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No Linguistic Borders Ahead?
Looking Beyond the Knocked-down Language Barrier

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1. Introduction

Our times are those of change. The paradigm-shifting technology of Machine Translation (MT) clearly comes with the potential of bringing down the so-called language barrier. This involves a vision of people using electronic devices to capture the spoken or written word, those devices then rendering the text or utterance from one language into another automatically. Already today, people use their smartphones exactly for that purpose, albeit with restricted functionality: they use a publicly available MT service with their smartphone, typing in a sentence in one language, have it translate the text, and show the on-screen result to the other party in the conversation, who then reads the translated message, and, in time, responds in the same way.

This rather cumbersome procedure is quite easy to enhance by voice recognition and voice synthesis systems. For example, the Google Translate service allows for speech being dictated into the device, then speech recognition software converting the spoken text into written text, which is then fed into the translation engine. The latter transforms the text material, and speech synthesis software enables the message to be read aloud by the device. What is here today, wrapped in rather a primitive interface, is the precursor of future wearable devices (some of which have been referred to as SATS[1]), or even augmented-reality tools,[2] which will better respect the ergonomics of human bodies and, eventually, become part of either smart clothing, or even implanted into our own organisms.

With such visions it is not difficult to envisage a world where people communicate freely, i.e. without borders, in all realms of language-intensive contact: when travelling, in trade, politics, academia, and even crime. A torn-down language barrier is a marvellous vision, yet not so marvellous for those who profit from the demand for paid language services that language obstacles generate, for example, translators or interpreters. Even today, economic considerations promote alternative solutions to costly human translators. As a result, the previous maxim of utmost translation product quality becomes compromised by the notion of 'good enough' or 'acceptable' quality. As soon as SATS—eventually—become readily available and affordable, target groups will certainly opt to make use of those solutions, and the demand for traditional paid linguistic services may shrink as a result. However, these services are not likely to become obsolete, given the many areas where professional, high-quality linguistic services will remain indispensable (high-risk areas such as medicine, law, and stylistically challenging domains, such as literary texts and marketing).

[1] Synchronous Automated Translation Systems – a term used by Lehman-Wilzig (Lehman-Wilzig "The Tower").
[2] For further reading on this topic, cf. Svoboda "Man and Machine".

Generally speaking, borders may entail positive values, too, such as a capacity of delimiting, protecting, and organizing. In the future, though, once the world is even more connected, borders are likely to become fluid and fuzzy.

The translation industry is going through a paradigm shift brought about by MT technology. Unlike the traditional Computer Assisted Translation (CAT) tools, MT does not only provide translators with the means to increase efficiency; it offers a completely different approach to translation. Using MT output means, most of the time, checking and correcting ready-made renderings, not writing the translation from scratch. With this being the reality today, translators have the choice of embracing it, or doing without it.

This article is a result of a continued effort in terms of monitoring, research, and reflection over the past ten years, based on numerous sources (specialized literature articles, popular posts, and discussions—around 160 at the time of submission). These have included both papers and books/monographs as well as the regular coverage of blogs and (more or less serious) social media, public lectures and discussions. It covers a wide array of views and topics, from futurism to augmented reality, and from state-of-the-art devices to political impacts. At times, it deliberately takes a philosophical approach in dealing with the matter. Its aim is to shed some light on the current developments in translation technology, to draw attention to the challenges involved in its wide-spread use and to catalyze second thoughts on stances that already seem to find general acceptance today, such as the actual idea of seamless communication across language borders. Where it refers to machine translation, it assumes future improvements[3] will occur, eventually leading to easily usable and highly proliferated systems. It adopts the fundamental postulation that it is important to "anticipate concerted effort, rather than competition, between computers and translators" (Pérez 187).

2. Barriers to Communication: from the Biblical Parable to Future Expectations

In this section, the concept of borders and barriers will be explored, beginning with the biblical parable of the Tower of Babel, and moving on to how the notion was embraced in Translation Studies, and how it echoes with the language industry and research projects. Attempts to tear down the language barrier will then be presented together with visions of a "perfect linguistic ease"[4] in the years to come.

2.1. The *Tower of Babel* Narrative

When contemplating the topic of borders and barriers to human communication, the parable of the Tower of Babel comes to mind. This narrative depicts a situation where humankind is forced to make a transition from a seamless communication experience to a state of linguistic division. Hardly any other metaphor has found its way into the discourse within Translation Studies and the translation industry in such a profound way.

[3] Obviously, there are views questioning this assumption; they are mentioned in the section 3.2.3, *Technology Failure* below.

[4] A term borrowed from Oleg Semerikov's blog post *Where will the translation industry be in five years' time?*, available from: http://www.translatorsfamily.com/blog/for-clients/where-will-the-translation-industry-be-in-five-years.html (retrieved 2016-07-27).

To understand why the narrative has attracted so much attention by translation scholars and practitioners alike, let us study the Bible's mythical account first (Genesis 11:4-5). Learned exegesis of the biblical account points out that the most important symbol of the rebellion[5] against God in the narrative is the reference to a city rather than the tower itself: "Here we have a great city. But it is great, not as Jerusalem is great (as God's city), but great in its defiance of God. This is […] the secular city" (Dolphin, no pagination). A city was the equivalent of choosing a way of life that was incompatible with the then typical way of life of nomad-ship, i.e., dynamism, change and diversity. Consequently, the punishment—the confusion of tongues—hits the people exactly where they wanted to gain their autonomy: instead of stability, and the rigid and uniform ways they had been seeking, it is diffusion that they are experiencing.

The following is a non-exhaustive list of the use of the Babel narrative and the notion of linguistic borders and barriers in the relevant literature within the field of Translation Studies, from the 1950s onwards.[6]

FIT's (Fédération Internationale des Traducteurs) journal is called *Babel*; it was first published in 1954. George Steiner's seminal work on "Aspects of Language and Translation" is called *After Babel* (1975). In 1989, Kölmel, Rainer and Jerry Payne (eds.) published *Babel: The Cultural and Linguistic Barriers between Nations*. The year 1998 saw the publication of Colin Haynes' *Breaking Down the Language Barriers: Machine Translation, the Technology That Can No Longer Be Denied*. In 2003 the book *Speaking in Tongues: Language across Contexts and Users* was published with a section by Celia Rico Pérez entitled *Overcoming the Language Barrier: Paths That Converge in Technology and Translation*.

Spanning some 60 years, this gives the gist of how important the topic of linguistic barriers, and even the Babel narrative is in the discipline. It has proven to be a fruitful ground when explaining the purpose of linguistic mediation, both in the past and when looking towards the future.

2.1.1. Current Referrals within the Language Industry

Having accounted for the reception of linguistic barriers and borders within Translation Studies, allusions to the narrative with some current[7] commercial services will be presented below.

BeatBabel, a Californian translation and localization company (http://www.beatbabel.com/), puts forward the following slogan: "So that the Babylonian confusion can be a lesson from the past…". The **UnBabel** site (https://unbabel.com/) offers "Translation as a Service", promises to "Make your team multilingual in 5 minutes" and claims to represent a "human corrected machine translation service that enables businesses to communicate globally".

[5] Babylon was founded by Nimrod and his name is derived from the verb "let us revolt". The two great cities of antiquity, Babylon and Nineveh, eventually became enemies of Israel; cf. Stedman 2010.
[6] Although other accounts are to be found – both older and in other languages – this list is meant for demonstration purposes here.
[7] All web pages and services were current and could be retrieved by 2016-07-27. Highlighting added in the account (the same is true for the following section).

The notion of language barriers is also widespread in the translation business environment, cf., for example, the cover page of Casmacat consortium's Projects Magazine, which features the following slogan:

"Crossing **Language Barriers**" (cf. http://www.casmacat.eu/uploads/Main/CBS-projects-report.pdf).

Other examples of using the narrative of language barriers within the industry include the following: "A World Without **Language Barriers**" is the motto of *WaverlyLabs* (http://www.waverlylabs.com/); the header of the site *SpeechGear* reads "Removing **Language Barriers**—Instant language translation of speech, conversations, documents, text messages and more" (www.speechgear.info); the promotional video for DROTR—Droid Translator (speech-to-speech instant translation device) begins by referring to "a **language barrier**" that developed, dividing the peoples' "isolating cultures and bringing with it massive chaos and misunderstanding" (https://youtu.be/LX-wEauL_jU).

Clearly, the metaphor lives both within academe and in the translation technology industry. The next section will explore its uptake within Research and Development (R&D)—an area where both of the above fields overlap.

2.1.2. European Programmes and R&D Projects

The fact that overcoming the linguistic diffusion in Europe is a matter of paramount interest to European Union (EU) policies is witnessed by several proclamations and actual research projects supported by EU funding. Below are some examples of projects and/or project calls that explicitly allude to the language barrier.

In 1995, the European Commission launched the *M-LIS program*, focusing on, among other things, "the need for overcoming **language barriers** at the doorstep of the information society by joint effort of EU-institutions, national governments and industry" (Ørsted, 440).

*"Cracking the **language barrier**"*—a project call of the *Horizon 2020* ICT 2014 programme —was geared at developing a "new paradigm leading to radically improved quality and coverage […] of machine translation" (Horizon 2020 website).

PANACEA (Platform for Automatic, Normalized Annotation and Cost-Effective Acquisition of Language Resources for Human Language Technologies) was an EU funded project running between 2010 and 2012. Its description reads as follows: "A strategic challenge for Europe in today's globalised economy is to **overcome language barriers** through technological means. In particular, machine translation systems are expected to have a significant impact in the managing of multilingualism in Europe" (http://cordis.europa.eu/project/rcn/93810_en.html).

The following observation appears in the description of the *CASMACAT* project (2011–2014): "[…] while political borders become less significant, there is a danger that the world will remain fractured by **linguistic boundaries**" (www.casmacat.eu).

The above were some examples of EU projects and project calls that focused on language technologies and used language hindrance as an argument. After this stock-taking of how the notion of border/barrier is perceived in academia, industry, and R&D, the following section focuses on state-of-the-art applications that are created with seamless communication across language borders in mind.

2.2. Actual Applications Geared towards Bringing down the Language Barrier

The following five examples[8] show how language barriers and borders could already be overcome today, or in the near future: instant translation using a mobile phone (1), speech-to-text conversion with instant translation (2), automatic translation in a so-called conversation mode (3), consecutive (4) or even near-simultaneous interpreting (5). It is important to point out that the following account is based on promotional material of the companies behind the technology and the visual as well as content representations should be regarded with this aspect in mind. The current section does not aim at judging the actual performance of the tools and, clearly, at present, many of them show significant flaws or limitations in terms of their deployment and performance.[9]

2.2.1. Instant Translation App

This Google app for mobile phones instantly translates text captured with the phone's camera. All that the user needs to do is point the phone's camera on a sign or other type of text (e.g., restaurant menu, product packaging) and, almost instantly and in the same picture, the foreign text turns into your desired language version.[10]

Figure no. 1: Camera-based instant translation app, part of the Google Translate app

2.2.2. Speech-to-Text on a Next-Generation Hand-Held Device

Using this device, the spoken word is converted to text on a tablet with a flexible and transparent screen (promotional video available from: https://youtu.be/f4AhTiQkWwk, retrieved 2016-07-

[8] The list is not exhaustive by far.

[9] To give but one example, cf. "Something Lost in Skype Translation", available from: https://www.technologyreview.com/s/534101/something-lost-in-skype-translation/ (retrieved 2017-3-30).

[10] In a video describing how the technology works (available from: https://g.co/go/NLtranslate, retrieved 2016-07-27) the feature is being referred to as "the crazy sci-fi magic"—and quite rightly so. Before it was acquired by Google, the technology was called WordLens. It is available off-line, too.

27).[11] The counterpart in the conversation needs to read the immediate translation on the screen before responding.

Figure no. 2: Portable translation functionality in promotional material with Samsung Mobile Display and AMOLED screen

2.2.3. Automatic Translation – Conversation Mode

Apps/systems that allow for speech-to-text conversion, while, subsequently, generating synthesized speech, are only extensions to standard machine translation services. They add speech recognition and speech synthesis to what is generally known as generic MT systems. Such applications include, for example, Google Translate speech mode or one of the functionalities of DROTR – Droid Translator. The picture below shows another example of this technology, already available on a smart watch.

Figure no. 3: Two men communicating via the SpeechTrans Translator Smart Watch, a wearable speech-mode enabled device (video available from: https://youtu.be/DtYbF7Qz5lQ, retrieved 2016-07-27)

2.2.4. Consecutive Interpreting – Skype Translate

Here is an example of English-German interpreting: "Skype Translator demo at Microsoft's Worldwide Partner Conference 2014" (available from: https://youtu.be/rek3jjbYRLo, retrieved

[11] Besides, this video shows other future avenues to overcoming language barriers, such as text-to-3D hologram conversion. The user simply points the tablet to a restaurant menu in a language he/she does not understand and the tablet produces a visual representation of the meal. Here, no words are necessary any more.

2016-07-27).[12] The difference between this type of automatic interpreting and the conversation-mode MT functionality as referred to above is that in this scenario users wear a headset and use two devices, instead of having to switch between language modes on one device, and, most importantly, engage in a video-enabled session.

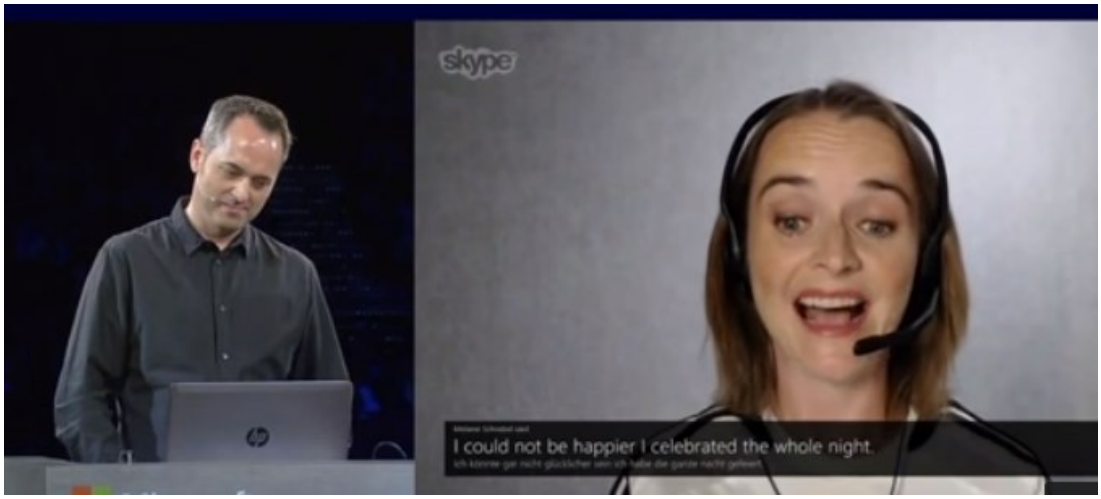

Figure no. 4: Demonstration of Skype Translator at a Microsoft conference

2.2.5. Simultaneous Interpreting

Translate Your World promises "[f]ull speed, real-time [service], no wait for processing"[13] and it claims to enable users to train the software with specific vocabulary and a personal accent.

Although the applications listed above are already available, or they are about to be launched in the near future, this article attempts to take the next step and look into what the more distant future might hold in the area of translation technology.

2.3. Likely Developments in the Future

In the longer term, it remains to be seen if the future brings linear continuation of today's processes or—due to the disruptive nature of innovation—completely new scenarios. Most likely, however, in the long term, people will change the way they interact, and communication is probably going to become more visual, involving less text and, therefore, less language-based translation.[14] For the medium term, however, demand for language services might be fuelled by new business models, such as deglobalization/relocalization.

To begin with, it is clear that large ambitions and high hopes are linked with future uses of MT. The *Translation Automation User Society* (TAUS) think tank has no less expectations than the following: "Translation available in all languages to all people […] will push the evolution of

[12] Another promotional video shows Skype consecutive interpreting with English to Spanish and vice-versa, available from: https://youtu.be/G87pHe6mP0I (retrieved 2016-07-27).

[13] Apart from automated services, this company offers human interpreters as well. In its promotional video, it admits that "the translation is not perfect because it is automated, but it can be incredibly good". Of course, Translate Your World (Tywi) claims the following: "Tywi Speech Translation Breaks the Language Barrier". Available from: https://www.translateyourworld.com/live-speech-translation-software (retrieved 2016-07-27).

[14] The interface between the real world and cyberspace will most likely widen to include other senses as well: "Cyberculture is primarily limited to the senses of sight and hearing at this time, but the time when people will be literally 'jacked in' to the Internet is not far off, and our sensual interactions are likely to engage all the senses including touch, taste and smell" (Wang and Reeves, "Cyberspace and Online Education" 247). An even more exotic idea is that of technology bridging the gap between humans and animals using interspecies translation/interpreting.

human civilization to a much higher level of understanding, education and discovery" (available from: https://www.taus.net/mission; retrieved 2016-06-28).[15]

Less general, yet still very ambitious are the desiderata of the European Union: MT was declared a key feature of EU policy in 2011 (document COM (2011) 216), and a call for EU-funded projects has stipulated the goal of a new paradigm in MT in terms of quality and coverage, including the vision of an "online EU internal market free of language barriers by 2025".[16] The European Parliament held a conference where automated simultaneous interpreting was introduced. The keynote speech included the mission of "Multi-Lingual Understanding & Integration for All" and "Achiev[ing] *Symbiotic*, *Scalable* Solutions by Language Services that Complement and Magnify Human Effort with Machine Support" (available from: http://www.europarl.europa.eu/interp/rectorsconference2012/files_en/index2_en.html, retrieved 2016-07-31).[17]

Even futurists not specializing in language technology seem to envisage a world without language barriers. Sam Lehman-Wilzig has foretold what he called SATS (see footnote 1 above) and claimed, in 2000, that we were at the beginning of a revolution[18] that would change the world. One should listen to Sam Lehman-Wilzig because he proclaimed that the first primitive SATS would be around by 2015. Taking the above state-of-the-art devices into account, along with, for example, an earpiece by Waverly Labs (introduced in 2016 on their website as the "world's first smart earpiece language translator"), they can well be regarded as primitive SATS devices, which proves that Lehman-Wilzig's prediction was remarkably accurate. He also anticipated that "SATS will be built into a person's eyeglasses […]" (Lehman-Wilzig, "Babbling" 19). One only has to consider the current Google Glass technology or a similar wearable device produced by the Japanese firm NTT DoCoMo to see that these augmented-reality glasses, which can translate foreign text in real time, match Lehman-Wilzig's predictions quite well.[19]

Apart from the above plans and visions, a professional translator's work will become more intertwined with all the other processes embedded in content creation and processing: technical writing / authoring, text analysis, searching, machine translation (post) editing, revisions and client feedback, text version management, transmission and transaction operations, interacting with Artificial Intelligence (AI), machine learning, data exchange and archiving, and many more (such as billing). Automated interpreting will soon appear in contexts such as banking services, call centres, airport announcements, hotel reservations, conference logistics, etc.

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[15] The idea of *AUTOMATED* translation as the mainstream service to cater for people's everyday communication needs is so natural to TAUS that they even do not deem it necessary to use this adjective in a statement such as the following: "We envision *translation* as a standard feature, a utility, similar to the internet, electricity and water. *Translation* available in all languages to all people in the world[…]" (https://www.taus.net/mission; emphasis added). Long before TAUS, the futurologist Sam Lehman-Wilzig sketched an alternative scenario: "Automated translation has the profound potential to either unite world ideology and values or create further diversity" (Lehman-Wilzig, "Babbling" 23).

[16] Cf. the call "Cracking the language barrier" mentioned above in section 2.1.2.

[17] Keynote speaker: Alex Waibel; title of presentation: *Simultaneous Machine Interpretation – Utopia?*. Quoted from presentation slides, original highlighting.

[18] He termed it "the coming SATS revolution" (Lehman-Wilzig, "The Tower" 468).

[19] Another example of an influential source that, although not primarily concerned with translation, gives it considerable attention is Ford 2015, with the entry "translation tools, Google", featured in the index.

Translators will benefit from comprehensive work suites with AI and machine learning functionalities. Machine translation and translation memory technology are already merging into one solution (cf. SDL Trados Fuzzy Match Repair technology or the so-called patching method, both using MT to improve TM matches), while it will be increasingly difficult to discern between a TM (Translation Memory) and an MT rendering. Built-in custom MT will reduce translator dependency on generic MT services, and data privacy will no longer be an issue. This will finally make the MT-always-on scenario the default option with CAT tools. Adaptive MT (the system "learns" from user edits in real time) is the currency of the day, and an adaptive interface will most likely follow suit (the tool zooms in or out according to segment length, Ctrl+F-type searches and complex filtering will be unnecessary as the tool will predict and display immediately what you might be looking for).

As other vehicles of communication, such as visual means, gain importance, the concept of translation will expand to incorporate new semiotic scenarios and modalities, comprising graphics, holograms, gestures, intuitive sharing, etc.

2.4. Section Summary

In order to outline the concept of barriers to communication, this section studied the biblical parable of the Tower of Babel and its uptake in the area of translation from several perspectives. It then listed several existing or planned automated applications aimed at bringing down the language barrier, closing with visions for the translation technology segment in a more distant future.

3. The Eventual Consequences of Linguistic Borders Disappearing

Our attention will now focus upon the eventual consequences the above developments might have, including the foreseeable risks clustered around the types of user groups.

3.1. Society as a Whole

3.1.1. Debilitation of Language

Economic pragmatism, which treats language as a commodity, promotes the 'good-enough' approach to MT output quality, giving up on the (costly) mission of the past to cultivate languages and contribute to their development. This tendency is one of the phenomena contributing to the situation where user expectations in terms of language/translation quality are already decreasing and may continue to do so. The following is a graphic presentation of this point:

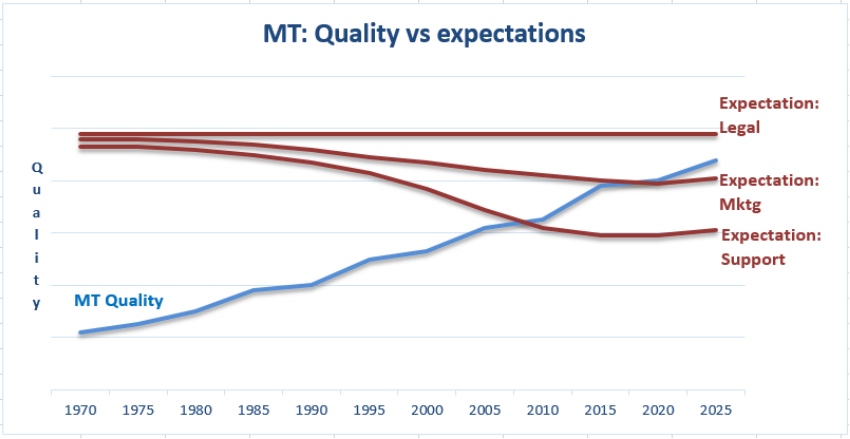

Figure no. 5: MT quality development as plotted against quality expectations on the part of language users[20] (Source: David Snider – Localization and language quality)

This graph illustrates the idea that while MT quality increases over time, quality expectations in the three areas of context may either remain unchanged (legal translation), may shrink in a limited way (marketing texts), or may shrink considerably in domains such as support literature.[21] Whatever the actual development, it should always be possible to opt out of using automated language mediation systems and use human services instead. Clearly, the choice to use or not to use MT is an ethical[22] one, be it amongst professionals or the general public.

Assuming that future MT solutions (including neural MT), to some extent, will be reusing existing language material to become trained, they run the risk of producing and consolidating superficial language. By this we mean a flattened language consisting of a limited number of the most commonly used words and phrases, without the true richness and diversity found in human expressions.[23] By the same token, FIT Europe warns against the "widespread use of machine translation" as it "would impair the quality of communication within the EU, thus ultimately leading to the impoverishment of cultural diversity" (FIT Europe, 2).

Users, who will often be exposed to such flat language, will absorb the simplified vocabulary and phraseology and will find it increasingly more difficult to express themselves "in their own words" as well as understand complex language structures rich in word choice and phrases. The consequences are clear: accelerated disconnection from past thoughts as recorded in one's own language, and the alienation of politics and science from society. This in turn will make it easier for authoritarian rule to take over. Societies might become radicalized when lacking the basis for critical thinking, which is grounded in subtle communication and nuanced language.

[20] It should be noted that the graph is used for illustration purposes only as Snider points out that it "is not based on hard data". Available from: https://www.linkedin.com/pulse/localization-language-quality-david-snider (retrieved 2017-3-22).

[21] John Hutchins admits that "[w]hat may happen is that MT itself will become so familiar to a widening segment of the public that quality will no longer be an issue of importance." However, he goes on to argue that "familiarity may breed contempt, and the whole MT industry may be condemned for ever by the general public as producers of inherently poor-quality software, with potentially damaging consequences for both research and development" (Hutchins, no pagination).

[22] On MT and ethics, cf. Kenny.

[23] The technology may jeopardize the etymological development of languages: "SATS threatens to render languages far less dynamic in their etymological development" (Lehman-Wilzig, "The Tower" 487). On the other hand, SATS may have counter destructive tendencies with those languages that are threatened by extinction, for example, by building dedicated MT systems using them.

3.1.2. Language Learning and Cultural Values

A substantial decrease in foreign language learning is one of the most obvious effects that potential systems of readily available instantaneous translation and interpretation might have.[24] The consequences will be manifold: a decline in the knowledge of other cultures amongst the general public, a deterioration or loss of cognitive, and other skills linked with using languages (see below), etc.[25]

The cultural component has been an integral part of traditional language learning, where it had been understood that "[…] the deepest meanings underlying any specific tongue cannot be separated from the culture from whence that language springs" (Lehman-Wilzig, "The Tower" 479). Therefore, already today, there are pledges for keeping up the virtue of learning foreign languages: A "Manifesto" from the UK All-Party Parliamentary Group on Modern Languages has the following to say: "Knowledge of other languages—*and of other cultures*—is important for education and skills, the economy, international engagement, defence and security and community relations." And Nataly Kelly (cited in Williams) observes: "When you learn words and phrases, you also learn cultural values. […] There is simply no replacement for learning a foreign language".

Another, and quite unexpected, effect of giving up learning foreign languages might be the negative impact on one's own mother tongue: those who learn other language(s) become more knowledgeable of their own language. Also, "as people stop learning foreign languages […,] cross-pollination" between languages will cease (Lehman-Wilzig, "Babbling" 21). Moreover, the command of meta-linguistic discourse will decline sharply amongst the general public.

3.2. Technology

3.2.1. Dependency on Technology

A frequent argument against the introduction of technology of any kind into human lives has been that of the loss of long-established skill sets linked with the original craft/activity. For example, one needed to understand maps and develop a skill in projecting map information into the real world, and vice versa, but with the use of navigation systems, one can navigate through unknown territory without knowing the names of roads, the layout of a city's streets, or what map scales are. On the other hand, navigation systems represent not just a handy replacement for the traditional map, but they offer augmented-reality features, such as immediately showing what the user does not see (e.g., the road ahead behind a hill or a curve), and they also work in the dark. Besides, they deliver many additional pieces of information (e.g. altitude, speed, coordinates). On the other hand, once a person becomes accustomed to using a navigation system, the ability to navigate using a traditional map is quickly weakened. It is highly unlikely

[24] David J. Hill puts it rather bluntly: "[W]hen it comes to foreign languages, let technology take care of bridging the gaps between different tongues, dialects, accents, and slang. There's nothing wrong with learning a language for fun, but the days of believing that you have to know a second language are over." At the same time, however, an interesting recommendation is put forward: "[F]ocus on one language, your native tongue, and master it in all forms. In the age of the Internet, communication is more important than ever […] On top of that, the web is persistent, so what you say can linger for a long time" (Hill, no pagination).

[25] Nicholas Ostler supports this prediction when he states: "Machine Translation […] replaces, rather than builds, the cognitive skills that underlie command of a language." Yet, he also suggests a situation where foreign languages (other than linguae francae) would be empowered by MT advances. Consequently, "[t]he key is to facilitate, not replace, the development of skill [of learning foreign languages]" (19–20).

that those who have used navigation systems only would ever develop map-reading skills—users exchange convenience for technology dependency in the process. The same is true for MT: once we surrender our cross-language communication capability to machines, it might not be easy to regain those skills. Technology, albeit far from perfect, is preferred because it will be so easy to acquire and simple to use. The price for convenience in this and many other areas where automation makes its headway, will be an unskilled and quite vulnerable mass.[26]

3.2.2. Intermediary Nature, Uncertainty, Depersonalization, and Privacy

Using a device instead of communicating directly implies the introduction of a new intermediary communication layer. With imperfect translation/interpreting systems, the user is much less certain whether the system's interpretation is correct compared to one's judgement of one's own language skills or the professionalism of a skilled human translator/interpreter. Moreover, cross-language communication is likely to become depersonalized in the course of using third-"person" devices. Besides, with cross-language systems available free of charge, there are always hidden costs involved: a user's communication and language patterns are surveyed and tracked to improve the service and/or for marketing purposes.

3.2.3. Technology Failure

Technology is useful, as long as it fulfils its purpose. An over-dependence on technology can have fatal consequences. Charles Perrow (cf. *Normal Accidents*) says that the complexity of systems renders failures inevitable. Future cross-language communication systems will be complex and they will be prone to deficiencies, be it temporary unavailability, hardware and software failure, wear-and-tear, cascade accident effects, etc.[27]

Most of the sources that have been referred to so far take it for granted that machine translation quality will steadily increase and, eventually, reach a near-Human Translation quality (or even surpass it, cf. below). Obviously, there is no guarantee for the development to reach such heights. Currently, some language pairs in some domains perform very poorly when machine translated and even with those that show the best potential (with current MT methods, that is), there are indices that MT quality might eventually "plateau" or that MT could reach a "point of degradation".[28] Thus, MT's own technological limits pose a potential boundary to be considered when contemplating new obstacles brought about by technology.

3.2.4. Manipulating Meaning

Since technology is hackable and can be misused, the vision of a person or entity manipulating such a key intermediary service becomes quite disturbing. As far as commercial services are concerned, there is limited control over potential manipulation and wilful acts. Even with public-service systems, there will always be the potential of them being attacked, disabled or otherwise

[26] When surrendering decision-making and critical thinking to machines as well, we might be in a position similar to when H.D. Thoreau lamented over the overly narrow specialization of professions some two hundred years ago: "Where is this division of labour to end? and what object does it finally serve? No doubt another may also think for me; but it is not therefore desirable that he should do so to the exclusion of my thinking for myself" (Thoreau 36).

[27] Bill Joy, cofounder and Chief Scientist of Sun Microsystems, refers to the notion of fragility: "[W]e, with our early-21st-century chutzpah, lack [humility] at our peril. The commonsense view […] is often right, in advance of the scientific evidence. The clear fragility […] of the human-made systems […] should give us all pause" (cf. in: "Why the future doesn't need us"; Available from: https://www.wired.com/2000/04/joy-2/ (retrieved 2017-3-29)).

[28] A similar concept is described with the term MT "time loop". For a more detailed discussion, cf. Svoboda "Man and Machine".

interfered with.[29] However, the worst scenario would probably be bugging the system with bots or algorithms that would twist meaning or spin messages. Such interference would be far less apparent than bringing the system to a temporary standstill. It would hit humans hard in one of the key areas of their activity, which is (cross-language) communication. Orwellian visions would easily be matched by such a "Babylonian" cyber-attack, entailing all sorts of manipulation, or instilling ideology.

3.3. Diplomacy, Economics, Political Fields, Migration

Whereas the economic potential of the envisaged systems is certainly huge, "[m]asses of immigrants retaining their native language [as a result of a torn-down linguistic barrier] will probably lead to greater local xenophobia" and heightened political turmoil. (Lehman-Wilzig, "Babbling" 20). This circumstance will have to be taken into account when dealing with future political and societal challenges in general.

3.4. Change Management

In view of the negative impacts as depicted above, there is no wonder that such changes are perceived as a threat, with concerns being articulated more or less often. Here are two statements for illustration purposes: "'post-processing' of machine translations [is a] reanimation of the dead detritus left by machine translation for humans to pick over it" (Vitek, no pagination); "History provides no better example of the improper use of computers than machine translation" (Kay 4). We believe that the implementation of technology in the area of language is not harmful *per se*. Only unreflected implementation and unrealistic expectations could pose a genuine threat here. To reap the fruit of technological progress, neither uncritical appreciation, nor distress and paralysis are desirable; what becomes necessary is change management. Here is an authentic record of a "change of mind" on the part of a translator when it comes to the future technologies:

> I used to say we translators need not fear machine translation because it will never work very well, and proceeded to list many reasons why it will not work. My new position is that instead of throwing up obstacles we should encourage researchers to build machine translation systems that can pass the Translation Turing Test[30] on demanding texts and specifications. […] [T]ranslation is so intellectually complex that if machines can do it really well, they will also be able to accomplish all other intellectual tasks […]. We will have truly achieved Artificial Intelligence in a sense that is now only science fiction.
>
> I want to be around to experience the adventure of interacting with truly intelligent machines […] (Melby, no pagination).

3.5. Section Summary: The New Barriers

[29] To my knowledge, few or no considerations of this kind have been presented in relevant literature so far. Revisiting the analogy of navigation systems, similar to Europe's own Galileo, where reliance on an external service was perceived as a strategic threat, the building of a Pan-European MT service is of key strategic importance. Its inception could be represented by European Commission's MT@EC system as part of the CEF facility (cf. http://ec.europa.eu/isa/actions/02-interoperability-architecture/2-8action_en.htm, retrieved 2016-07-31).

[30] In the test, the name of which alludes to the so-called Turing test (cf. below), humans and computers are compared as to how they perform in a translation task, relative to various source texts and structured specifications.

Eliminating the language barrier will rob people of their motivation to learn foreign languages, and with it the learning of other cultures as we know it today will be substantially impaired. Unless countered by targeted action, this tendency could give rise to new obstacles, eventually erecting a new cultural barrier.

Furthermore, there is not just the risk of technology breaking down and automation ceasing to automate: there is actually a statistical certainty of disasters of this kind happening (cf. Perrow *Normal Accidents*). In such a scenario, humankind, which has surrendered its foreign language competency to machines, eventually needs to prepare for system black-outs, which, in their consequences, are far reaching. Thus, with technology tearing down the linguistic barrier, dependency on technology creates another barrier. Technology itself will become the new intermediary, eventually creating uncertainty, depersonalization, and, in some cases, it might lead to user exploitation. Compared to people communicating in foreign languages on their own, using an artificial device will create a new, genuine and physical barrier.

In a "translation-rich environment"[31] there will be a flood of (translated) information, which might contribute to a resistance reaction, explore-fatigue: people might become too passive in mental pursuits if all of the world's information is at their fingertips. Thus, a new barrier of indifference may be erected as a result.

Those cross-language messages that will reach the recipient might be auto-formulated in simple language, which will proliferate to human daily language usage. Ultimately, this development implies superficial messages, thus erecting new barriers to conveying meaning that is more sophisticated.

4. Overcoming the New Barriers

Having summarized the concept of border and barrier, their representations in Translation Studies and the industry (in the second section) and having outlined possible challenges that could be triggered by the language barrier disappearing (in the third section), some remedial suggestions will now be discussed in the next part.

4.1. The Cultural Barrier

It has been suggested that, in the future, instead of learning a second language, students pursue intercultural studies: "[…] we might see an increase of 'inter-cultural' studies in primary/middle/high schools and in higher education, to make up for the lack of first-hand linguistic knowledge of other peoples" (Lehman-Wilzig, "The Tower" 485). As synthesized (target) language might impact our own language usage, intensified efforts in learning and cultivating one's own mother tongue will become necessary as well.

4.2. Technology Barrier

The new barriers of indifference to gaining and retaining knowledge, of superficial language, and those to conveying sophisticated meaning will only be reinforced by technology itself. As automated language services will increasingly proliferate in our communication world, they should be marked as such to enable users to discern them consciously from genuine human language.

[31] Term by Lehman-Wilzig, "The Tower" 485.

Of course, many of the consequences in the area of technology will not be perceived as obstacles by digitally-native generations to come, yet superficiality and the browsing culture will not be remedied, but rather reinforced. What could help here is showing the value of reflection, serious discourse, and critical thought.[32] For this, having all the imaginable resources in all of the languages readily accessible could certainly be an asset.

4.3. Societal and Strategic Challenges

Specific, ultra-secure systems (or, in the lack of such systems, reliable Human Translation, HT) will be used in diplomacy and international relations to avoid wilful interference and espionage of automated devices. Generic solutions used by the general public as a technology standard should be in public hands to ensure control and avoid any manipulation of meaning.

[32] In this regard, the following remark by H.D. Thoreau deserves quoting: "Our inventions are […] but improved means to an unimproved end […] We are eager to tunnel under the Atlantic and bring the Old World some weeks nearer to the New; but perchance the first news that will leak through into the broad, flapping American ear will be that the Princess Adelaide has the whooping cough" (40).

4.4. The Value of Obstacles to Automation

Streamlined communication will make it difficult for people to develop a sense for the beauty of language. It will become necessary to create barriers of beauty[33] to counter sheer pragmatism with its adverse consequences regarding one of humanity's most valuable assets: human language.

4.5. Section Summary

After outlining the potential new barriers in section 3, this section focussed on how these obstacles could eventually be overcome. The cultural barrier should be lowered by intensified (inter) cultural studies in all sorts of schools and in higher education, hand in hand with efforts to strengthen the mother tongue competency. The technology barrier could be faced by making technology more reliable and motivating its users to use it in a reflected and critical way. Automated linguistic solutions used by the general public should eventually be in public hands to avoid misuse. Automation itself might deserve to be countered to give humans a pause from over-using technology and allow for more space for their own development: "barriers of beauty" might be the desirable obstacles to be erected and maintained, whatever their eventual nature and form.

5. Consequences for the Translation Profession

This final section turns the focus on the translation profession, the challenges it is/might be facing and possible solutions.

5.1. Challenges Ahead

Contrary to the comforting words of many MT advocates it needs to be clearly pointed out that translators' jobs as we know them today will most likely be made redundant[34] by the advances in MT technology in the future—a prediction based upon current trends as well as upon experience in other areas of what used to be a traditional human activity.[35] The rise of machines seems omnipresent and algorithms are, or will be, used to mimic not only tedious activities (call centre telephone bots, the automated grading of student writing), but also creative processes: robot (or automated) journalism, robotics in the legal sector (cognitive computing), robotic surgery, algorithmic music, or even short-story generators.

In localization, MT has gained ground with banal content and is moving upmarket. The localization industry is pioneering novel processes of increased automation and disintermediation

[33] What these might look like is unclear, as it will depend upon the actual technology being in place in the future. Inspiration can be drawn from the Austrian artist Friedensreich Hundertwasser, who demanded art and design to create obstacles to haste and superficiality. Being primarily an architect, Hundertwasser designed his buildings as obstacles of beauty to hinder people in their hectic lifestyles. For instance, he designed highway service areas so appealing to make drivers stop and enjoy the architecture's refreshing otherness.

[34] Interestingly, among current translators themselves, there seems to be little agreement when it comes to predicting job losses or gains: David Katan performed a "global survey of freelance translators" and found out that of 432 individuals surveyed (comprising translators and interpreters) "51% were unsure as to whether there would be more or fewer jobs by the year 2025, and 30% who were convinced that there be at least a loss" (11).

[35] Recently, the BBC has launched a site entitled "Will a robot take your job?" (available from: http://www.bbc.com/news/technology-34066941, retrieved 2017-3-29). It shows the likelihood of jobs replaced by machines, based on a study by researchers at Oxford University and Deloitte. It gives data for the UK only. Typing in "Translator" and hitting the "Find out my automation risk" button renders the following result in 2017: Likelihood of automation: "It's not very likely (33%)". More generally, the concept of jobs itself might be replaced by a new (job) market order, post-scarcity society and reputation economies (cf. https://techcrunch.com/2013/02/16/this-time-is-different/, retrieved 2017-3-29).

(see below), referred to as "Continuous Localization", to eliminate projects and jobs, and to create a continuous assignment flow of individual segments and meta information. For the wider public interested in automated cross-language renderings, generic MT is available free of charge, and even professionals have now an array of CAT tools available, most of which already come with built-in MT functionality.

One area where AI's impact might be even more profound when automating the entire content processing chain is translation agencies. Translation exchange portals will suggest translator matches to particular jobs automatically based on automated source text analysis together with respecting client criteria of price, deadline and product quality. "Big data" (for example, text analysis of completed assignments, records of client satisfaction) will replace costly hiring procedures as best-match translators will be easily identifiable. This entire process is called disintermediation and it might easily wipe out a considerable proportion of current translation agencies.

An emerging theme in discussions among MT technology promoters is the notion of MT not only becoming comparable to Human Translation (HT) in terms of quality, but actually surpassing it. This does not necessarily entail outperforming HT product quality as we know it today; it can mean surpassing HT on the other accounts of the typical client-oriented definition of quality (deadline and cost) with product quality not being the key concern any more.

No doubt, the translation profession is going to see profound changes. However, most likely, it will be the jobs of non-professional translators that will be "lost in (automated) translation", as the quality of texts produced by non-professionals might eventually be similar to that of fully automated text services—unlike, obviously, their speed and cost of service.[36]

As regards actual job prospects, 2029 has been suggested as the date when computers will pass the Turing test (testing the ability of machines to exhibit behaviour similar to that of a human) and reach human levels of translation quality, and 2045 as the year of singularity (AI capacity outperforming the human mind).[37] However, as obsolete job descriptions go, other jobs emerge: with the advancements in information mining and use, Nataly Kelly sees a bright future for a new sort of translators in a process of making all the existing content accessible and understandable: "[A]s a society, we are moving beyond the Information Age, and into the Information Transformation Age. […] translators are as critical to this societal transition as blacksmiths were to helping us advance to the Industrial Age" (Kelly, no pagination). In this regard, Santilli (*El futuro*…) calls for members of the professional community of translators to acquaint themselves with translation technology, so as to be able to counter naïve statements on

[36] Sam Lehman-Wilzig's prediction goes even further: "The most obvious economic consequence [of introducing SATS] will be the virtual disappearance of the translation profession" (Lehman-Wilzig, *The Tower* 484). Yet, there are other predictions giving a more balanced account of eventual developments, for example, by Martin Williams: "Technology […] is having a deep impact on the translation industry, but is not about to eradicate it".

[37] On the former date, cf. R. Kurzweil in an interview with Nataly Kelly (Ray Kurzweil on Translation Technology; http://www.huffingtonpost.com/nataly-kelly/ray-kurzweil-on-translati_b_875745.html; retrieved 2017-3-29). On Translation and singularity, cf., for example, "Technological Singularity And Mechanical Translation", (https://www.ulatus.com/translation-blog/technological-singularity-and-mechanical-translation/; retrieved 2017-3-22).

translator replaceability, because, for him, the most important threat that they face is damage to the image as professionals in society.

5.2. Ways in Which Translators Can Cope with the Challenges to Their Job Prospects

With non-literary translation, the role of technology is hardly likely to shrink. What it means for translators is that they need to be up-to-date as regards technology developments. They should eventually embrace it and make use of it to the very fullest.[38]

Knowledge and skills in intercultural communication will be indispensable for translators and they will need to become genuine experts in the field. In the long run, they will also have to become masters of their target languages and will also need to retain critical thinking in order to understand the potential and the limitations of technology.

As academia has to recognize and face these developments as well, it is good news that some translator training institutes are already implementing modules in their curricula that deal with post-editing machine translation and even building translators' own MT engines.[39]

The translators who are most likely to thrive in their changed professions will be those who use technology to let it substantially empower themselves: creative translators, whose productivity is boosted beyond pure human capability by project management and MT/TM prediction software, who have technology provide them with search and reference sources reaching far beyond human capacity, and who will be able to understand the source text much better due to allusion/intertextuality checking applications. Translators, whose stylistic talent will be enhanced by "brainstorming" software offering synonymy checks and formulation aids triggered by thought, whose writing will be perfected by AI-enabled correction software and who will use text recording which takes place in virtual man-machine-interfaces. These translators making use of augmented-reality features of the technology, which is ahead of us, will become the true winners.

New machine collaboration jobs will emerge requiring expert human judgement to evaluate the performance and usability of such systems as those systems need to be trimmed, tested, and evaluated with the help of humans.[40] As they will have remained the relatively few knowing foreign languages and being able to judge MT systems' performance, future translators will need to become "super linguists" to evaluate linguistic matters and express them using meta-language. Specialized, creative professional translators[41] will be able to benefit from MT. The

[38] Michael Cronin suggests seeing the "translation agents in the new millennium as *translational cyborgs* who can no longer be conceived of independently of the technologies with which they interact" (Cronin, 112; original emphasis).
[39] European Master's in Translation (EMT), a network of currently 63 European universities, for example, require their members upon entry to produce evidence that students are delivered a "technology competence", which involves making oneself familiar with CAT and MT technology.
[40] To be fair, however, these "human-machine collaboration jobs" might not be as numerous: "[W]hile human-machine collaboration jobs will certainly exist, they seem likely to be relatively few in number and often short-lived" (Ford 129).
[41] On creativity and trends in translation, cf. Maylath (44): "Despite, or perhaps even because of, the automation of MT, the stages left for human translators to complete can have the effect of heightening the value of the human element, namely creativity".
On MT-HT coexistence: "MT and human translation can and will co-exist in relative harmony. […] [T]he human translator is (and will remain) unrivalled for non-repetitive linguistically sophisticated texts (e.g. in literature and law),

proliferation of imperfect and/or simplistic MT[42] could paradoxically generate more demand for high-quality human translation. Added value services of expert professional translators with enhanced capability and productivity should be recognized by the market and provide a basis for high-paying and rewarding translation (niche) jobs.

5.3. Section Summary

This section was concerned with the challenges that lie ahead of current translators and the profession as a whole in the period to come. Machines are improving and becoming involved in areas of formerly creative processes driven by humans. The field of localization seems to be particularly eager to leverage MT all the more intensely. Exchange automation might have a profound impact on translation agencies, eventually seeing many of the current ones give in to the trend of disintermediation. In some domains and language pairs, non-professional translators producing mediocre translations might be easily replaceable by technology. There are many voices, however, suggesting that the future for (a new sort of) translators is bright, especially when they possess knowledge and skills in intercultural communication, specialize and when they master their own language; as for technology, they will be motivated to make use of it to the fullest and add value in evaluating/trimming it.

6. Conclusion

It could be observed that the biblical narrative of the *Tower of Babel* is a frequent metaphor used to describe the ambitions of current and future technology when it comes to communicating across linguistic borders. When looking for examples of such technology, an array of devices and functionalities could be presented, which seems to witness to the fact that the producers of such devices are seeing a high demand and a profitable future for such technology. Whatever the actual course of events in the future, some trends can be predicted for both the translators' profession and general economic/business trends. However, many other avenues of progress will evolve unexpectedly, creating entirely new scenarios and contexts.

The intention of this article is not to oppose the introduction of MT or to paint a bleak future of the translation profession. It rather attempts to venture beyond a point in time (should such a situation arise), when every-day cross-language communication will have been almost fully taken over by automated systems. The aim has been to counter plainly positive stances, often motivated by vested interest, and argue that the way forward lies in a reflected and balanced attitude towards implementing technology as it evolves.

The question of whether such systems will contribute to the elevation of humankind, or to its detriment (see section 2.3 and section 3), cannot be answered now. However, the option of making cross-lingual communication barrier-free, and thus accessing most of the world's knowledge seamlessly, will become an opportunity to question the kind of information that is being communicated and to try to stimulate in-depth exchanges.

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and even for one-off texts in specific highly-specialized technical subjects" (Hutchins, no pagination). On specialization: "There will be no space in the future for the translator who does not dominate specific areas of work and translation technologies" (Santilli 2016; translated from the Spanish original using Google Translate – unedited).

[42] Cf. footnote no. 20 above.

More immediately, it needs to be pointed out that there is an ethical dimension to the use of MT systems: it is a translator's/vendor's/buyer's choice whether to use MT or not, and whether to contribute to training a third-party system with his/her own renderings or not. Similarly, it is up to the post-editor to judge his/her post-editing effort with its ultimate bearing on linguistic quality of a translation product and, consequently, on natural language and its paradigms. As translators have always been the shapers of language and culture, future translators will have to come to terms with this role as well, or even more than ever before.

Superb human mediation in the linguistic and cultural fields will neither be entirely replaceable by technology due to the flaws of the latter, nor dispensable, due to the human need for proximity; hence, the translation profession is here to stay, although it is bound to evolve as communication patterns are subject to change, too. It is vital that human translation experts be involved in future technological developments. "Super-linguists" will be needed to trim the linguistic engines and, eventually, override the recommendations of machines. For a long time still, complex semantics and the interpretation of text passages will remain the art of human involvement in processing the input and output. Technology is not set to become autonomous in the medium term. It can serve people very well if applied with boldness and creativity, as well as with responsibility.

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