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Translation, human–computer interaction and cognition

Sharon O’Brien

21.1 Introduction

Translation is, without a doubt, a form of human–computer interaction (HCI). In a period of less than 30 years, technology has radically transformed the way in which professional translators work (Folaron, 2010, p. 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 cognitive processes involved in translation must surely also be impacted by the significant use of technology.

Thinking about translation as a form of HCI requires a statement about the concept of “translation” underpinning the discussion. Tymoczko (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 or on restricted notions of what constitutes a text. While Tymoczko’s appeal for broadening the concept of translation within Translation Studies is acceptable, at the same time, it is legitimate also to consider translation as something more specific, especially when exploring the cognitive aspects. Otherwise, the scope would be too broad for a coherent discussion in this chapter. Therefore, the notion of translation considered here is that of bilingual, text-based translation destined for public consumption for which the translator is paid. While this may be a restricted concept of translation, it constitutes a significant global economic activity and is the type of translation from which many Translation Studies graduates earn their livelihoods.

The concept of translation under consideration here is one of which some repetition, high volume and time pressure are characteristic, making the task particularly suitable for computer-aided translation tools. 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 audiovisual material, which are both also characterized by interaction with computers. Literary translation is not explicitly included in our discussion, but even the translation of literary text can also be a form of HCI, and the use of technology for literary translation is on the rise (see, for example, Toral & Way, 2015). While the primary focus
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here is on written translation as a form of HCI, it is important to acknowledge that interpreters use computer resources in their work, and that can therefore also be considered a form of HCI. Furthermore, speech is now becoming a more viable form of input, as will be discussed in Section 21.3.

This chapter is structured along the following lines. First, the core topics relating to HCI and translator–computer interaction (TCI) are explored, including the benefits and challenges presented. This is followed by a discussion of future directions.

21.2 Core topics

21.2.1 What is human–computer interaction?

HCI is defined as “the study of the interaction between people, computers and tasks” (Johnson, 1992, p. 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” (see Ehrensberger-Dow, this volume). Human factors focus 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 has evolved to also include the “ease” with which software products can be used. A sub-domain within ergonomics is “cognitive ergonomics”, which is concerned with the cognitive demands placed on users by the design and complexity of computer programs. In a description of the scope of a 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 personalization, care, and complexity.3

These days, translation requires ever-increasing, complex, physical and cognitive interaction with computers and computer programs. As described by Ehrensberger-Dow (this volume), the task of translation involves sitting at a workstation for extended periods of time interacting with various tools, and this has been both enabling and a source of malcontent in the translation profession.

21.2.2 Translation as human–computer interaction

The translation profession has changed over time, with the translator in some circumstances becoming almost symbiotic with the “machine” (used synonymously here with “computer”). Yet, TCI is not a new phenomenon. With the introduction of the electronic typewriter, with only two lines of memory, and the use of dictaphones, translation already became a computer-interaction task. This was followed by the introduction of word-processing software. Although the origins of word processing date to before the mid-1970s, word processing only started to become known globally in the mid-1970s and early 1980s (Haigh, 2006). This development required translators to interact with a computer for the first time. Not long after the mass embracing of word processing came the introduction of TM 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 information technology (IT) industry and, in particular, the software localization 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), because 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 cognitively tedious, time-consuming and error-prone task. The IT industry therefore had a problem, and TM tools were developed to solve it. Additionally, translation of the text in user interfaces (UI) was required. At first, this necessitated the extraction of UI strings of text into a contextless spreadsheet, but eventually, dedicated tools were developed for the translation of this specialized type of text.

Access to the Internet and to personal computers grew in the early to mid-1990s, and this also had an impact on translators, who now had electronic dictionaries, encyclopaedias, and other sources of digital information at their fingertips. The IT industry deals in specialized terminology that is reproduced across different content types; it is important that the menu name in a program, for example, is reproduced consistently in the online help so as not to confuse and frustrate the user. Therefore, terminology management tools were introduced to solve another problem related specifically to specialized terminology management.

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 become redundant. Where once large-scale translation projects were delivered on disks or CD-ROMs in boxes, they are now downloaded from websites or accessed via specially designed workflow management tools. Project team meetings are now done via online conferencing systems or team collaboration tools such as “Slack”, and training is done via webinars. Purchase orders and invoicing are managed through ERP (Enterprise Resource Planning) systems.

The developments described can be categorized as technology that aids the human cognitive translation process. Initially, there was some resistance to the introduction of TM technology, because it meant a considerable change to the way translation was done, and translators also had well-founded fears that it would change how they were paid for their work. Although not all translators use it, it has become relatively standard in many professional domains.

Although introduced before TM, MT has taken a different path, and the professional community has been slower to adopt it (see Carl, this volume).

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.

Taubman’s words were prescient; MT did not make the translator obsolescent. However, recent developments in MT mean that the fear Taubman alluded to has returned. In the last decade, MT has been reinvigorated due to three key developments. First, large repositories of parallel translated data became available due to the use of TM technology for over 20 years. This gave birth to a new data-driven paradigm that produced better machine-translated output than the
previous rules-based paradigm. Second, the World Wide Web provided a massive database of mostly free electronic text from which MT systems can learn. Third, recent developments in machine learning, coupled with greater computer processing power, have led to the successful application of neural networks to the problem of MT, which in turn has produced higher-quality (particularly in terms of target-language fluency) MT output. These key developments have led to a situation where the quality of machine-translated text is now at a level where it is a realistic aid to the cognitive process of human translators.

However, 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 between volunteer translators, such as “fan-subbers” (O’Hagan, 2009), and the machine. 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 or product of translation, leading to increased “machine translation literacy” (Bowker & Buitrago Ciro, 2019).

21.2.3 Translation–computer interaction—benefits

Development of translation as an HCI task has undoubtedly brought with it many challenges for humans. Before delving into these, however, it is important to enumerate the benefits. At least three groups benefit from HCI in translation: translation clients, end users (otherwise known as recipients of translation) and translators themselves.

For clients and end users, the use of translation technology theoretically speeds up the process, because a repeated sentence (normally) does not need to be retranslated. In turn, quality is improved through consistency, and costs are reduced because a 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 brought about by the introduction of TM tools. 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 only to translation clients or end users.

In addition to the three main advantages discussed, 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. 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 and autocomplete 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 or he translated a term previously, or having to look it up in several dictionaries, which effectively breaks the flow of the translation process, even if it is an essential part. If used correctly, both these tool types help contribute to translation expertise by supporting consistency and task flow.

Machine translation systems translate sentences at a speed that is significantly faster than a human translator can achieve. Even when post-editing (or fixing of MT errors) is necessary,
research has shown that reasonable-quality raw MT output can enable the translator to work at speeds beyond what might otherwise be achievable and to translate a higher number of words per hour (Guerberof, 2009; O’Brien, 2007). The downward pressure on payment rates has somewhat been compensated for by higher throughput, supported by technology. Early research using data-driven MT engines suggested that novice translators, such as students and recent graduates, who are at the starting line with regard to their accumulation of professional expertise, might benefit from MT, while professionals with long-term experience might not benefit as much (or at all) (García, 2010). MT is also a useful tool for end users of translations—it can be used to decide whether the content of a document is interesting or relevant 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. Furthermore, MT is now being deployed in new areas, such as a writing aid for academic publication for non-native speakers of English (Bowker & Buitrago Ciro, 2019; Goulet et al., 2017; O’Brien et al., 2018a; Parra Escartín et al., 2017) or for educational purposes (Hu et al., 2019).

The uptake of MT also means that now even more information can be translated. It 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 has been 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 produced by multinationals who want to sell products) into the languages of the richest countries in the world. Very little content is formally translated into, from or between 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 (O’Brien et al., 2018b).

In summary, the use of computers to aid translation creates a number of potential and real benefits, including faster throughput, increased consistency and 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.

### 21.2.4 Translator–computer interaction—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 many advantages, it has also introduced a number of significant challenges and raises some important questions about the future of the translation profession.

How the increasing use of technology impacts on the status of the translation profession has been, and continues to be, of considerable concern. Some translators feel dehumanized by the technology they are required to use. Having to fix the errors created by an MT 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 (Krings, 2001) of seemingly unintelligent errors. Cognitively, the task is boring and tedious, with translators often reflecting that they have been robbed of their creativity. That they are paid lower rates to fix such errors than to create their own translation...
Cooper's first point is peripheral; i.e., it is not just technology that can dehumanize; humans can too. The more relevant point here is that it is how the technology is created, or implemented, that has a dehumanizing 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 personalization in Section 21.3) leads to a level of mistrust and sometimes also to rejection of the technology. The more the professional translator is involved in the design, testing and implementation of translation technology, the more ownership she or he feels over the technology, and the more likely it is to be seen as an aid rather than a dehumanizing threat. In fact, the ability to have control over the use or non-use of MT has been shown to have an effect on feelings of “agency” among translators (Cadwell et al., 2016; Cadwell et al., 2017; Olohan, 2011). On the flipside of the dehumanizing debate, claims that TCI actually results in humanizing, or socializing, translation have been made (Pym, 2011). 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 create a human translating network that is supported by technology. This is an interesting image that stands in quite stark contrast to that of machine as master and translator as a bored slave.

The tension between translators and computers is only one of many such frictions to have occurred over time. As Christian observes (2011, p. 84), the reshaping of job markets through automation and mechanization is centuries old. One side of the debate argues that machines take human jobs away, while the other side argues that increased mechanization has resulted in an economic efficiency that raises the standard of living for all, releasing humans from unpleasant tasks. 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 make their jobs, in other words, more human” (Christian, 2011, p. 88)—and potentially more cognitively fulfilling. 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 cognitively complex problems? And what are those problems that machines cannot solve, but human translators can? These are some of the important questions facing us today.

Psychological theories play a major role in HCI research (Johnson, 1992). Designers and developers of computer programs are often required to make assumptions about task
structure, human behaviour during a task, user experience levels, a user’s 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” (Cooper, 2004, p. 19). He also points out that there is a tremendous difference between designing for function and designing for humans (Cooper, 2004, p. 90). Olohan (2011), exploring how 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 organizational aspects are not addressed at all, or only implicitly, or in an ad-hoc fashion, when the system is being developed.

Olohan, 2011, p. 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 (Ehrensberger-Dow & O’Brien, 2015; O’Brien et al., 2017). 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). 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? What do they know about the cognitive process involved in translation? This goes some way to explaining the friction that sometimes exists between translators and their computer aids.

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. A recent interesting development is the move to “neural machine translation” (NMT) (see Forcada, 2017, for a detailed explanation). NMT engines produce seemingly better output than previous types of engines (statistical or rules-based ones). Interestingly, they produce a new challenge for post-editors: the output is deemed to look and sound very fluent and sometimes almost like a human translation. However, the fluency can be misleading—the meaning might be quite incorrect, even though the translation sounds convincing. For instance, a city name might be replaced with a different city name from an entirely different country or continent. This is just a feature of how neural networks work. Nonetheless, it might be difficult to spot the error
in “logic” if the grammar and meaning otherwise seem to be correct. At the time of writing this chapter, no substantial research had been conducted on the different cognitive demands of editing NMT output compared with output from older types of engines. However, it is reasonable to speculate that when the errors are not obvious and the output sounds fluent, the cognitive task will have changed from one of quickly spotting and fixing errors to a task that is closer to that of revision, by a human, of translation produced by a human. The reviser will have to pay close attention to the meaning of the source text in order to identify errors in the target text that are not so obvious at first glance. This leads us to wonder whether post-editing might become more of an accepted task among professionals, given that the task might now approximate that of traditional “revision”.

At the same time, 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. 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 operationalization of the construct in terms of cognitive shifts between source text and target text (Bayer-Hohenwarter, 2009, 2010, see also Bayer-Hohenwarter & Kussmaul, this volume). 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 prides him- or herself as 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 humdrum than eureka moments, whatever the profession, and computer-ization has arguably added to this.

Until quite recently, translators translated texts, and some still do. However, in some domains the notion of a text, with a beginning, a middle and an end, has changed radically. Translators now frequently work with isolated “chunks”, sentences or even “segments” and “sub-segments”. This is a result not only 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, 2011, p. 3). Contextual clues are missing. Lay on top of this the fact that space limitations can also be imposed, that there is often no forgiveness for languages that happen to take more characters than English to communicate a message, or that the time available for reading can be restricted (e.g. for subtitles), and we have before us a rather complex puzzle that requires creative solutions! In his consideration of man vs. machine, Christian (2011) 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, at voice and register, levels which are, after all, also conduits for meaning. Pym (2011, p. 4) argues that the more technology is part of the equation, the less easy it is to make decisions about the linearity of the text. True, but translators are in an excellent position to compensate for the machine’s failures in cohesion, coherence, register, voice and context generally.
21.3 Future directions

Translation as a human–computer interactive task has clearly brought many advantages, arguably to all stakeholders in the translation process and beyond, but this has not happened without significant changes to work practices and serious challenges for the translation profession and for translator trainers (for the latter topic, see also O’Brien & Rodríguez Vázquez, 2019). While it is always interesting to observe what has happened in the past, it is intriguing to contemplate what might happen in the future, and all the more because it would seem that we are living in a time of significant change in general, thanks to advances in AI.

Once upon a time, Kay (1980, p. 11) 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 long passed the point Kay predicted. Little steps have turned into considerable leaps. What does the future hold?

Almost a decade ago, the general feeling among researchers was that translators would continue to play a central role in the production of high-quality translation by fine-tuning and repairing MT output. Expectations were that it was unlikely that there would be anything more than incremental advances in performance for the industry as a whole. However, the situation has changed substantially in the past five years or so, with the improvements in NMT, discussed earlier. Some view this as a “game changer” for the use of MT. Others caution that the advances should not be overstated and that there is still a significant need for professional translators for the future. What, exactly, the cognitive task of translation will involve in the future is open for discussion. Perhaps little will change, but the speed of technological advances in the past few years suggests that this is unlikely. Will more translators post-edit more content types for more language pairs? If MT produces reasonable quality for low-stakes content, does that mean that more text will be translated into more languages in the future, but professional translators will only handle high-stakes, highly creative or very sensitive content? These are open questions. What is certain for the next few years is that MT will become an even more dominant technology for professional translators, and we can expect an increased interaction between translators and computers, even for some genres that, heretofore, were deemed untouchable (see Toral & Way, 2015).

Ironically, the future of current TM technology, a long-standing translation aid, is now under question, fuelled by the recent success of MT. TM, as it was known ten years ago, is already changing, since it has now merged with MT. Within most TM tools these days, automatic translation via an MT engine is available as an option in addition to the traditional TM “matches”. This means that the traditional differentiation between TM and MT technology is being eroded, as is the differentiation between “translating” with the help of a TM match and “post-editing” MT output. Cognitively, the tasks are getting closer. For instance, a translator can now be offered a TM match, part of which is then enhanced using MT —this is sub-segment machine translation. A translator may no longer know what part of the text comes from TM and what comes from MT, or even which MT engine generated the proposal. Other innovations also continue apace. For instance, “adaptive” MT now forms part of one of the major TM tools. When a sentence from MT is edited, the system learns from it and applies that learning to the sentences that follow. This tackles one of the major weaknesses of MT —generating the same or similar
errors repeatedly. From a cognitive perspective, the innovation of “interactive” MT is perhaps even more interesting: traditionally, MT output is delivered as a fait accompli to the translator, who then assesses it and edits or retranslates, if necessary. With interactive MT, the translator accepts or rejects words produced on the fly by the MT system, like the functionality of an autocomplete text editor. Very little research has been conducted, from a cognitive perspective, on the implications of this novel way of working with MT. This mode of operation forces the translator to focus on the word more than ever and, operationally, demands that the translator either types a preferred word or just presses a key on the keyboard if they want to accept the proposal. Is this a step backwards from a HCI perspective? Does it reduce the translator to an operator that presses “go” or “no go” buttons? Or is it a very clever extension of the translator’s brain? Early empirical research comparing traditional post-editing with interactive post-editing concludes that the interactive mode might be a viable alternative if productivity indicators and translators’ qualitative feedback are considered (Sánchez Torrón, 2017), but obviously more research is required.

An area that is ripe for deployment is technology personalization. As was mentioned earlier, translation technology has not typically been developed in conjunction with translators, but rather in isolation for translators. Its impact on the cognitive task, on ergonomics, on job satisfaction and on the status of the profession has been largely ignored. “One-size-fits-all” has been the dominant approach. Now, in the era of machine learning, it is much more viable to expect AI-driven technology to learn from individual translators and to adapt on their behalf. This concept is known as personalization and is defined as “tailoring products and services to better fit the user” (Göker & Myrhaug, 2002, p. 1). As discussed in O’Brien & Conlan (2019), personalization of translation technology has, conceptually at least, much scope. Imagine a technological aid that learns about the specialized domain a translator is most interested in and finds only appropriate resources, discarding ones that are less relevant or less trustworthy. Imagine an aid that understands the context in which a translation is being produced and tailors its features accordingly. To elaborate, a context that demands very high quality might switch off the MT feature, whereas one that demands sufficient quality, but has an even greater demand on productivity, foregrounds the MT proposals. Or imagine one that learns about the uncertainty tolerances of each individual translator and only presents suggestions based on those tolerances. Imagine a technology that can detect, based on gaze information from eye trackers embedded in our personal devices, when a translator needs assistance and when she or he is in a cognitive “flow” and should not be interrupted with prompts. This is what personalized translation tools could potentially achieve. Personalization is not, however, trivial and does not succeed overnight. It requires the willingness of the user to train the personalization engine, and this takes time. Nonetheless, the potential for more sophisticated, useful HMI is considerable, should translation technology developers and translators decide to collaborate.

Since the invention of word processing, the mouse and keyboard have been the main mechanisms for TCI. Prior to that, the dictaphone was used. With current advances in speech recognition and increasing accuracy for speech to text conversion, it can be expected that new modes of interaction will emerge. This possibility has already gained some traction in our discipline, with researchers investigating user experience of multimodal input, including touch-enabled screens and speech recognition. Findings are reported as being promising, though inconclusive (Teixeira et al., 2019). Although we have some way to go with these new modes of interaction, it is quite likely that they will impact on TCI into the future. The positive aspect of this is that it may help to reduce some of the ergonomic challenges reported in the literature (e.g. Ehrensberger-Dow & Hunziker Heeb, 2016; Ehrensberger-Dow & O’Brien, 2015) by allowing translators to use voice rather than keyboard as input. The translator would thus not necessarily
have to sit at his or her desk looking at a screen for many hours in the day. Also, using speech for input and as an output tool increases accessibility and opens up the task of translation to blind translators (Rodríguez Vázquez et al., 2018). It has to be noted, though, that speech input is still not entirely reliable, and it requires a quiet work setting.

All these changes—merging of TM and MT, adaptive MT, interactive MT and multimodal input—are likely to impact on the process of translation from a cognitive perspective. Considerable research will be required in the coming years to help us understand what that impact is.

Notes

1. This chapter is a reworked and revised version of the following article: O’Brien, S. (2012). Translation as human-computer interaction. Translation Spaces, 1, 101–122.
2. Tymoczko deliberately uses the asterisk to differentiate the two concepts.
4. Examples of current visual localization tools are Alchemy Catalyst and SDL Passolo.
5. An example of such a tool is the GlobalSight product.

Further reading

This article explains how neural machine translation works in an accessible way for translation scholars.

This chapter discusses MT from a cognitive perspective, focusing in particular on two types of interaction: MT evaluation and post-editing.
See also in the present Handbook the chapter on Translation, ergonomics and cognition by Maureen Ehrensberger-Dow for a discussion of cognitive ergonomics and cognition in more detail as well as the chapter on Translation, artificial intelligence and cognition by Michael Carl for a coverage of machine translation in more depth.

References

Cooper, A. (2004). The inmates are running the asylum: Why hi-tech products drive us crazy and how to restore the sanity. Indianapolis: SAMS.
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