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Translation's Histories and Digital Futures

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Drawing on Latour's actor-network-theory and De Landa's robot historian, this essay asks in what ways translation's past is a prehistory of the present and to what extent nonhuman agents have shaped and are shaping translation. In particular, it examines the impact of computational media on translation and finds that the difference made by the computer as a convergence medium is that, for the first time in history, one medium has become capable of presenting in its entirety the *media history of translation*. To grasp the changes that translation is undergoing in the 21st century therefore requires a comparative understanding of its relations to the mediascapes of the past, present, and future.

Keywords: translation and technology, machine translation (MT, TM), crowdsourcing, translation factories, digital translation, media and translation history, nonhuman agents

Media Technologies and Translation

Technology is the main driving factor in the processes of globalization. When McLuhan coined the idea of the "global village" in 1962, he drew our attention to the importance of the role that media technologies play in creating new forms of knowledge and new systems of communication and transmission. With the invention of the printing press in the 15th century, knowledge and learning could be diffused more swiftly and "[m]en found themselves possessed of the means of communicating with people all over the world," (de Condorcet, 1794/1955, p. 100), thus expanding the project of the *translatio studii* by industrial means. With the invention of motion pictures, a "universal language" was born that could convey an "essential message" and spread it "farther and faster and to more people than books ever could" (Gilman, 1926, p. 144). This compression of the space-time continuum became vastly accelerated with the invention of the computer and the Internet.

It is a truism that translation has been key to disseminating information, knowledge, and forms of cultural expression across linguistic boundaries. Yet it is technologies that have enabled and decisively changed these processes of dissemination. Studies of translation and technology have tended to focus on the history of specific translation technologies in order to assess the impact of machine translation (MT) or

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translation memory tools (TM) on translation in the 20th and 21st centuries (Chan, 2015). By contrast, studies on translation and history have tended to focus on "the ideological, sociocultural, and historical circumstances that have determined translation choices and strategies in a variety of traditions over the centuries" (Bastin & Bandia, 2006, p. 6). What is missing is a history of translation that would explain how media technologies have impacted on translation practices. When Tahir Gürçağlar (2013), for instance, suggests that "[o]f approximately 200 researchers registered in the [International Directory of Historians of Translation (http://artsites.uottawa.ca/jdelisle/fr/repertoire/)], a considerable number have expressed an interest in a variety of issues *outside of the historical field, such as media translation*" (p. 133, emphasis added), she omits a crucial point: that media history might well be key to understanding the changing face of translation. We only need to think here of the powerful combination of print technology and translation that Luther understood and exploited so well that proved to be a significant trigger of sociocultural change in early modern Europe.

Elsewhere, I have addressed these issues in the media contexts of oral, scribal, early modern print, and screen cultures (Littau, 2011). Drawing on insights from historians of the book, who have shown how practices of writing and reading have varied historically in accordance with the media forms available for the storage and retrieval of information, I've asked whether these insights are also applicable in the context of translation. In particular, I examined the extent to which translations bear the traces of their particular technological environment, be this performance-based, artisanal, industrial, or electronic. My aim was to show how translation changed over the course of history in accordance with the material and technical resources at its disposal and to throw new light on age-old debates about word-for-word and sense-for-sense translation. Similarly, Cronin (2003, 2013) and Pym (1998, 2011, 2014) have addressed translation in a broader media-historical context: the former examining the various chirographic, print, and electronic tools at the translator's disposal throughout the history of writing (2003) and the latter fleshing out the correlation between contemporary and historical practices of translation, such as that between website localization and medieval translation practices (2014). Both have shown why it is important to chart connections between the *effects* of old media on translators and translations of the distant and recent past and the *effects* of new media on translators and translations now. Understanding more about such connections and affinities will help us to grasp more fully the challenges that translation is facing anew in this historical period and perhaps will even enable us to extrapolate from past and current trends translation's plausible future trajectories and prospects.

In this article I want to show how historically diverse practices associated with particular recording media, such as memory, print, and film, are "remediated"—that is, incorporated, refashioned, and repurposed (Bolter & Grusin, 1999)—by the computer. Because all media, new and old, engage in "remediation" by appropriating each other's characteristics, we must ask what is new about the new media, or rather, what is different about the fundamental material affordances of the computer. According to Turing (1950/2003), a computer is a "universal" machine that can "mimic" any discrete machine (p. 54). It is universal because there is no machine it cannot mimic, yet it does nothing itself until some task is given to it. Any such task will therefore be a repetition of a task hitherto conducted by other machines or media. In the context of translation, this means, for instance, that TMs have a precursor in the ancient practice of mnemotechics; that crowdsourcing remediates the collaborative translation practices of the medieval scriptorium (Pym, 2014); that MT has a human correlate in the "translator-machines" (Gutzkow,

1839) of the "translation factory" of the 18th and 19th centuries; and that morphing and flashing in the multilingual works of contemporary poets and artists such as John Cayley or Young-Hae Chang Heavy Industries, which make visible the translation process on the screen, turn translation into a protocinematic experience.

It follows that digital media are second-order or meta media, repeating—that is, remediating—the outputs and tasks once conducted in other media: codices, books, films, etc. As Bolter and Grusin's "remediation" thesis (1999) postulates: "What is new about new media is therefore also old and familiar: that they promise the new by remediating what has gone before" (p. 270). The computer is a convergence medium because it converts texts, images, and sounds—once associated with these discrete media—into digital code. The difference made by digital media, as this essay will show, is that for the first time in history, one medium has become capable of presenting in its entirety the *media history of translation.*

In what follows I outline the contours of a media-historical approach to translation that does not take the "human" subject or agent as its point of departure but asks instead what role media and machines have played in the history and constitution of translation.

Machine History of Translation

Latour's (2005) "actor-network-theory" (ANT) is an attempt to do away with the subject/object dualism that has dominated the social sciences. ANT, which posits that human actors perpetually interact with nonhuman actors, asks us to abandon the idea that it is only humans who have agency and to consider how it is that technology becomes an agent. Latour's point is that neither human actors nor nonhuman actors can claim exclusive agency; rather, it is the network itself that is an actant, acting on and determining both the human and nonhuman. Latour's thinking is a serious challenge to humanism and its tendency to put the human at the center of all things. Although ANT was "largely ignored" by translation studies, according to Buzelin (2005, p. 194) a decade ago, more recently its insights have been applied to translation in a technologized context (Olohan, 2011, 2014). Uncontroversially, network theory draws attention to how human and nonhuman agents are operatives in the production of translations (Figure 1 shows a human translator operating a translation machine). More controversial, however, is the claim that nonhuman actors have agency when it comes to translation.

The social reality of the translator in the age of Google Translate is such that "the human translator" might well be "condemned to large-scale extinction" (Cronin, 2013, p. 1) and that in the near future machines rather than humans do the bidding to meet the ever-increasing demand for translation. Although users are skeptical about the readability of MT output, as are translators, who increasingly see their profession reduced to post-editors of machine-generated translations (Garcia, 2011), the quality of MT has vastly improved of late. According to Austermühl (2011) this is so for two reasons: Our "expectations as users" of MT "have become so much lower" (p. 3), and MT "has become so much more human" (p. 12), owing to "high-quality human input" (p. 14) and accordingly improved results. Yet as Garcia (2011) has shown, "the more MT is used the better it becomes" because "the new generation of MT now in deployment . . . self-learn[s]" (p. 229). At issue is whether the improvement of MT is due to its humanization or to the acquisition of agency on the part of the machine. A self-learning system is an

intelligent machine, even if only in rudimentary form. In this context it becomes pertinent to ask, what would a machine history of translation look like? Rather than adopting a human-centered perspective, which would focus on the central role that translator *x*, *y*, or *z* has played in the history of translation, what would a nonhuman actor notice about the evolution of translation? Or to put this more speculatively, what would a nonhuman agent such as De Landa's "robot historian" (1991, pp. 2–3) register about the effects of old and new technologies on translation? Would the past not become the prehistory of the present, a virtual history not just with humans interacting with nonhumans but also nonhuman agents acting on humans and machines interacting with machines? Isn't the latter precisely what already happens on the World Wide Web: "automated agents 'crawl' the Web, mining, scraping, and harvesting; and sometimes we deploy text files called 'robots' to ward against them" (Kirschenbaum, 2013, para. 4)? And isn't this also what happens in automated translation, where automated agents mine bilingual databases and post-edited output that are fed back into system?

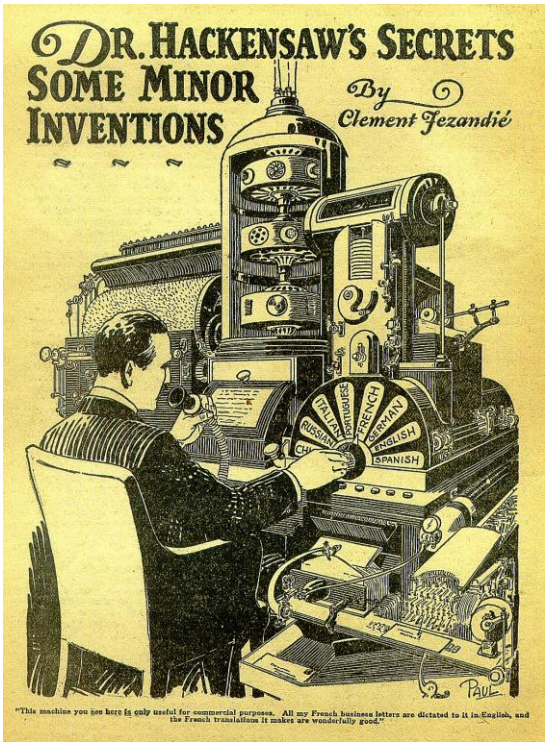

Figure 1. Translation machine imagined in 1926.
Source: *Amazing Stories, 1*(3), p. 280.
See http://www.pulpmags.org/PDFs/AMS1926_06.pdf

So, what role have nonhuman actors played in the far and recent past of translation? What entanglements of humans and nonhumans have characterized the history of translation? What precursors and precedents would a nonhuman agent register for the interface between computing and translation?

First, there would be the recognition that even human actors are "*translational cyborgs*" insofar as human translators "can no longer be conceived of independently of the technologies with which they interact" (Cronin, 2003, p. 112). Robinson (2003) makes a similar point: "*all translators are cyborgs*" (p. 372), not only because translators produce their work on word processors but also because professional translators nowadays use software tools for technical translations. His point that "all translation will continue to require a human-machine interface" (p. 371) would be an anthropocentric perspective for the robot historian of the near future, who is more likely to see this the other way round. The issue is not, as Robinson upholds, that "*you* do the translating. The computer helps; but you are the translator. You are a human being. The computer cannot translate; it's a translation tool. Only you can translate" (p. 372). Rather, for the robot historian, all translation is human-assisted machine translation, and humans are little more than cogs in an assemblage of machines. At this juncture, the very term *nonhuman*—which, after all, distinguishes the other (machinic, technological, material, synthetic, etc.) from the human, as if derived from the human—would itself be evidence of an anthropocentric bias.

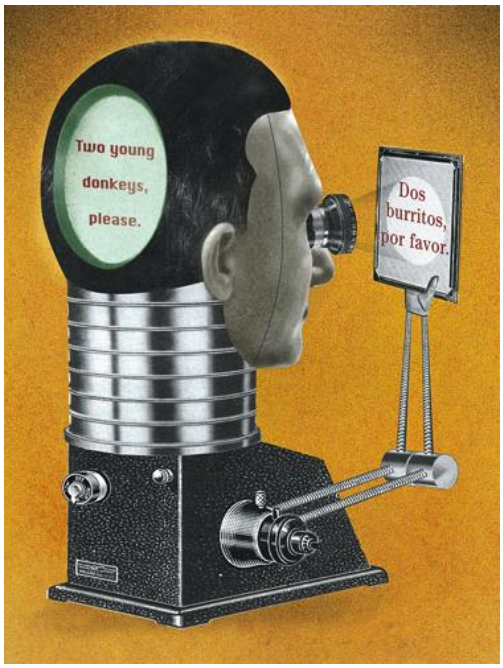

Figure 2. Cyborg translator.
Source: http://archive.wired.com/wired/archive/14.12/translate.html

We should also bear in mind that a technological apparatus is not *just* a prosthetic for a human's limb or organ. For instance, computer memory is not just an exosomatic extension of human memory. Technology is an environment that humans inhabit like fish do water (McLuhan, 1969). We not only make use of technology or interact with it, at every point in our lives, particularly in the developed world, we are also immersed in it. The issue here is not about how we make use of technology or how we might master it but that it has become part of us, including the interiority of our mental spaces. Based on this recognition, the robot historian would in all likelihood be mining a history of human translation (HT) for "machinic ancestors" (De Landa, 1991, p. 3), that is, searching either for those instances where the human translator resembles a machine translator, where an erstwhile human actor is assimilated into the technologies of translation, or where automation and machines are the sole agents (Figure 2).

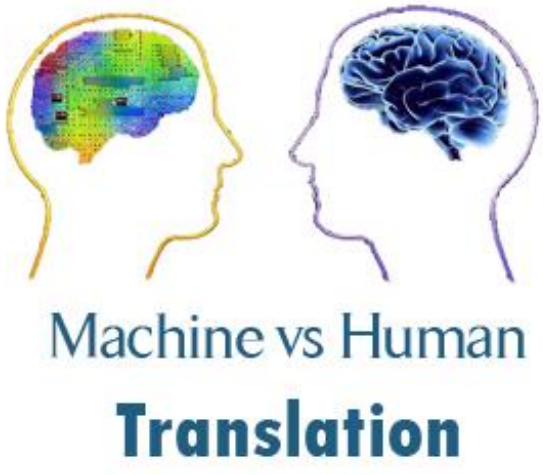

Figure 3. The stakes of technological evolution?
Source: http://blog.globalizationpartners.com/google-translate.aspx

In other words, the robot historian's concern would be with the machinic phylum: In the first instance, how technology has infiltrated the human translator's work and world, and in the final instance, how the machine translator—even if this nonhuman actor still uncannily resembles its human counterpart (Figure 3)—came to replace the human translator. For the nonhuman agent, this genealogy would be a consequence of a long technological evolution of hitherto unseen connections and unexpected turns and twists that might be traced back, for instance, to mnemotechnics.

Mnemotechnics and Memory-Assisted Translation

Let us imagine the following scenario from the perspective of the nonhuman agent. If mnemotechnics as a tool made it possible for Cicero to translate Aristotle's *Topics* from memory (Small,

1997, pp. 217–218) or for Julius Caesar Scalinger in the 16th century to translate "a whole book of Martial into Greek, working from memory, as he lay in bed" (Grafton, 1999, p. 197), a machine history of translation would want to seize on the brain and mnemotechnics as precursors of the computer's memory-processing capabilities. Unlike media technologies such as the wax tablet or the book, which are just storage devices for memory, the brain and computer can also process information. This is to say, the logical structures now associated with computing would merely have "migrated" from the human body to systems of notation and calculus and from there to chips and circuits with a processing power not of split seconds, as is the case with human perception, but of nanoseconds or even picoseconds, the processing speed of the computer. "From the robot's point of view, what is important is precisely this 'migration'," writes De Landa (1991), "and not the people involved in effecting it" (p. 4). This decenters the human in two ways: The processing of information is not exclusive to humans, because a nonhuman actor can also take on this task, and a nonhuman actor can do it more quickly than its human counterpart.

Before the development of technological media, memory was just in our heads. In order to recall information efficiently, mnemotechnics served as an artificial memory system, whereby "texts" were filed according to a certain system in the mind and could readily be retrieved by particular prompts. With regard to translation, it is possible to see mnemotechnics as a forerunner of TM, a computer-assisted tool (CAT) now widely used in the technical translation sector to speed up the process of translation and enhance productivity. TM is a searchable database of source and corresponding target text segments. It allows users to call up pretranslated content and to add newly translated segments for future use. O'Hagan (2013) explains: "As the translator moves from one segment to another, TM searches and retrieves identical and similar (fuzzy match) segments from those stored on the database in relation to the current segment being translated" (p. 504). TMs are automated agents that sift through memory content and reuse it by breaking up a text into segments, some of which are translated by the human translator and others filled in by the program, not unlike the text-message completion function on a mobile phone. An ethnographic study conducted by LeBlanc (2013) in three translation firms and services in Canada suggests that translators are becoming more reliant on TM because they trust the choice of the database more than their own brains, a point also borne out by Bowker's (2005) notion of translators' "'blind faith' behaviour" in accepting TM proposals all too readily without verifying their accuracy (p. 19). In certain respects this tallies with Plato's suspicion that writing stored on a wax tablet as an external memory device atrophies human memory insofar as men might begin to rely on this technology rather than continue practicing the techniques of memorizing (1925, 274e–275a). Arguably, therefore, media technologies affect cognitive processes, how much or how little the brain remembers.

Translation memory tools also affect cognitive processes, as Dragsted (2006) found: The increased focus of the TM on sentence-by-sentence translation resulted in translators spending less time on revision and undertaking fewer sentence-structure alterations. Furthermore, they affect how the source text is read and translated. Since the translation is not undertaken from scratch but assembled through a "collage" method (LeBlanc, 2013), writing here is not the creative expression of individual authorship but the product of a human/nonhuman interface, whereby the human translator responds to automated offerings by the TM software. Although the translator makes conscious decisions about TM prompts, text nevertheless acquires agency rather than remaining an inert material to be shaped by the human agent. Put differently, the text is more active when using TMs than would be the case in other textual media

forms (scroll, codex, print). Since TMs make use of a windowed environment in which a segment, typically a sentence, is read and translated *in a box* before moving on to the next box "in non-sequential fashion" (Garcia, 2009), "the text is broken" and "its linearity is repeatedly interrupted" (Pym, 2011, p. 3). This is congruent with the way in which readers read in a hypertextual environment: not from beginning to middle to end but jumping from one reading unit (called "lexia") to another (Littau, 1997). Thus, the translator encounters the source text as text segments, sentence-like units, or paragraphs (each with a number or code) with little connection between segments or context (Gil & Pym, 2006, p. 12). This changes not only the experience of translating but also its practice. This is not word-for-word or sense-for-sense translation, the main paradigms that have historically defined translation practice, but segment-for-segment translation.

Crowdsourcing and Collaborative Translation

TMs have now migrated from the desktop to the server (Garcia, 2009). This allows translators to share memory content and enables several translators to work on one translation in real time from different locations. Already, there are initiatives, such as by the Translation Automation User Society (TAUS), to increase data sharing across the sector. The scale of the ambition is evident in Figure 4, which asks us to imagine how translation would change if databases contained 100 billion translated words.

Figure 4. Cloud translation.
Source: http://atc.org.uk/conference/images/Past_conferences/2%20Jaap%20van%20der%20Meer.pdf

According to TAUS founder Joop van der Meer (2013, para. 18), "The Cloud is the natural infrastructure environment to connect with the Crowd." Here, another technology-driven aspect comes to the fore: crowdsourcing, which is a term that Jeff Howe (2006), editor at *Wired* magazine, coined by combining "crowd" and "outsourcing." The underlying idea of crowdsourcing is that the knowledge and know-how of the many exceed those of the one. The term refers to a collaborative translation process that has variously been described as "user-generated," "open," "community," "volunteer," or "hive" translation (Jiménez-Crespo, 2013, p. 193). From a machine-historical perspective, crowdsourcing and collaborative translation is of particular interest because agency is distributed between human/nonhuman or human/human actors. In other words, "agency," to borrow Robinson's (2003) words, "becomes loosely collectivized. Subjectivity becomes deterritorialized" (p. 380).

Crowdsourcing uses the Internet as a platform for collaborative translation in the form of solicited, top-down managed or unsolicited, bottom-up projects that rely solely on peer review (European Union, 2012). An example of the former would be the new applications launched by Facebook since 2008, whereby a text is machine translated and then post-edited by volunteers (e.g., the translation of the Facebook site into French took only 24 hours to complete). An example of the latter is "scanlation," where comics such as "manga are scanned, translated, and distributed by fans" (O'Hagan & Mangiron, 2013, p. 299), or "fansubbing," where the crowd undertakes every task of the translation process from choice of material to organizing the work itself. Freely available subtitling software in the 1990s first enabled fan-directed translations of Japanese animation films, thus making anime available to a wider community. But even when commercial subtitles are available, fansubbers produce alternative versions, thus deliberately flirting with the illegality of copyright infringement. As Pérez-González (2012) has pointed out, networked and collaborative technologies have created communities of amateur translators who actively resist "global capitalist structures through interventionist forms of subtitling" (p. 6). On the one hand, crowdsourcing is potentially subversive, and on the other hand, it provides a pool of amateur translators and ready-made volunteer translations that companies can exploit. Instead of using the services of professional translators, companies enlist the crowd as an unpaid labor force, or instead of producing new audiovisual translations from scratch, companies can hijack extant fan translations that they use with minimal changes for their own commercial ends (Interview with Jorge Díaz Cintas, European Union, 2012). Even when the *crowd in the cloud* is remunerated, as Garcia (2015) shows, thus "removing the vagaries of volunteerism" (p. 24), this new way of managing translation arguably contributes to the greater casualization of labor.

Crowdsourced translation is a means by which to cope with the sheer amount of global information that has been generated and that requires translation in the 21st century. In Hollowood's view, former director for research within Symantec's global localization department, MT and crowdsourcing constitute "a tale of two technologies," whereby the less than perfect results of MT can be post-edited by "the ordinary citizen in the street, in subject areas where they consider themselves expert" (Interview; European Union, 2012, p. 73). The Internet in this respect is a medium that makes possible by new technological means what print ushered in over the course of the 18th century: that "anyone" can put their writing in the public domain. As Samuel Johnson observed in 1753: "There never was a time, in which men of all degrees of ability, of every kind of education, of every profession and employment, were

posting with ardour so general to the press" (2014, p. 210). Or, as Alexander Pope remarked in 1716 about translators working in the context of Grub Street British publishing: "they'll swear they understand all the languages of the universe" (qtd. in McMurran, 2010, p. 55). Both Pope and Johnson were responding to an information overload that was felt as acutely in the 18th century as it is now. The translation industry, which first emerged during that period as a commercial enterprise, dealt with the proliferation of information and the demand for cost-effective translation in a similar manner to what is done now: by distributing projects across several working hands. Not unlike the practices associated with MT, subcontracted translators would provide raw translations, and others would undertake the post-editing, thus undermining our investment in the idea that a translation, like a piece of original writing, is undertaken by a single creator. However, the same period also produced what Knufmann identified in 1967 as an "amateur or Sunday translator" (p. 2682), the correlate of the present-day fan translator, who undertakes translation for the love of it. Crowdsourcing in the 21st century thus remediates both the amateur and the collaborative translation practices of the 18th and 19th centuries. Garcia (2009) similarly finds that crowdsourcing is the "return of the amateur."

Human Translation Machines

Precedents of collaborative translation practice emerged even before the 18th century, in the medieval scriptorium and in the scholastic context of the Renaissance, as Pym (2014) and Bistué (2011) have shown. Translation teams would distribute tasks: In the case of the translation of Avicenna's *De anima* (from around the 12th century), one translator (Avendauth) "orally rendered" the Arabic word-for-word into a vernacular tongue, probably a Spanish dialect, and another (Dominicus Gundisalvus) converted it into Latin (Bistué, 2011, p. 143). We should remember here that teamwork in the medieval period, marked by a "frequent lack of linguistic knowledge" (Pym, 2014, p. 6) is not the same as translation teamwork in a multimedial contemporary environment, where technical complexity in electronic text processing demands the input of several hands. Equally, we should not forget that although collaboration was a widespread practice in the Middle Ages, where there was no mechanism "to distinguish between composing a poem and reciting one, or writing a book and copying one" (Eisenstein, 1983, p. 95) and where several scribes and illustrators might have labored on the same codex to get it finished in good time, by the 18th century the context of writing and making books was radically different. Book production and translation in this period had become part of the larger wheel of the industrialization of writing, and novel translation in particular was becoming a prime example of the broader commercialization of the literary marketplace.

During this period, the much maligned "translation-addiction" (Gottsched, 1741, p. 516) or "translation-mania" (Engel, 1879)—a correlate of what contemporaries had variously dubbed "novel-fever," "reading addiction," and "reading mania"—was felt to have raged across Europe like an epidemic (Littau, 2006, pp. 39–45). The countless diseases that men of letters and physicians attributed to too much reading in an age of too much print was overtly blamed on technology. Consider, for instance, the comparison that the author and journalist Shand makes in 1879 between manuscript and print culture. Of the former he says that it was marked by "easy-going tranquility" that the "discovery of printing recklessly disturbed," when "nimble fingers" were busy "mechanically translating thought into metal" (p. 240). By contrast, in the pre-Gutenberg era, "There was no wear-and-tear of the mental fibres, and, consequently,

there were none of those painful brain and nerve diseases that fill our asylums" now (p. 236). Shand's comments must be understood in the context of a mania—and especially the reading mania associated with the new genre of the novel, itself a product of print culture (Feather, 1988)—that was brought about by the industrial means of book production. The impact of technology is also evident in contemporary descriptions of the reader as a "machine" (Butterworth, 1870, p. 501), a "living lexicon, walking encyclopedia" (Anonymous, 1867, p. 317), or "animated bookcase" (Murray, 1886, p. 517). Repeatedly, readers are characterized as automatons or animated objects: "Their minds, their whole natures, have become subdued to what they work in. They have become of the books, booky" (Austin, 1874, p. 256). As Mays (1995) points out, these "dehumanized individuals resembled rather than managed technology and its products, mirrored rather than controlled the machines that produced their reading matter" (p. 172).

In this media-historical context, it is hardly surprising that translation would similarly be conceived of as a mechanical process and that translators would resemble the automatic motions of a machine. As if in response to the speed of the printing machines themselves, foreign works were picked up swiftly for translation and translators rushed to finish one translation after another, just as readers hurried from one book to the next and speed-read sometimes not one but several books (Littau, 2011). To keep up with the demand for reading, translations and publications were kept cost-effective in two ways: They were produced by a team of translators, speeding up the process to final publication and therefore keeping it less costly, or produced by one translator, still proving lucrative insofar as the publisher "could pay the translator a smaller fee than an author's honorarium" (Brown, 2005, p. 26). Since no legal mechanisms existed by which to obtain the rights for a foreign work, "the biggest risk in undertaking a translation was another translation of the same work being done simultaneously for a different bookseller" (McMurran, 2010, p. 64). Speed therefore was of the essence. As the Scottish poet and novelist Tobias Smollet (1748) writes about one of his translations from French: "Gil Blas was actually translated by me; tho' as it was a *Bookseller's* job, done in a hurry" (qtd. in McMurran, 2010, p. 65); or as the Swiss translator Hermann Wuest (1774) explains the different strengths that he and his translation partner Gabriel Seigneux de Correvon brought to their collaboration: "Correvon's was elegant prose; his was speed" (Freedman, 2012, p. 172).

Arguably then, print created conditions in which demand for translation rose and in which it became more economical to meet this demand by employing not an individual but a team of translators working on a text either at the same time or consecutively. These collaborations took many forms, as did individual working practices. Some would dictate the translation to no less than four note-takers (Bachleitner, 1989); other translators employed "sub-translators" (Nicolai, 1799) who would produce for them a first draft that they themselves would post-edit (Hauff, 1827/2013). Still others would use published translations from a third language to cobble together their own version, thus producing a translation twice removed. Or they would cut corners by omitting from and improvising on the original source material (Knufmann, 1967). The skipping and inattentive translator of the translation factory thus produced, not unlike his or her nonhuman counterpart in the contemporary context of MT, what we would now call a "gist translation," a lower quality output that justifies speedy translation (Cronin, 2013, p. 101). Translating double-decker novels in a matter of weeks and paid by the page and the weight of the sheets completed, translators in this new economy largely remained anonymous and only rarely saw their names in print (Bachleitner, 2013).

What is most striking, though, from a machine-history point of view are the literal and metaphoric castings in 18th and 19th-century German discourses of the process of translation as machine translation or of human translators as "translator-machines" (Gutzkow, 1839). Translation here is not only "factory ware" (Nicolai, 1799, p. 112), but it has become so integrated in processes of print mechanization that a "translation machine" (Hauff, 1827/2013) becomes entirely imaginable. All that is needed, the novelist and Walter Scott–translator Wilhelm Hauff writes satirically in 1827, is a "steam machine that understands French, English and German. Then, there is no need for humans anymore." The idea that steam drives literary translation is also picked up by Theodor Mundt (1832) in an article published for *Magazin für die Literatur des Auslandes* (Magazine for Literature from Abroad). Here, translation and the steam engine are equated, since both make travel and transport possible. More positively than the critiques of the translation factory, Mundt sees steam and translation as the twin engines of cultural communication. Both can overcome the space-time continuum, and both make possible the traffic between nations, cultures, and languages, which will, he surmises, turn European patriots into cosmopolitans.

Vision Machines and Translation

In the late 1890s it is clear that film technology began to have a profound impact on the culture of reading. Psychologists, educationalists, and artists sought through various experiments to get the reader up to speed with the emerging film spectator, processing visual cues in the form of written marks as quickly as one might "read" images in motion—that is, to take them in at a glance. For instance, the psychologist Edmund Huey proposed on the basis of tests that he had carried out in 1899 to redesign Western typography. A change to the materiality of the page, its typefaces and layouts would enable, he argued, easier legibility so as to speed up the reading process and even enhance skimming. In a chapter first published in 1908 titled "The Future of Reading and Printing," he proposed a "graphophone-film book" (1921, p. 429) that would get its message across more speedily and efficiently than print. Arguably, Huey sought means by which to adapt the reader's body—kinetically—to machine speeds. Such "motor readiness" was entirely compatible with the "then-new patterns of production and spectacular consumption" (Crary, 1999, p. 309).

Current methods using eye tracking to assess translators' interaction with translation technology and measure the signs of cognitive effort and the reading-for-translation processing speed (O'Brien, 2007) have their correlates in late 19th- and early 20th-century reading experiments that used tachistoscopes. These speed-reading machines were developed in conjunction with Eadweard Muybridge's mechanically operated shutters for his animal locomotion photography and were used in reading pedagogy by Huey and others to calculate the rapidity of thought and measure reaction during reading, not merely to manage but also to increase speed and attentiveness. I mention these experiments because the data gathered have served researchers as a basis for developing usable and productive tools both for reading then and for translation now, and because such experiments are linked to motion-picture technology.

Film technology is also the key idea behind the avant-garde poet Robert Carlton Brown's imaginary machine, the "readies." In lieu of the book, this speed-reading machine would allow him, he

says, to "read hundred thousand word novels in ten minutes if I want to, and I want to" (1930, p. 64). The readies is "a word-conveyer" with "microscopic type on a movable tape running beneath a slot equipped with a magnifying glass and brought up to life size before the reader's birdlike eye" (p. 34). For a contemporary online simulation created by Craig Saper, see http://www.readies.org/. As Brown explains its purpose:

> The word "readies" suggests to me a moving type spectacle, reading at the speed-rate of the present day with the aid of a machine, a method of enjoying literature in a manner as up to date as the lively talkies. (p. 62)

Brown seeks to modernize reading and bring reading practices in line with modern film viewing.

As Pressman (2014) has noted, there are "unseen connections" (p. 59) between the electric readies and digital reading machines, a point that is also applicable to Huey's "graphophone-film book." The second generation e-literatures that emerged with computer flash technology and that unlike their hypertext precursors are "dynamic, visual, and animated works" (Pressman, 2014, p. 24) in effect remediate an obsolete and now largely forgotten medium like the tachistoscope, thus revealing the latter as an important "medial layer" (p. 60) of computational media. The digital works of artist collective Young-Hae Chang Heavy Industries (YHCHI) simulate such dead and unrealized media technologies from around 1900. Arguably, "born-digital" literature (Kirschenbaum, 2008, p. 114) and "born-translated" literature (Walkowitz, 2013, p. 174), like that by YHCHI, is comprised of many medial layers—typographic, photographic, tachistoscopic, phonographic, filmic—that the computer fuses into one. That is, formerly distinct media are mimicked and translated into digital form, thus bringing to an end the medial specificity of older media.

The Computer and Online Translation

YHCHI's oeuvre cannot be read offline. It can only be accessed via the artists' website (http://www.yhchang.com) or seen in an art gallery. Each work begins with a countdown of numbers before we see the title card of the artists' corporate name, as if a film were about to be shown (Figure 5). Apart from a cinematic aesthetic, these works also feature a typographic and numeric aesthetic: Presented in Monaco font with each letter *O* represented by the numeral *0*, the writing self-consciously evokes print and computer code. While the simple font promotes the kind of legibility that Huey recommended for print, the sheer speed of the animation has the reverse effect. YHCHI's flash-based literature-in-motion is both digital literature *and* flicker film folded into one, demanding that we watch movable type as if it were moving images.

YHCHI's works cannot be consumed at the reader's pace of reading, as would be the case with print, but are dictated by the pace of film technology. In the cinema, film can neither be paused, slowed down, rewound, or fast-forwarded at the spectator's will. Unlike the readies, which does allow speed variation, the flash technology favored by YHCHI deliberately prevents the leisure of contemplation (a virtue associated with print media) and deliberately eschews the possibilities of interactivity (a virtue associated with computational media). If the reader wants to reread a given section, the work must be

replayed from the beginning. Here, it is not the human reader who controls the text's speed but the nonhuman reader—the "intelligent" computer—that determines the text's duration. Nor does the human reader move the text by flicking from one page (print) or screen (computer) to the next: the text moves by itself. Thus composed by human actors (the artists) and read by human actors (the readers/viewers), these works are also programmed, or written, and read by nonhuman agents (the computer software). Accompanied by a jazzy music score, words pulse or flicker across the screen in sync with an uplifting drumbeat, resembling the various animation and transition effects available on PowerPoint software. But words and phrases appear and vanish with such speed that close reading, the bedrock of literary engagement, is frustrated at each turn. What YHCHI literatures test are the limits of legibility and readability, making the human reader into a superficial skimmer just as much as a multiple in-depth rereader. According to Pressman (2014), a digital work like *Dakøta* paradoxically "promotes both speed reading and close reading" because the difficulty of "its literary content demands an opposite response" (p. 79) to speed. Reading at one and the same time at machine and at human speed thus "challenges traditional reading practices in ways that promote updating them" (p. 84).

***Figure 5. Screen shot*, Nippøn.**
Source: http://www.yhchang.com/NIPPON.html

YHCHI's work makes us reassess our print-minded assumptions about literature, not least because reading and writing reveal themselves as auto-motions. However, their work also asks us to reassess our print-minded assumptions about translation both as a process and product. The artist duo, Young-Hae Chang and Marc Voge, write in, among other languages, English, Spanish, German, French, Korean, Chinese, and Japanese, with individual works presented either in several languages (*Dakøta*), as split-screen translations (*Nippøn*, Figure 5), or with subtitles (*Traveling tø Utøpia: With a brief Histøry øf the Technøløgy*), thus harking back to dual-language editions for print and to screen translations for film. Auto-translation is literalized here in two senses: Chang and Voge translate their own work, but the computer simultaneously flashes the translation across the screen, thus giving the impression that the text shown in one language is an automated translation by the computer into another language. Human

and machine translation appear to be inseparable. And what masks as original or translation becomes indistinguishable. The sheer speed of the auto-translation makes it impossible for the human reader to keep pace with the nonhuman translator: "Even a reader fluent in both languages is unable to read both texts simultaneously" (Pressman, 2014, p. 153). YHCHI's translations-in-motion thus fulfill *and* resist the dream of instant translation insofar as instantaneity is impossible to apperceive: We may perceive that a translation occurs but cannot apperceive the translation as translation. The temporal difference necessary to compare source with translation on an animated screen, unlike in printed parallel text editions, is eliminated by instantaneity. As such, their works are comments on translation as much as onscreen depictions of it in a computer age that promises that everything—including the translation process itself—can happen in an instant.

Like YHCHI, the poet John Cayley brings together words with audio and kinesthetic effects, making his translation-poems the product of a convergence of different art forms, media, and computer programming. In contrast to poetry published in the print medium, where writing is space-bound and fixed, Cayley's (2005) poems reconceive "textuality as time-based." Poems like "RiverIsland" and "translation" (available at http://programmatology.shadoof.net) are temporal and in flux. They are also "poem-machines" (Hayles, 2006, p. 181) that raise the very issue of how to engage with them: "Read or play? Watch or participate?" (Cayley, 2008). Unlike YHCHI, Cayley's works include an interactive dimension. *RiverIsland*, which is based on Wang Wei's 8th-century poem "Wang River Sequence," features visual borders that illustrate the written words and serve as navigational tools. By sliding the cursor across the images and stopping, we can move between poems. The horizontal border gives us access to sixteen translations by Cayley, the vertical border gives access to one particular poem in the River Sequence and its translations into English, French and Spanish by, among others, Octavio Paz and Gary Snyder, as well as a pinyin version.

What is especially striking in his work is the procedure of "transliteral morphing" (Cayley, n.d.) by which the computer makes visible the translation *qua* translation. Morphing usually refers to the transition from one image to another; here, it also refers to the transition from one letter, text, and language to another. Through this procedure, his poem "translation," for instance, shows us how language literally "falls apart and comes together" (Hayles, 2003, p. 286). Using an algorithmic process, the poem displays the destructive-reconstructive labor of the translation process, including the unsettled and provisional space in between source and target. Figure 6 shows this process: On the left hand of the screen are scanned print fragments from Marcel Proust and Walter Benjamin. Out of these fragments is algorithmically generated a "temporal object" (Cayley, 2005) on the right hand side. While the fourth stanza shows us a readable English version, the other stanzas show German and English at various stages of the versioning process. At other times a French version surfaces by filling in the missing letters and recombining them. With each translation words fade in and out of legibility, making the poem only ever partially readable in any of the three languages. Here, programming reveals itself as a self-generating and quasirandomized mode of writing and translating. As Cayley (1996) puts it, "the procedure 'learns' new collocations and alters itself" (p. 180), thus foregrounding the input of nonhuman agency into the creative process. If poetry and poetic translation have traditionally been regarded as products of the inner workings of a human mind, here, the algorithmically generated poem and its translation give the human reader a glimpse of a "codework" that "makes exterior the inner workings of the computer" (Raley, 2002).

Although the code itself does not appear, the screen shows us how software "runs (in time) and produces writing" (Cayley, 2006, p. 312). So told, the history of translation demonstrates a passage from the technological mediation of mental processes to the technological mediation of technological processes.

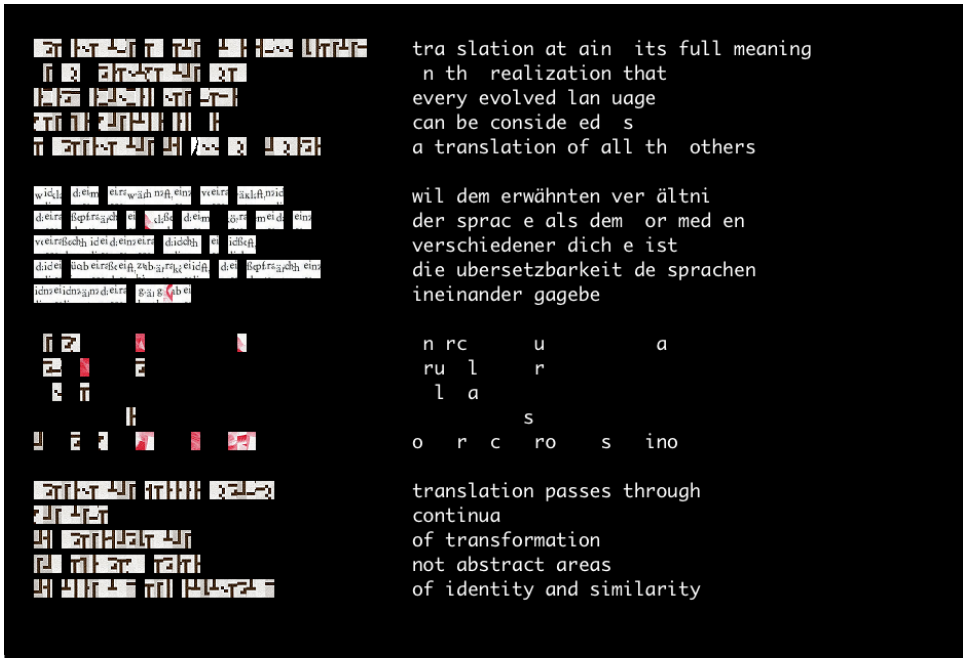

Figure 6. Screen Shot, "translation 5.5."
Source: http://programmatology.shadoof.net/index.php?p=works/translation/translation.html

Drawing on the typographic, photographic, tachistoscopic, phonographic, and filmic, computer-mediated translation makes us aware of the technological element that has always and inalienably formed the media history of translation. The computer not only sums the media history of translation but also alerts us, precisely because it is a *universal* machine, to those mediations of translation as yet unglimpsed. In other words, remediation does not exhaust the possibilities of the computer. Everything here hinges on the computer's universality: Because the computer is a universal machine, it instantiates the entire history of media in the present but it also contains within itself as yet uninstantiated media possibilities, which will be the future.

The computer teaches us that exclusive focus on one of its operational modalities, such as MT or TM, obscures the infinite array of possibilities that it is capable of instantiating as a medium and the vast array of roles that technological mediation has played in determining translation, its practices, and documents. Precisely because the computer is a convergence medium, it directs attention to the broader media ecology within which cultural practice occurs. To grasp the changes that translation is undergoing at

this moment in history therefore requires a comparative understanding of translation's relations to the mediascapes of the past, present, and virtual future. A media history of translation yet to be written will have to take into consideration not only the human translator as an important agent in this history but also, as this essay has sought to demonstrate, those nonhuman agents that have shaped and continue to shape translation.

References

Anonymous. (1867). Reading as a means of culture. *Sharpe's London Magazine*, *31*(December), 316–323.

Austermühl, F. (2011). On clouds and crowds: Current developments in translation technology. *T21N. Translation in Transition, 9*-2011, 1–26. Retrieved from http://www.t21n.com/homepage/articles/T21N-2011-09-Austermuehl.pdf

Austin, A. (1874). The vice of reading. *Temple Bar,* XLII(September), 251–257.

Bachleitner, N. (1989). "Übersetzungsfabriken": Das deutsche Übersetzungswesen in der ersten Hälfte des 19. Jahrhunderts [Translation factories. The business of translation in German in the first half of the 19th century]. *Internationales Archiv für Sozialgeschichte der deutschen Literatur* (IASL), *14*(1), 1–49.

Bachleitner, N. (2013). From scholarly to commercial writing: German women trasnlators in the age of the "translation factories." *Oxford German Studies*, *42*(2), 173–188. doi:10.1179/0078719113Z.00000000033

Bastin, G. L., & Bandia, P. F. (2006). Introduction. In G. L. Bastin & P. F. Bandia (Eds.), *Charting the future of translation history* (pp. 1–9). Ottawa, Canada: Ottawa University Press.

Bistué, B. (2011). The task(s) of the translator(s): Multiplicity as problem in Renaissance European thought. *Comparative Literature Studies, 48*(2), 139–164. doi:10.1353/cls.2011.0024

Bolter, J. D., & Grusin, R. (1999). *Remediation: Understanding new media*. Cambridge, MA: MIT Press.

Bowker, L. (2005). Productivity vs. quality? A pilot study on the impact of translation memory systems. *Localisation Focus*, *4–5*(1), 13–20. Retrieved from http://www.localisation.ie/locfocus/issues/5/1

Brown, H. (2005). *Benedikte Naubert (1756–1819) and her relations to English culture*. Leeds, UK: Maney Publishing.

Brown, R. C. (1930). *The readies*. Bad Ems: Roving Eye Press [Facsimile Edition]. In B. Allen & C. Saper (Eds.) (2010), *The readies* (pp. 1–113). Houston, TX: Rice University Connexions. Retrieved from http://cnx.org/content/col10962/1.1/

Butterworth, C. H. (1870, November to April). Overfeeding. *Victoria Magazine*, *14*, 500–504.

Buzelin, H. (2005). Unexpected allies. *The Translator*, *11*(2), 193–218. doi:10.1080/13556509.2005.10799198

Cayley, J. (1996). Beyond codexspace: Potentialities of literary cybertext. *Visible Language, 30*(2), 164–183.

Cayley. J. (2005). Writing on complex surfaces. *Dichtung Digital*, *35*(2). Retrieved from http://www.dichtung-digital.org/2005/2-Cayley.htm

Cayley, J. (2006). The code language: New media poetics and programmed signification. In A. Morris & T. Swisse (Eds.), *New media poetics* (pp. 307–333). Cambridge, MA: MIT Press.

Cayley, J. (2008). RiverIsland QT: The Iowa review web. In S. Moulthrop (Eds.), *Special Issue: Instruments and Playable Text, 9*(2). Retrieved from https://wayback.archive-it.org/org-165/20081206005338/http://research-intermedia.art.uiowa.edu/tirw/vol9n2/johncayley.php

Cayley, J. (n.d.). What is transliteral morphing? Retrieved from http://programmatology.shadoof.net/index.php?p=contents/transliteral.html

Chan, S.-W. (2015). *The Routledge encyclopedia of translation technology*. Abingdon, UK: Routledge.

Crary, J. (1999). *Suspensions of perception: Attention, spectacle, and modern culture.* Cambridge, MA: MIT Press.

Cronin, M. (2003). *Translation and globalization*. Abingdon, UK: Routledge.

Cronin, M. (2013). *Translation in the digital age*. Abingdon, UK: Routledge.

de Condorcet, A.-N. (1955). *Sketch for a historical picture of the progress of the human mind*. June Barraclough (Trans.). London, UK: Weidenfeld and Nicholson. (Original work published 1794)

De Landa, M. (1991). *War in the age of intelligent machines*. New York, NY: Zone Books.

Dragsted, B. (2006). Computer-aided translation as a distributed cognitive task. *Pragmatics & Cognition, 14*(2), 443–464.

Eisenstein, E. L. (1983). *The printing revolution in early modern Europe* (2nd ed.). Cambridge, UK: Cambridge University Press.

Engel, E. (1879). Die Uebersetzungsmanie in Deutschland. [Translation mania in Germany]. *Magazin für die Literatur des Auslandes*, *43/44*, 461–464, 677–680.

European Union. (2012). *Crowdsourcing translation: Studies on translation and multilingualism*. Luxembourg: Publications Office of the European Union. doi:10.2782/64042

Feather, J. (1988). *A history of British publishing*. London, UK: Routledge.

Freedman, J. (2012). *Books without borders in Enlightenment Europe: French cosmopolitanism and German literary markets*. Philadelphia, PA: University of Pennsylvania Press.

Garcia. I. (2009). Beyond translation memory: Computers and the professional translator. *The Journal of Specialised Translation, 12*, 199–214. Retrieved from http://www.jostrans.org/issue12/art_garcia.php

Garcia, I. (2011). Translating by post-editing: Is this the way forward? *Machine Translation, 25*(3), 217–233. doi10.1007/S10590-011-9115-8

Garcia. I. (2015). Cloud marketplaces: Procurement of translators in the age of social media. *The Journal of Specialised Translation, 23*, 18–38. Retrieved from http://www.jostrans.org/issue23/art_garcia.pdf

Gil, J. R. B., & Pym, A. (2006). Technology and translation: A pedagogical overview. In A. Pym, A. Perekrestenko, & B. Starink (Eds.), *Translation technology and its teaching* (pp. 5–20). Terragona, Spain: Universitat Roviro I Virgili. Retrieved from http://usuaris.tinet.cat/apym/on-line/translation/BiauPym_TechnologyAndTranslation.pdf

Gilman, C. P. (1926, November). Public library motion pictures. *The Annals of the American Academy CXXVIII*, 143–145.

Gottsched, J. C. (1741). Nachricht über von neuen hieher gehörigen Sachen [Report concerning matters recently heard here and there]. *Beyträge zur critischen Historie der deutschen Sprache, Poesie und Beredsamkeit* [Contributions to the critical history of German language, poesy and rhetoric] (Band 7) Stück 27 (pp. 512–519). Leipzig, Germany: Breitkopf.

Grafton, A. (1999). The humanist as reader. In G. Cavallo & R. Chartier (Eds.), *A history of reading in the West* (pp. 179–212). L. G. Cochrane (Trans.). Cambridge, UK: Polity Press.

Gutzkow, K. (1839). Die Deutschen Uebersetzungsfabriken [The German translation factories] *Telegraph für Deutschland*, *7/8*, 49–52, 57–59. Retrieved from Gutzkow Editionsprojekt at https://projects.exeter.ac.uk/gutzkow/Gutzneu/gesamtausgabe/Abtei1/DDtUebe.htm

Hauff, W. (2013). *Die Bücher und die Leserwelt* [Books and the world of the reader] [Kindle edition]. Wuppertal, Germany: Gerettete Schriften Verlag. (Original work published 1827)

Hayles, K. N. (2003). Translating media: Why we should rethink textuality. *The Yale Journal of Criticism, 162*(2), 263–290.

Hayles, K. N. (2006). The time of digital poetry: From object to event. In A. Morris & T. Swisse (Eds.), *New media poetics* (pp. 181–209). Cambridge MA: MIT Press.

Howe, J. (2006, June). The rise of crowdsourcing. *Wired*, *14.06*. Retrieved from http://archive.wired.com/wired/archive/14.06/crowds.html

Huey, E. B. (1921). *The psychology and pedagogy of reading.* New York, NY: Macmillan.

Jiménez-Crespo, M. A. (2013). *Translation and web localization*. Abingdon, UK: Routledge.

Johnson, S. (2014). The age of authors. *The Adventurer, 115*. In P. Keen (Ed.) *The age of authors. An anthology of 18th-century print culture* (pp. 209–212). Toronto, Canada: Broadview. (Original work published December 11, 1753)

Kirschenbaum, M. (2008). *Mechanisms: New media and the forensic imagination*. Cambridge, MA: MIT Press.

Kirschenbaum, M. (2013). Robot historians. Retrieved from https://mkirschenbaum.wordpress.com/2013/02/22/robot-historians/

Knufmann, H. (1967). Das deutsche Übersetzungswesen des 18. Jahrhunderts im Spiegel von Übersetzer- und Herausgebervorreden [The business of German translation in the 18th century from the perspective of translators' and editors' forewords.] *Börsenblatt für den Deutschen Buchhandel—Frankfurter Ausgabe*, *91*, 2676–2716.

Latour, B. (2005). *Reassembling the social. An introduction to actor-network-theory*. Oxford, UK: Oxford University Press.

LeBlanc, M. (2013). Translators on translation memory (TM): Results of an ethnographic study in three translation services and agencies. *International Journal for Translation and Interpreting Research, 5*(2), 1–13. doi:ti.105202.2013.a01

Littau, K. (1997). Translation in the age of postmodern production: From text to intertext to hypertext. *Forum for Modern Language Studies*, *XXXIII*(1), 81–96. doi:10.1093/fmls/XXXIII.1.81

Littau, L. (2006). *Theories of reading: Books, bodies, and bibliomania.* Cambridge, UK: Polity Press.

Littau, K. (2011). First steps towards a media history of translation. *Translation Studies, 4*(3), 261–281. doi:10.1080/14781700.2011.589651

Mays, K. J. (1995). The disease of reading and Victorian periodicals. In J. O. Jordan & R. L. Patten (Eds.), *Literature in the marketplace: 19th-century British publishing and reading practices* (pp. 165–194). Cambridge, UK: Cambridge University Press.

McLuhan, M. (1962). *The Gutenberg galaxy: The making of typographic man*. London, UK: Routledge & Kegan Paul.

McLuhan, M. (1969). *Counterblast*. London, UK: Rapp & Whiting.

McMurran, M. H. (2010). *The spread of novels. Translation and prose fiction in the 18th century*. Princeton, NJ: Princeton University Press.

Mundt, T. (1832). Deutsche Literatur im Auslande. Goethe in Italiänischem Gewande.—Bürger. [German literature abroad. Goethe in Italian dress.— Citizens. *Magazin für die Literatur des Auslandes*, *127* (Montag 19, November), 505–507.

Murray, J. (1886). Books and reading. *Quarterly Review*, *162*(324), 501–518.

Nicolai, F. (1799). *Leben und Meinungen des Herrn Magisters Sebaldus Nothanker* [Life and opinions of Mr. Sebaldus Nothanker Esq.] (Band I). Vierte verbesserte Auflage (4th improved ed.). Berlin, Germany: Friedrich Nicolai.

O'Brien, S. (2007). Eye-tracking and translation memory matches. *Perspectives: Studies in Translatology, 14*(3), 185–205. doi:10.1080/09076760708669037

O'Hagan, M. (2013). The impact of new technologies on translation studies: A technological turn? In C. Millán & F. Bartrina (Eds.), *The Routledge handbook of translation studies* (pp. 503–518). Abingdon, UK: Routledge.

O'Hagan, M., & Mangiron, C. (2013). *Game localization: Translating for the global digital entertainment industry*. Amsterdam, The Netherlands: John Benjamins.

Olohan, M. (2011). Translators and translation technology: The dance of agency. *Translation Studies 4*(3), 342–357. doi:10.1080/14781700.2011.589656

Olohan, M. (2014). History of science and history of translation: Disciplinary commensurability? *The Translator, 20*(1), 9–25. doi:10.1080/13556509.2014.899091

Pérez-González, L. (2012). Co-creational subtitling in the digital media: Transformative and authorial practices. *International Journal of Cultural Studies 16*(1), 3–21. doi:10.1177/1367877912459145

Plato. (1925). *Phaedrus*. H. N. Fowler (Trans.). Cambridge, MA: Harvard University Press, & London, UK: William Heinemann.

Pressman, J. (2014). *Digital modernism*. Oxford, UK: Oxford University Press.

Pym. A. (1998). *Method in translation history.* Manchester, UK: St. Jerome Publishing.

Pym, A. (2011). What technology does to translating. *Translation & Interpreting, 3*(1), 1–9. Retrieved from http://www.trans-int.org/index.php/transint/issue/view/14

Pym, A. (2014). The medieval postmodern in translation studies. Retrieved from http://usuaris.tinet.cat/apym/on-line/translation/2014_MedievalPostmodern_web.pdf

Raley, R. (2002). Interferences: [Net.Writing] and the practice of codework. *Electronic Book Review*. Retrieved from http://www.electronicbookreview.com/thread/electropoetics/net.writing

Robinson, D. (2003). Cyborg translation. In S. Petrilli (Ed.), *Translation translation* (pp. 369–386). Amsterdam, The Netherlands: Rodopi.

Shand, A. I. (1879, August). Contemporary literature VII: Readers. *Blackwood's Magazine*, *126*, 235–256.

Small, P. (1997). *Wax tablets of the mind: Cognitive studies of memory and literacy in Classical Antiquity*. London, UK: Routledge.

Tahir Gürçağlar, S. (2013). Translation history. In C. Millán & F. Bartrina (Eds.), *The Routledge handbook of translation studies* (pp. 131–143). Abingdon, UK: Routledge.

Turing, A. (2003). Computing machinery and intelligence. In N. Wardrip-Fruin & N. Montfort (Eds.), *The new media reader* (pp. 50–64). Cambridge, MA: MIT Press. (Original work published 1950)

van der Meer, J. (2013), Choose your own translation future. Retrieved from https://www.taus.net/think-tank/articles/translate-articles/choose-your-own-translation-future

Walkowitz, R. L. (2013). Close reading in an age of global writing. *MLQ, 74*(2), 171–195. doi:10.1215/00267929-2072980