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Human Agency and Machine Agency in Digitalised and Datafied Translation Production Networks

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Abstract: This essay draws on concepts and findings from translation sociology, translation technology and translation process research and investigates translators' agency as it manifests itself in modern digitalised, datafied and distributed working environments (translation production networks) as well as in the interplay with non-human 'agents' such as neural machine translation (NMT) systems or recent large language models (LLMs). My discussion of translators' agency in translation production networks adopts a macroscopic perspective. It conceptualises such networks as sociotechnical systems with asymmetric power relations between the individual network actors and analyses how translators can exercise their agency vis-à-vis these actors and how translators' agency may be curtailed by the other actors' agency. Then the perspective is narrowed down to the interplay of human and machine agency with a focus on translator-NMT interaction in production networks. In this interaction, translators and NMT systems form a hybrid system in which both system elements contribute to the successful completion of a task. In such a hybrid human-machine system, human and machine agency become intertwined in a "double dance of agency" (Rose/Jones 2005), where both forms of agency can either converge or diverge.

The chapter concludes with some reflections on human vs. machine agency in the context of recent LLMs such as GPT-4. These language models, I argue, bring about a further redistribution of cognitive labour between humans and machines—not just in the translation sector but also in a wide range of other professional fields—and therefore lead to a reconfiguration of the interplay between human and machine agency.

Keywords: Translators' agency, Digitalisation and datafication of translation, Translation production networks, NMT, LLMs, Human vs. machine agency.

1 Introduction: Human and machine agency in translation

The pragmatic turn of the 1980s and the subsequent emergence of a "sociology of translation" (Wolf 2007: 1) has brought about a gradual shift from *translation studies*, which mainly investigates the product of translation, to *translator studies* (cf. Chesterman 2009: 20) which focuses on the translation process and its actors. Sociological approaches to translation are primarily concerned with the "translational action" (cf. Holz-Mänttäri 1984) of translators in particular social spaces. A central concept in translation sociology is the notion of "translators' agency" (Kinnunen/Koskinen 2010), *agency* being defined here as "the willingness and ability to act" (Kinnunen/Koskinen 2010: 6). According to this definition, which is primarily applicable to human agents, the term *willingness* stresses the reflectivity and intentionality of individual conscious agents (cf. Kinnunen/Koskinen 2010: 6). The term *ability* "relates the concept of agency to constraints and issues of power(lessness), highlighting the intrinsic relation between agency and power" (ibid.), while the verb *act* stresses that, by exercising agency, agents exert "an influence in the life-world" (Kinnunen/Koskinen 2010: 7). Since human agents always act in a particular social space, agency has to be viewed in tandem with the con-

cept of *structure*, which constrains human agents in exercising their agency and is in turn shaped by these human agents (cf. Kinnunen/Koskinen 2010: 7; Koskinen 2010: 183).

Nowadays, professional translators are usually part of highly complex digitalised, datafied and distributed work structures (cf. Risku et al. 2013: 153; Risku 2014: 340–341), which often place multifaceted constraints on translators' agency (see the discussion in sections 2, 3 and 4 below). Also, in recent years, the concept of agency has been extended to encompass non-human actors, particularly powerful digital technologies, which allow fully or partially automating intellectual tasks that were previously performed by humans (cf. Hirsch-Kreinsen 2015/2018: 18). For this *material* or *machine agency* (cf. Rose/Jones 2005), the definition by Kinnunen/Koskinen (2010) discussed above is evidently not applicable, since machines lack the intentionality of conscious human agents.[1] Therefore, material/machine agency is often defined more broadly as "the capacity to make a difference" (Giddens 1984: 14) or as the capacity to do "things which have consequences for humans" (Rose/Jones 2005: 26, see also footnote 1). Machine agency has garnered particular interest with the development of powerful new artificial intelligence (AI) technologies based on advances in machine learning (see the discussion in section 2)—for example, neural machine translation (cf. Koehn 2020) or the large language models of the GPT (Generative Pre-Trained Transformer, cf. OpenAI 2023a) family.[2] These AI technolo-

1 Cf. Rose/Jones (2005: 26): "[M]aterial agency differs from human agency in lacking intentionality; it is not organized around plans and goals. Machines do not have minds of their own, even if they exhibit agency in the sense of doing things which have consequences for humans."

2 Among other things, LLMs can be used as machine translation systems (see, for example, the discussion in Krüger 2023: 311–317).

gies can imitate human cognitive processes at a very high level and are therefore sometimes called "cognitive technologies" (Schatsky et al. 2015) in industry contexts.

In order to stress the fact that such modern cognitive AI technologies do not possess human-like cognitive faculties but merely imitate these faculties—albeit at a level which, in the spirit of the *Turing Test* (cf. Turing 1950), makes it increasingly difficult to distinguish confidently between human and machine performance—, Liu (2021: 387) introduces the term *apparent agency*. Apparent agency "denotes machines' exercise of thinking and acting capacities that they appear to have during [human-machine] interaction".[3] In this context, Liu (2021: 387) also introduces the concept of *agency locus* to denote the source of an AI technology's apparent agency.[4] For example, in the early machine translation (MT) paradigm of rule-based machine translation (RBMT, cf. Hutchins/Somers 1992), humans explicitly coded the translation rules for these systems to operate on. Here, the locus of the technology's apparent agency was external (residing in the humans who created the rules), making RBMT a case of "human-agency AI" (Liu 2021: 387). On the other hand, modern NMT systems are trained on the basis of large translation corpora and learn their

3 Rose/Jones (2005: 27) point out that the degree of autonomy and agency humans ascribe to machines increases with the complexity of these machines. From a psychological point of view and referring particularly to recent LLMs, Ullman (2023: 8) notes that the human mind "seems hard-wired to ascribe animacy and mental states to various behaviors, creating agents where there are none […]. The danger here is that in the same way we see faces in the clouds or ascribe mental states to the wind or germs, we may be biased to anthropomorphize LLMs."

4 "[W]e define the locus of a machine's agency as its rules, which are the cause of its apparent agency and can be 'external' (e.g., created by humans) or 'internal' (e.g., generated by the machine)" (Liu 2021: 387).

own translation rules from these corpora. Here, the agency locus is internal (i.e., within the machine), making modern NMT systems a prime case of "machine-agency AI" (Liu 2021: 387).[5] The ongoing digitalisation and datafication of translation, which I will discuss in more detail in the following section, means that translators' agency is increasingly influenced by such machine-agency AI systems, most notably in NMT-assisted translation scenarios.

2 Digitalisation and datafication of translation

As I discussed briefly in section 1, automation describes the process of delegating human manual or intellectual tasks to a machine (cf. Heßler 2019: 235). Translation automation (TA), like any other form of intellectual automation, is fuelled by processes of *digitalisation* and *datafication*. In a translation context, digitalisation refers to the development and/or evolution of translation technologies such as translation memory (TM) systems, terminology management systems or MT systems (for a detailed historical overview of the development of translation technology, cf. Chan 2015). Translation datafication, on the other hand, describes the large-scale accumulation and provision of translation data (terminology databases, translation memories, mono-/multilingual corpora, etc.) and of translation meta-data, such as translator-specific quality or productivity data (cf. Sandrini 2017: 140; Moorkens 2020: 17). The beginning of translation automation can be dated back to the year 1954, when the *IBM 701 Translator* employed in the famous *Georgetown-IBM Experiment* demonstrated, for the first time, the feasibility of MT (cf. Gordin 2016). Translation automation

5 In section 5, the concept of machine agency will be taken up again and discussed further with specific reference to recent LLMs.

then truly gained momentum at the beginning of the 1990s, when the first commercial translation memories allowed the commodification of translators' intellectual labour (cf. Behrens 2016: 165–166) and the World Wide Web (WWW) as a new 'space of social action' (cf. Boes 1996: 159) provided the technical infrastructure for distributed work processes and the emergence of online labour markets (cf. Alonso 2016: 19; Garcia 2017: 59). The recent advances in AI in the form of cognitive technologies such as NMT or LLMs are also fuelled by processes of digitalisation and datafication, i.e., the development of complex neural network models[6] and powerful hardware for running these models and the collection of large volumes of suitable training data (in the context of NMT these are large-scale and high-quality translation corpora or translation memories) on powerful storage devices. Translation automation has traditionally been modelled by taking recourse to Hutchins/Somers' (1992: 148) *translation mechanization* (= automation) *continuum* (cf. e.g., Bundgaard 2017: 9), which ranges from non-automated traditional human translation via semi-automated *Machine-Aided Human Translation* (MAHT) and *Hu-*

6 To date, the most powerful of these neural network models, at least in the field of natural language processing, is the *transformer* (cf. Vaswani et al. 2017), which is particularly well-suited for language understanding and language generation tasks such as machine translation. Most modern NMT systems are based on an *encoder-decoder* transformer architecture, where the encoder converts the source text into a vector representation and the decoder converts this vector representation into the target text. On the other hand, generative LLMs such as OpenAI's GPT-4 (OpenAI 2023b) or Google's PaLM 2 (Google 2023) are usually based on a *decoder-only* transformer architecture, where the decoder is responsible for both the models' language understanding and language generation capabilities. Given their shared transformer base architecture, NMT systems and LLMs are quite similar in their operating principles.

man-Aided Machine Translation (HAMT) to *Fully Automatic High-Quality Translation* (FAHQT).[7] More recently, Christensen et al. (2022) proposed a translation automation taxonomy based on the driving automation taxonomy developed by the Society of Automotive Engineers. Their translation automation taxonomy provides a finer-grained classification on the degrees of automation on the left side of the Hutchins/Somers continuum (covering human-aided machine translation and fully automatic translation) and describes five levels of automation: (0) No Translation Automation, (1) Translator Assistance, (2) Partial Translation Automation, (3) Conditional Translation Automation, (4) High Translation Automation and (5) Full Translation Automation. Each level of TA describes a different division of labour between translators and translation technology.

Since different degrees of translation automation can be considered one aspect of the structure of social contexts in which translators act, it can be assumed that there exists a correlation between degrees of translators' agency and degrees of translation automation. The present essay will investigate this issue from two perspectives. From a macroscopic perspective, the chapter explores how translators' agency is impacted by translation automation (mostly through NMT) in the wider work structures that have emerged in the modern translation industry. A microscopic perspective will then zoom in on the immediate translator-NMT interaction when producing a

7 Since the notion of Fully Automatic High-Quality Translation has traditionally been a contested one, the adjective *high-quality* has sometimes been placed in brackets or been replaced by the adjective *usable*, resulting in *Fully Automatic Usable Translation* (FAUT). On this concept, cf. van der Meer (2006: 7): "While academics are still debating what the best approach ultimately will be to generate FAHQT, the users start to realize that a mix of whatever translation technologies are available today already produce FAUT."

translation. It will conceptualise translators and NMT as a hybrid system in which both system elements contribute in different ways to achieving an overall task (cf. Hirsch-Kreinsen 2015/2018: 18), resulting in a complex interplay between human and machine agency.

3 Macroscopic perspective: Translators' agency in digitalised and datafied translation production networks

With the proliferation of the World Wide Web as a new space of social action and the resulting emergence of digitalised, datafied and distributed online labour markets (*network economy*, cf. Meyer et al. 2001: 1) as sketched out in the previous section, the traditional "expertise-based dyadic relations between the client and the translator" (Abdallah 2012: 30) were gradually replaced by what Abdallah/Koskinen (2007: 677) and Abdallah (2012: 40) call *translation production networks* (TPNs). Such TPNs are complex network economic structures which incorporate further relevant stakeholders beyond translators and their clients (such as project managers, end users, translation software developers, overall society, etc.; cf. Moorkens/Rocchi 2021: 324). Within TPNs, language service providers (LSPs)[8]

8 According to DePalma (2021: 368), language service providers are "translation, interpreting and localization suppliers consisting of two or more full-time employees." DePalma (ibid.) makes a broad distinction between large *Multi-Language Vendors* (MLVs), mid-sized, *Regional-Language Vendors* (RLVs) and small *Single-Language Vendors* (SLVs). Behrens (cf. 2016: 164) points out that outsourcing translation projects from end clients to MLVs, from there to RLVs, from there to SLVs (and from there potentially to individual freelance translators) may result in translation supply chains that are longer than the actual value chains.

assume a central position and act as powerful intermediaries between the other stakeholders (cf. Abdallah/Koskinen 2007: 674). While networks are generally associated with positive attributes such as openness, dynamicity and democratic participation, Abdallah/Koskinen (2007: 676) stress that TPNs are often strongly hierarchical configurations with asymmetric power relations between the individual stakeholders. The degree of agency translators can exercise in such production networks will be impacted by their (central or peripheral) position in these networks (cf. Koskinen 2010: 183; Cadwell et al. 2018: 302). Specifically, prototypical TPNs are often characterised by neo-Taylorist work practices in the tradition of Frederick W. Taylor's (1911) *Principles of Scientific Management*[9], meaning that the work processes in these networks tend to be highly fragmented, automated, micromanaged and continuously monitored (cf. Garcia 2017: 60; Moorkens 2020: 12–13). Such neo-Taylorist work practices may have the effect of gradually pushing translators from their traditional central position to the periphery of modern TPNs (cf. Vieira/Alonso 2020: 173), where their role as the experts responsible for the successful completion of translation projects may be diminished (cf. Abdallah/Koskinen 2007: 675) and where they may be relegated to "a tiny cog in a large machine" (Moorkens 2020). Accordingly, Abdallah (cf. 2012: 32) describes translation production networks as challenging working environments for translators. The tendency of modern TPNs to develop hierar-

9 Seeking to maximise speed, efficiency and output of factories, Taylor envisioned an objective way to identify the ideal method for completing individual jobs or tasks, which would bring about "the gradual substitution of science for rule of thumb throughout the mechanical arts" (Taylor 1911: 25). According to Carr (2020: 149), Taylor and his *Principles* can be considered the philosopher and the philosophy of the industrial revolution.

chical structures brings about corresponding concentrations of power and hence agency, often in the form of "extremely large, geographically-diffuse super LSPs handling a large portion of translation work globally" (Lambert/Walker 2022: 283). Due to their size, such super LSPs (e.g., TransPerfect, RWS, or Lionbridge, cf. CSA Research 2022) usually have considerable market power (including the power to dictate translation rates, cf. Pym/Torres-Simón 2021: 47) and can therefore often shape translation production networks to their own advantage.

On the other hand, translators are often working as freelancers within these networks, which gives them a high degree of autonomy and flexibility but at the same time often prevents them from being able to influence important aspects such as translation rates or work processes (cf. Moorkens 2022: 132–133). With the recent rise of the platform economy (cf. Schmidt 2017), new TPNs in the form of translation platforms (such as *Gengo* or *Unbabel*) have emerged, which automatically match clients and translators while providing the full digital infrastructure for completing translation projects (cf. Lambert/Walker 2022: 282). For amateur translators, such translation platforms "offer a quasi-legitimate forum […] to join the body of practising translators and offer cheaper rates, further competing with professional translators who look to charge more" (ibid.).[10] For professional translators, this amateur competition fuelled by translation platforms endangers both their professional as well as their overall societal status (cf. Bowker 2021: 272). Firat (2021) describes the business model underly-

10 Cf. also DePalma (2021: 369): "Traditional freelancers today are joined by gig workers." Given the relatively high base quality of modern NMT systems, such amateur translators may be able to conceal their competence deficits vis-à-vis professional translators—at first glance at least—to a higher degree than was possible prior to the introduction of NMT.

ing such translation platforms as "Uberization of Translation".[11]

Taking a sociological perspective, modern digitalised and datafied TPNs can be conceptualised as *sociotechnical systems* (cf. Hirsch-Kreinsen 2018: 23; Karafyllis 2019: 300). These describe configurations of organizational, technological, and human elements as well as the complex interplay between these individual system elements.[12] Sociotechnical systems can be organisation-, technology-, or human-centric—with different external and internal factors impacting their configuration.[13] For example, the relative competitive pressure exerted on a TPN may influence the degree of the network's human-centredness.

11 Cf. Firat (2021: 50): "Uber-like platforms have been around since the 2010s to bring different groups (buyers and sellers) together on a digital labour platform, enabled by the development of mobile applications, high-speed Internet networks, AI-driven automation systems, rating/rewarding mechanisms, and the exploitation of (big) data. […] The uberized platform businesses mainly (1) operate under the basic assumptions of the capitalist market economy […], (2) use an online platform or an application to enable peer-to-peer transactions, (3) claim to cut out any middle person, (4) benefit from a large crowd of freelance and precariat workers (also known as gig-workers or crowdworkers), (5) deploy automation systems and exclude themselves from the legal labour regulations, (6) adopt a reward/rating system for product, work or service quality, and (7) monetize the data collected from producers and customers."

12 The concept of a sociotechnical system goes back to the work of the Tavistock Institute of Human Relations, which was founded in London in 1947 and which used this concept as the theoretical basis for investigating the social, physical and economic impacts of a new coal mining method employed in the English coal mining sector (cf. Deuse et al. 2015/2018: 195; Karafyllis 2019: 301).

13 (Neo-)Taylorist work structures are generally characterised by a low degree of human-centredness: "In the past the man has been first, in the future the system must be first" (Taylor 1911: 7).

In this context, a study by Cadwell et al. (2018) of MT adoption among translators of the EU Commission's Directorate-General for Translation (DGT) and the language service provider Alpha CRC revealed an overall higher degree of human-centeredness of the DGT's translation production network, whereas in Alpha CRC's TPN, "material agency prevails over human agency" (ibid.: 317).[14] Competitive pressure and other factors may also affect the degree of automation of the individual tasks or processes which are performed within a given TPN/sociotechnical system. This degree of automation will then determine the relative contributions that humans and machines make within this system in order to complete specific tasks/processes (see also the discussion in sections 2 and 5). However, the degree of automation is not solely determined by the functionality and performance of the technologies employed to (semi-)automate individual tasks or processes. It also depends on how these technologies are *construed* by the relevant actors in a sociotechnical system, which is one of the central tenets of the *Social Construction of Technology* (SCOT) approach. According to SCOT, the meaning of such artefacts does not reside in the technology itself; instead, this meaning is shaped by a complex interplay of social interactions (cf. Bijker 1995: 6).[15] It is important to note here that different actors may

14 It should be pointed out here that not just freelancer-LSP configurations or translation platforms but all translation settings (including in-house language services or other organisations employing salaried translators) can be viewed as production networks and hence be conceptualised as sociotechnical systems. On this point, see also Risku et al. (2016: 236): "[W]e assume that translation can indeed be described as a network activity, regardless of the size of a given translation project: on closer inspection, all translation projects reveal themselves as networks of interconnected actors and tools."

15 Cf. Bijker (2010: 68): "An artefact is described through the eyes of relevant social groups. Social groups are relevant for describing an ar-

propagate different interpretations of a technological artefact. Which of these interpretations will ultimately achieve dominance in a given sociotechnical system (such as a translation production network) will be determined by the relative degree of agency that the individual actors can bring to bear in the process of meaning making (cf. Olohan 2017: 273). Take, for example, translation memories (TMs) and TM systems, which had arguably been the most impactful translation technologies before the introduction of NMT in the mid-2010s. High-agency TPN actors such as LSPs, translation technology developers or translation clients, tend to construe this technology in a positive way as instruments for achieving a higher translation productivity and for remaining competitive in today's translation market (cf. Olohan 2017: 268). From a SCOT perspective, this interpretation could be considered the dominant one in prototypical TPNs. Lower-agency actors, such as translators or translation researchers, on the other hand, often stress the risk of translator disempowerment—i.e., a reduction of translators' agency—associated with TMs and TM systems. This may come, for example in the form of lower translation rates, the loss of intellectual property rights with regard to translations saved in TMs, or a decrease in translators' autonomy when clients or LSPs require them to reuse translations from (potentially low-quality) TMs. It may also manifest itself in a devaluation of the specialised knowledge that translators contribute via

tefact when they attribute explicitly a meaning to that artefact. […] Because the description of an artefact through the eyes of different relevant social groups produces different descriptions[,] [t]here is not one artefact, but many." For SCOT approaches in translation technology research, see Sakamoto/Yamada (2020), Vieira et al. (2022) and Tieber (2023). See also the overviews provided in Olohan (2017) and (2020). Olohan (2020: 384) also sees the SCOT approach as a potential theoretical cornerstone for a future "sociology of translation technology".

their translations to a TM and which can be reused by less competent translators (e.g., by amateur translators on translation platforms) without having to contribute their own intellectual added value to these translations (cf. Behrens 2016: 165–166; Moorkens/Lewis 2019: 10–11; Bowker 2021: 265; Firat 2021: 55; Pym/Torres-Simón 2021: 50).The risk of TM-induced translator disempowerment can be exacerbated when translation memories—without translators' consent or compensation—are used to train NMT systems which are then integrated into TPNs in order to require a higher translation throughput or to put further pressure on translation rates (cf. Moorkens/Lewis 2019: 9; Moorkens 2022: 125). This last aspect provides the conceptual bridge to a SCOT perspective of NMT systems, where we also find different interpretations by different TPN actors. Here, the interpretation propagated by high-impact/agency actors (such as clients, translation technology developers, LSPs or project managers) construes NMT as a high-performance technology that can be used to increase translation productivity and to reduce translation costs and delivery times (cf. do Carmo 2020: 52; Moorkens/Rocchi 2021: 331; Lambert/Walker 2022: 282). On the other hand, translators and translation researchers tend to stress various risks associated with this technology, e.g., a decrease in income when the productivity gain through NMT does not fully compensate for the decrease in translation/post-editing rates or a further reduced possibility to positively impact the quality of the final translation when light post-editing guidelines require translators to use as much of the raw MT output as possible[16] (cf. Olohan 2017: 278; do Carmo 2020: 37–38; Vieira/Alonso 2020: 173). Also, translators and translation researchers usually

16 Sakamoto (2019: 209) calls such highly restrictive post-editing guidelines a "cognitive and intellectual straightjacket".

construe the artefact of NMT as a technology primarily intended to assist human translators, thus stressing the "complementarity between human translators and MT" (Aragonés Lumeras/Way 2017). Yet, a potentially more dominant discourse, which originated in MT research and which was then amplified via news media (cf. Vieira 2020a), claims that current NMT systems achieve (super)human performance and that "[h]uman translation is not necessarily an upper bound of translation quality" (Popel et al. 2020: 10).[17] It should be obvious that this discourse—which has been rejected by translation studies (cf. e.g., Krüger 2022) runs the risk of negatively impacting professional translators' expert status and agency as attributed to them by the other relevant actors of a TPN or by society as a whole (cf. Moorkens 2022: 129). For example, in a Bourdieusian analysis of how different stakeholders in the translation industry conceptualise machine translation post-editing (MTPE), Sakamoto (2019: 209) found that many LSPs attach "high values to the economic capital of post-editors rather than their cultural capital".[18] In a similar context, do Carmo

17 This construction of the technological artefact of NMT by certain parts of the MT research community as a technology operating on par with or above the performance level of human translators is supported by certain industry actors such as TAUS (2022), which advocates a "No-human-in-the-loop" approach – i.e., a FAHQT (Fully Automatic High-Quality Translation) approach on the left side of the Hutchins/Somers continuum or a full translation automation at level 5 of Christensen et al.'s TA taxonomy. This perspective invites the view that the intellectual added value which is required to produce high-quality translations does not reside in human translators but rather in the machine (cf. Bowker 2021: 268). TAUS' "No-human-in-the-loop" approach stands in stark contrast to the "Expert-in-the-loop" approach propagated by other translation industry actors (cf. Slator 2022).

18 In Sakamoto's study, *economic capital* refers to translators' capacity to contribute to the cost-saving efforts. C*ultural capital*, on the other hand,

(2020: 52) stresses that "PE cannot go on being seen essentially as a time and cost-saving strategy, because this is hampering the general perception of its specialised, expert dimension." In other words, the degree of symbolic capital that is conceded to translators in a particular translation production network may depend, among other things, on how the dominant actors in this TPN construe the technological artefact of NMT. Staying within the Bourdieusian framework, translation production networks could be conceptualised as force fields which the relevant actors attempt to structure in their favour by drawing upon their respective capital resources (cf. Bourdieu 1990: 43). Analysing the force field of a given TPN, one could ask whether the dominant actors in this TPN value translators for their incorporated cultural capital in the form of their expert translation competence and thus treat them as experts in control of and responsible for the successful completion of the translation process or whether these dominant actors reduce translators to their economic capital and relegate them to disempowered 'fixers of MT output' (cf. Alonso/Vieira 2021: 398).

With reference to Prunč's (2007/[3]2012: 340) notion of 'translation culture'[19], one could also inquire about the *transla-*

refers to translators' expert competence (i.e., their incorporated cultural capital).

19 On this concept, cf. also Risku et al. (2013: 172–173, italics removed): "The working environment of the translator includes the social, cultural and historical framework(s) in which a translator works, specifically the cultural norms that influence translation […] or the 'translation culture' […], which includes all social expectations about translators' roles, goals and tasks, the workplace, space and legal and financial organization of work."

tional diaculture[20] of particular translation production networks, and this may be shaped, among other things, by the dominant interpretation of the technological artefact of NMT entertained by the high-impact actors in this network (see above).[21] With regard to the present discussion, Ruokonen/Koskinen (2017: 310) assume that introducing NMT into TPNs may further reduce human translator's agency in these networks. Vieira/Alonso (2020) corroborate this hypothesis in their analysis of perspectives on MT on the management and production sides of TPNs, finding that the current configuration of many networks "restricts translators' field of influence to the text while alienating them from wider aspects of a project's business strategy" (ibid.: 178). Reducing translators' agency in technology/organisation-centric TPNs in such a way prevents them from contributing their MT-related "consulting competence" (Nitzke et al. 2019: 248) to the initial planning phase of translation projects where they could advise, e.g., on MT-related aspects such as the machine translatability of certain texts/genres, on required post-editing levels for certain risk levels, on client requirements, fair price calculation in MT-assisted translation workflows, etc. Disregarding this important expert competence of translators is often to the detriment of all stakeholders of a TPN (cf. also Vieira/Alonso 2020: 178). Adopting a Bourdieusian perspective again, if translators' agency is structurally curtailed in the force field of modern TPNs as discussed above, this may also affect their translational habitus (cf.

20 A diaculture refers to specific groups or communities (e.g., the *translation community*) within an overall paraculture (cf. Reinart 2009/²2014: 43).

21 Cf. also Rose/Jones (2005: 31): "[Social structures] are both the medium and the outcome of human action […]. Social structures […] influence which human acts of agency are considered legitimate and how machine and human agency is later interpreted."

Alonso/Vieira 2021: 391), understood as their "incorporated dispositions" (Gouanvic 2005: 148). This means that translators may eventually stop perceiving themselves as the actual experts in the loop required and responsible for the successful production of high-quality translations (cf. Risku 1998: 90–91).[22] This may again be to the detriment of the overall TPN, since high-quality translations usually require self-confident translators and a correspondingly self-confident translational action (cf. Hönig 1995/1997: 89).

4 Microscopic perspective: The 'double dance of agency' of translators and MT systems in NMT-assisted translation production networks

Further aspects affecting translators' agency in NMT-assisted translation production networks reside not in the overall network as I discussed in section 3, but in functional aspects of NMT and in the immediate interaction of translators and NMT in the network. According to Hirsch-Kreinsen (2015/2018: 18), when humans interact with powerful cognitive AI technologies, a *hybrid system* is formed in which both humans and technology possess a certain type of agency and contribute to the successful completion of a task. In contrast to artificial intelligence (AI), which is usually concerned with *replacing* human intellectual tasks by machines, hybrid human-machine systems—where the individual system elements are supposed

22 For example, Guerberof-Arenas/Moorkens (2023: 130) observe that "there is a belief in some parts of the translation community that, because they are dealing with MT post-editing, the effort required and the responsibility towards the content, the user and reader, and the final quality is not as high as without MT".

to *complement* each other—are often described using the term *intelligence augmentation* (IA) (cf. Szczerbicki/Nguyen 2021). IA is "an alternative conceptualization of artificial intelligence […] that focuses on AI's assistive role, emphasizing the fact that cognitive technology is designed to enhance human intelligence rather than simply replacing it" (ibid.: 381).[23,24]

From an agency perspective, the interplay between humans and machines in a hybrid system has been described by Pickering (1995: 21, italics removed) as a "dance of agency" consisting of processes of resistance and accommodation between the two system elements.[25] In this dance of agency, hu-

23 From a cognitive perspective, such hybrid intelligence augmentation systems are sometimes discussed under the term *Blended Intelligence*, cf. (Eberhart et al. 2015: 1): "Blended intelligence (BI) is a system exhibiting intelligent behavior resulting from a blend of carbon-based [i.e., human] and silicon-based [i.e., machine] sub-systems in which the contributions of the subsystems are constantly adapting to complex and dynamic environments such that the intelligent behavior cannot be ascribed to specific subsystem contributions. An important characteristic of blended intelligence systems is that each component provides functionality to the overall system stemming from its own unique skill set. The blending of abilities from multiple sources produces better cognitive results than any subsystem could produce independently." On the blurring line between human and machine intelligence in a translation context, cf. also Castilho et al. (2018: 27): "[I]t is typically unknown to what extent MT or other translation technologies and tools have been involved in [producing a translation in] the [computer-assisted] translation process. We therefore suggest here that the traditional separation of human and machine is no longer valid, and drawing an arbitrary line between HT [human translation] and MT no longer serves us in research, teaching and professional practice."

24 For a detailed discussion of the concept of augmentation, with a focus on augmented translation, cf. O'Brien (2023).

25 In her translation sociological analysis of the interplay between translators and translation memories, Olohan (2011) introduced Pickering's

mans try to use machine agency for their purposes. If the machine resists this effort, humans try to accommodate this resistance by adjusting their actions, strategies or goals (cf. Rose/Jones 2005: 26; Cadwell et al. 2018: 302). Based on Pickering's notion of the dance of agency, Rose/Jones (2005: 27–31) developed the concept of "double dance of agency" in order to better highlight the mutual influence between humans and machines as elements of a hybrid system and to stress the emergent nature of the results of such a hybrid human-machine interaction. In their "socio-theoretical model of the interaction of machine and human agency", Rose/Jones (ibid.: 27–28) highlight three main factors: 1) the properties differentiating human agency from machine agency (see the discussion in section 1); 2) the conditions under which human and machine agency are exercised (see the discussion of digitalised and datafied TPNs in section 3); and 3) the process of agency, which is concerned with the question of "How is it that the two forms of agency combine and influence each other over time to produce particular outcomes?" (ibid.: 27). Here, the authors point out that machine agency can either *constrain* or *enable* human agency (ibid.: 29; cf. also the brief discussion of resistance and accommodation above).[26] One important functional aspect of an NMT system that influences the double dance of agency of translator-NMT interaction within a hybrid system is the underlying architecture of the system. An NMT system can either

concept of dance of agency in translation studies. Ruokonen/Koskinen (2017) draw on this concept in order to analyse the emotional reactions of translators towards different translation technologies employed by them.

26 Cf. Rose/Jones (2005: 29): "The fact that a machine is designed in a certain way, and operates in a particular set of conditions, implies that certain human courses of action are made more feasible, and others less feasible (or so overwhelmingly difficult as to seem impossible)."

be *static*, which means that the system remains unaffected by translators' post-editing of the MT output and produces further translation solutions without taking translators' feedback into account, or the system can be *adaptive/interactive*, which means that it learns from translators' corrections and adjusts its output immediately (interactive MT) and/or over time (adaptive MT; cf. e.g., Daems/Macken 2019). In this context, Vieira (2020b: 327–328) proposes a "spectrum of human agency in the post-editing process", which covers the middle MAHT and HAMT area of Hutchins/Somers' translation automation continuum (cf. section 2). The left pole of this spectrum constitutes the MT-centric endpoint (comparable to a technology-centric sociotechnical system as discussed in section 3), where automatic post-editing (cf. Shterionov et al. 2020) is performed without human intervention (the no-human-in-the-loop approach, cf. section 3) and where translators' agency is therefore reduced to zero. The midpoint of the spectrum covers the static post-editing scenario discussed above, where human agency may be constrained by a static, non-responsive MT system. The right pole then constitutes the human-centered endpoint (reminiscent of a human-centric sociotechnical system) where translators perform post-editing with interactive/adaptive MT suggestions and where translators' agency is highest and is enabled by the MT system (since translators' feedback will be incorporated directly into future MT suggestions, which, in turn, enhances the MT system's agency). Adaptive/interactive MT systems thus contribute towards a higher human-centeredness of otherwise technology- and/or organization-centric TPNs and may serve to counter effects of technology-induced 'dehumanisation' of computer-assisted translation workflows (cf. Daems/Macken 2019: 117).

Also with regard to human and machine agency in translation, Ruokonen/Koskinen (2017: 311) distinguish between a

convergent agency, where human and machine agency move in the same direction when solving a particular task within a hybrid system, and a *divergent agency*, where human and machine agency are "pulling in different directions" (ibid.). Combined with Rose/Jones' insight that machine agency either constrains or enables human agency, this may give rise to the following situations: 1a) *A convergent agency of the overall hybrid system where machine agency enables human agency*. This may be the case when an NMT system takes over routine tasks in the translation process (e.g., translating standardised/recurring passages) and thus allows translators to allocate more cognitive resources to more challenging translation problems requiring creative solutions (a switch from a "cognitively less demanding routine mode" to a "cognitively more demanding creative mode", Bayer-Hohenwarter/Kußmaul 2021: 312). This would allow translators to complete the translation faster, with adequate quality and ideally using less cognitive resources than without NMT assistance—which would constitute a prime example of intelligence augmentation as discussed above. 1b) *A convergent agency of the overall hybrid system where human agency enables machine agency*. This will be the case when human expert labour serves to improve an MT system's future translation quality, as was discussed in the context of interactive/adaptive MT systems above. This higher MT output quality achieved through human feedback can be understood as an enhancement of the MT system's agency. 2) *A convergent agency of the overall hybrid system where machine agency constrains human agency*. This situation may arise when non-creative output produced by an MT system leads translators to remain in the cognitively less demanding routine mode (where they rely solely on their "translation routine activation competence," cf. Göpferich 2008: 155), even if the translation task would have required translators to switch to the cognitively more demanding creative mode. Such NMT-

induced "over-routinisation" (Massey/Ehrensberger-Dow 2017: 305)[27] may be attributed to structural defects of the overall translation production network (rate/time pressure, restrictive PE guidelines, etc., see section 3) or to priming effects within the hybrid translator NMT-system where the presence of the MT system's output leads translators to unconsciously accept large portions of this output without any further revision.[28] 3) *A divergent agency of the overall hybrid system where machine agency enables human agency*. This may be the case when the output of the NMT system provides a creative (lexical, stylistic or other) impulse to translators who would otherwise have resorted to their translation routine activation competence when translating the respective source text passage.[29] 4) *A divergent agency of the overall hybrid system where machine agency constrains human agency*. This situation may arise when translators encounter a demanding source text passage which requires a high amount of cognitive effort and thus forces translators to switch from

27 Cf. Massey/Ehrensberger-Dow (2017: 305): "[I]t is reasonable to assume that an increasing reliance on technology and tools might well encourage translators to deploy more routines and unconsciously adopt greater automaticity in their work."

28 On MT priming, cf. Carl/Schaeffer (2019: 64): "In the case of post-editing, the translator is primed by two stimuli: the source text and the MT output. Due to its similarity with the target text, MT output is a stronger prime than the original source text, which makes post-editors accept MT suggestions more easily even when the produced target text becomes unidiomatic or ungrammatical." The linguistic target text patterns resulting from such MT priming are called "post-editese" (Toral 2019).

29 Cf. Ruokonen/Koskinen (2017: 321): "[T]ool's divergent agency can be a welcome support or make the human user's work more varied and enjoyable or change the human for the better […]." Massey/Ehrensberger-Dow (2017: 305) also highlight MT's ability to "kick-start" creative translation processes.

unchallenged to *challenged* translation production (cf. Carl/Dragsted 2017: 8) and the NMT system mistranslates this passage and therefore fails to support translators in this instance (or even primes them to accept this mistranslation without revising it). This would constitute a missing intelligence augmentation effect within the hybrid translator-NMT system, and this may arise quite often in NMT-assisted translation since human translators and NMT have been shown to have similar weaknesses (e.g., both human translators and NMT are prone to produce semantic mistranslations, cf. Yamada 2019: 102; Vardaro et al. 2019: 8). This means that NMT tends to let translators down precisely in those instances where its support would have been most welcome.

5 Outlook: Human and machine agency in light of recent large language models

Recently, large language models such as GPT-4 have extended the scope of human intellectual tasks that can be (semi-)automated through cognitive AI technologies. The in-context learning ability of LLMs (cf. Zhao et al. 2023: 4) allows these models to be conditioned "on-the-fly" on a range of language-related tasks (autonomous text production, text summarisation/optimisation, machine translation, etc.) via natural language instructions (*prompts*). Given their versatility, LLMs are also called *general-purpose AI technologies*, which are "machines designed to perform a wide range of intelligent tasks, think abstractly and adapt to new situations" (European Parliamentary Research Service 2023: 1). Recent LLM research has also attempted to convert these models into autonomous AI agents (see, for example, the *Auto-GPT* project by Significant Gravitas 2023) that can be assigned complex process chains consisting of a range of interconnected sub-tasks and that can decide au-

tonomously which steps to perform in which order so as to achieve their goal (for an overview on LLMs as autonomous agents, see Wang et al. 2023). In light of these new technological developments, van Lier (2023: 84) claims, rightly in my opinion, that LLMs "foreshadow a change in our interaction with AI-systems that we are not yet conceptually ready for." This can also be seen in current reflections of human vs. machine agency in light of recent LLMs. For example, Floridi (2023: 9) claims that, with LLMs, we have "liberated agency from intelligence" because "[w]e have decoupled the ability to act successfully from the need to be intelligent, understand, reflect, consider, or grasp anything". On the other hand, van Lier (2023: 79–80) argues against conceptualising LLMs as intelligence-free agents and stresses that current LLMs can only exercise agency in collaboration with human agents (who prompt these models and evaluate/optimise/use their output).[30] Therefore, van Lier (ibid.) proposes to conceptualise hybrid human-AI systems as *collaborative agents*. The author also stresses that there is a hierarchy in these hybrid collaborative agency systems where the lower-agency AI element of the system remains—at least for now—under the authority and supervison

30 Of course, this point would also be applicable to narrow AI technologies such as NMT, which were discussed as machine agents in the previous sections of this chapter. In van Lier's terms, these narrow AI technologies could also exercise agency only in collaboration with human agents. In current reflections on agency in the context of LLMs, there seems to be a tendency to return to more 'ambitious' conceptualisations of agency, which understand the concept as encompassing more than merely 'the capacity to make a difference' (see the discussion in section 1). One could interpret such reconceptualisations as the attempt of humans to become 'conceptually ready' for recent LLMs (and other powerful new AI technologies) by devising stricter criteria against which to measure these high-performance technologies.

of the higher-agency human system element (ibid.).[31] Bringing the discussion back to human vs. machine agency in digitalised and datafied TPNs, the general-purpose character of LLMs will certainly bring about further increasing degrees of automation and hence a further redistribution of cognitive labour between translators and technologies in production networks. At the micro-level, the double dance of agency within a hybrid translator-LLM system can be expected to become even more complex than in hybrid translator-NMT systems since, through iterative prompting, translators can engage in dialogue-like interactions with LLMs in order to progressively refine the models' output according to the task at hand.[32] How LLMs will affect translators' agency at the macro-level of modern translation production networks remains to be seen, as these networks are still in the early stages of integrating

31 Cf. van Lier (2023: 80): "Calling current LLMs agents, I would say, is thus under the understanding of them being the non-autonomous and non-independent components of a collaborative agent." Van Lier does not seem to take into account recent attempts to convert LLMs into autonomous agents, which would naturally increase the degree of autonomy and independence of such LLMs. However, even with Auto-LLMs, the initial impulse to act has to be provided by humans, and these humans will also be required to supervise the subsequent actions performed by these LLMs and to intervene if necessary.

32 Also, the scope of possible interaction between translators and LLMs is much wider than the scope of interaction between translators and NMT systems (even if these systems are adaptive/interactive). For example, translators can prompt LLMs to pre-edit the source text before translation, to produce different stylistic translation variants, to perform conceptual or terminological research prior to the translation (provided the LLMs can be connected to the internet), to rank different translation variants according to their adequacy, to perform an error analysis, to post-edit the translation output, etc. For a more detailed discussion of potential areas of application of LLMs in the language and translation industry, cf. Krüger (2023: 311–321).

LLMs into their production processes (cf., e.g., Custom.MT 2023). At first glance, it may seem that general-purpose LLMs may further curtail translators' agency in these networks since these models may be used to (semi-)automate further sub-tasks of the overall translation process, pushing translation automation even further to the FAHQT endpoint of Hutchins/Somers' translation automation continuum or to level 5 (full translation automation) of Christensen et al.'s translation automation taxonomy. However, given that LLM interaction relies on natural language prompting where previously programming languages would have been required[33], human professional linguistic competence—which is one important component of expert translation competence but which has come under pressure from AI-induced translation automation in recent years—may experience somewhat of a renaissance in the dawning era of LLMs (cf. also Wolfram 2023: n.p.).

This chapter will conclude with an optimistic scenario for translators' agency in a future AI-saturated translation industry: it is to be hoped that dominant actors will recognise translators as indispensable linguistic experts-in-the-loop in future LLM-fuelled translation production networks and will concede translators corresponding capital and agency. As the higher-agency elements in hybrid collaborative agency translator-LLM systems, translators can then act as intermediaries between the other TPN actors' communicative requirements and these LLMs, decide when LLMs should be integrated into production processes, supervise LLM performance (and, where necessary, intervene in LLM production processes) and remain the final authority on the adequacy of the LLM output for particular target-cultural communicative purposes.

33 Cf. Karpathy (2023: n.p.): "The hottest new programming language is English."

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