obtained from a TM, the fragments are considered to have a negative impact on the coherence of text (ibid. 279). Interestingly, Dragsted also found that translators seem to prefer segmentation at a paragraph level. While there is some support for paragraph-level segmentation in translation tools, the general trend still seems to be one of sub-segment matching. For example, sentence-level source and target text couplets tend to be highlighted as the default 'unit' in TM tools. On a sub-

segment level, terms that exist in the relevant glossary are highlighted, as is information that is automatically replaced (e.g. numbers, dates). Concordance searches are, by their very nature, executed on a phrase (or 'word string') level and the relatively new feature of automatically predicting the text that is being typed and giving a drop-down list of potential alternatives also operates on the sub-segment level. Moreover, in a climate where integration of TM with MT systems is becoming more popular, consideration is being given to the feasibility of partially translating sub-segments via MT systems in order to speed up translation processing. Thus, while it would seem that translators like to process larger textual units, and consider sub-segments as having a negative effect on coherence, the technology forces a sub-segment mode of processing, which potentially leads to cognitive friction.

What is needed are efforts to promote symbiosis, rather than friction. Karamanis et al. (2011) point to the need for user-centered design to support the flexibility (and, I would add, increasing complexity) of the translation process since any technology that is too rigid actually disrupts the work it is supposed to support (ibid: 49). Translator-computer interaction would likely benefit from an increased focus on ethnographic-style, cognitive ergonomic studies of both translation tools and the translation process itself. This might involve, for example, spending time observing and working with translators who interact with multiple tools and technologies to see where the 'speed bumps' and frustrations lie in this interaction. More experimental studies of translator-tool interaction could be carried out using formal usability research methods such a screen recording, eye tracking and observation, the results of which could then be used by translation technology developers to improve the specifications of tools for the benefit of translators and, ultimately, the end users of those translations.

With the topic of symbiosis, we return to a point alluded to earlier, i.e. that on the surface it appears as if MT systems are black boxes that impede the collaborative nature of the translation process. To this we might add the practice of creating project-specific Translation Memories, i.e. databases of translation that contain only matches for the exact content to be translated, leaving the translator with little 'concordance' or contextual clues. The lack of support for collaboration in translation tools is detrimental as it reduces the capacity for humanising, socialising activity, as mentioned earlier in the context of volunteer collaborative translation efforts, and probably impedes acceptance of computer interaction. Of course, the

recent changes in MT development paradigms towards data-driven MT, as well as the closer coupling of TM and MT technologies have led to a closer collaboration between translator and machine than perhaps many translators know of or care to believe. By re-using human-generated translations, MT developers create machine-generated translations, which are edited by humans, whose edits can then be used by the machine to 'learn' new translation variants. This raises the topic of 'agency' in translator-computer interaction, a topic that is attracting increasing attention in translation studies. Space restrictions prevent us from delving into this topic here, but Olohan (2011) offers an interesting initial discussion, albeit concerning translators and TM tools, rather than MT. Now we are back to that parallel with the software programmers who automate solutions for their own problems. By repairing MT segments and letting the machine learn about those repairs, are we progressively making ourselves redundant? Or, again, are we freeing ourselves up for those harder, subtler, more complex problems?

1.6. Summary and Outlook

Translation as a human-computer interactive task has clearly brought about many advantages, arguably to all players in the translation process, but this has not happened without significant changes to work practices and serious challenges for the translation profession and translator trainers, which I have outlined and discussed above.

While it is always interesting to observe what has happened in the past, it is very interesting to contemplate what might happen in the future. This is all the more the case because it would seem that we are living in a time of significant change in the translation profession and trainers of future translators have, I believe, a duty to understand what landscape future graduates might be faced with and to train them accordingly.

Once upon a time, Martin Kay (1998: 226) made the following prediction:

> I want to advocate a view of the problem in which machines are gradually, almost imperceptibly, allowed to take over certain functions in the overall translation process. First they will take over functions not essentially related to translation. Then, little by little, they will approach translation itself. The keynote will be modesty. At each stage, we will do only what we know we can do reliably. Little steps for little feet!

We have, I believe, long passed the point Kay predicted above. Little steps have turned into considerable leaps. What does the future hold?

On the subject of MT into the future, Joscelyne (2010) comments that the general feeling among researchers is that translators will continue to play a central role in production of the high quality translation by fine-tuning and repairing MT output as post-editors through the feedback loops that are vital to optimising MT systems (so, modesty, as Kay mentions, is still apparent). The gradual build up of postedited texts will then turn into a huge body of training data for MT systems. Joscelyne expects more research into ways in which the symbiotic relationship between translator and computer can be optimised leading to improved toolsets for post-editors, but cautions that it is unlikely that there will be anything more than incremental advances in performance for the industry as a whole: "We can expect forward-looking technical translators to adopt new power tools emerging from such research to stay competitive."

Like the prodigal son, MT has made a comeback, while TM and other computer aids have been steadily supporting the hard work over the last twenty years. Ironically, the future of TM is now under question. Pronouncements about the demise of TM are fuelled by the recent success of MT. A more measured opinion is offered by Vashee, who sees the current 'klunker-type' TM technology being replaced by more elegant solutions (2011). Vashee parallels the evolution of word processing technology in the past with the future evolution of TM technology and in referring to new types of database technology maintains that:

> [w]hat is emerging from these amazing new data analysis tools, is the ability to see new social structures and dynamics that were previously unseen and to make our work more and more relevant and valuable.

> (ibid)

Thus, if Vashee has the right vision, TM technology will not disappear, but will become more sophisticated and, of relevance to our dehumanisation and devaluation worries, will make translators' work more valuable…

Thus, MT and TM technology are likely to form a significant part of the professional translation landscape into the near future. New tools will emerge and they will be more

sophisticated. To elaborate a little more on the bright side, I foresee new roles for translators, not only as post-editors with MT systems, but also as collaborators with MT system developers, researchers and implementers. This role can be expanded into assessing quality of MT output, assessing the quality of the corpora that are used to train MT engines, editing those corpora to ensure that they will result in the best quality MT generated output, managing terminology for the systems in use, refining workflows, pre-editing source text to make MT more successful, liaising with user-interface developers to ensure that tools are designed with translators in mind and so on. Thus, in the short term (let's say over the next ten years), we can expect an increased interaction between translators and computers. By interacting more with computer-supported translation tools, translators will enable more translation to occur, into more languages and, hopefully, in language directions that do not normally gain attention through lack of resources. The task, in the short term, for translator trainers would seem to be to equip our graduates with more technological knowledge and skills. Echoing Pym, in the context of research, we need more humanistic research on the effect of technologies on the translator and translation.

However, a question that is harder to answer is: what will happen in the longer term? As the field of artificial intelligence develops and programs become better as passing themselves off as human, will translator-computer interaction lead to the redundancy of the professional translator as we know her today? In my experience, there are two general reactions to the question: one is to scoff at the idea that computers will be able to translate to a level of quality that would be acceptable to an end user; the other is to worry about one's future as a professional translator and to take a somewhat defensive position. Neither reaction is appropriate: MT systems can already produce output of a quality that is acceptable to some end users. It is true that this is not the case for all language pairs and all domains, but it is quite feasible that will change over time. Moreover, the volunteer translation paradigm has demonstrated that people other than professional translators are willing to assess, discuss and edit translations, machine or human generated, and that untrained volunteers are reasonably good at doing so. The alternative reaction of worrying about one's future as a professional translator and of refusing to engage with the changes is an understandable reaction to a perceived threat. A shift in paradigm is required here: the increasing technologisation of the profession is not a threat, but an opportunity to expand skill sets and take on new roles. In the translation classroom, emphasis should be put

on the fact that there is no one definition of creativity and quality and that editing, revising or post-editing are valid skills to have alongside translation.

The question remains, though, if computers become better and better at translating the dull and repetitive text and we assume that a living is not to be made by all from translating literature, what then is left? Context, cohesion, coherence and perception were earlier identified as areas where humans still outperform machines in text-based tasks (Christian 2011). The tension between translator and machine is still evident in this question, for which I do not have an answer. The best I can do at this point is to borrow Christian's words to conclude (2011: 70): "[t]he tension is the point. Or, perhaps to put it better, the collaboration, the dialogue, the duet".

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