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Translators and translation technology: the dance of agency

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Andrew Pickering's (e.g. 1992, 1993, 1995, 2008a) view of agency in scientific practice challenges other views from the sociology of science, in that he seeks to account for both human and non-human agency within a performative idiom of science. His approach has been applied in various contexts, within and beyond the sciences. This paper explores the potential of mobilizing Pickering's notions of the 'mangle of practice' and the 'dance of agency' to conceptualize translation practice, specifically to develop a deeper understanding of translators' interaction with translation technology, both individually and collectively. I argue for the relevance of this conceptualization and make a case for a 'mangle-inspired' reading of translators' contributions to an online technical forum. However, I also reflect on how this analysis deviates from the principles of the mangle and conclude by discussing some of the methodological challenges of researching the interaction between translators and translation technology within this framework.

Keywords: translation technology, translation memory, sociology of science, science and technology studies (STS), human agency, material agency, language services industry

Translation technology, in particular translation memory (TM) software, now assumes a significant role in professional translation practice and translator training. In spite of this, translation studies research has paid relatively little attention to TM use and the interplay between the technology and translation practices. At the same time, translation studies has become increasingly interested in questions of agency and in situating motivation for translators' choices in the realm of the social as well as the linguistic or the cognitive. With that sociological perspective in mind, I introduce Andrew Pickering's 'mangle of practice' and, by showing how it has been effectively applied to conceptualize aspects of software design and information systems implementation, I establish its potentially usefulness for a

study of TM use. I then draw on this conceptual model in my consideration of translators' posts to an online forum dedicated to a new version of a TM tool. Through the contributions of individual translators, I seek to trace the intertwining of material and human agency and to indentify the dialectics of resistance and accommodation. Then, at the level of the translation community, attention is turned to the ways in which the technological – i.e. the TM software – and the social – i.e. translators, the translation community, the translation industry – are, in Pickering's terms, reciprocally 'tuned' to achieve an interactive stability. Having sought to interpret the forum posts within the mangle of practice framework, I then discuss some of the shortcomings of this approach and address some of the methodological challenges posed by this conceptualization.

1. Translation memory

Translation memory (TM) software is a computer-assisted translation (CAT) tool designed to facilitate the process of translation. TM allows translators to store source and target texts in such a way that source text sentences or sub-sentential segments will be recognized by the software if encountered again; the previously used translation can then be retrieved from memory by the software. As the translator works through a text, the software will identify those segments which are matches (exact or fuzzy) with segments in the memory; it can produce those previously used translation solutions, while also storing the newly generated translations for future reuse. The main benefit of using TM software is that it eliminates repetitive work and helps to ensure consistency across texts or for teams of translators. There are usually productivity gains; if the translator has to translate only parts of a text, she/he can translate at a faster rate. There are also savings to be made on the part of translation companies or agencies or clients; TM tools allow companies to analyze source texts before they send them to translators, thus ascertaining the extent of matching and budgeting for time and costs accordingly.

For our purposes it is not necessary to examine TM algorithms or individual tools, but it is useful to consider existing research on TM use by translators. Alongside some training-oriented overviews of TM and other CAT tools (e.g. Austermühl 2001; Alcina 2008), several survey-based studies have tracked the uptake of TM by translators and have sought to examine various aspects of usage. For example, Dillon and Fraser (2006) and Fulford and Granell-Zafra (2005) established that non-adoption of TM had more to do with lack of

awareness of the capabilities and functionalities of the software than active rejection of it. These surveys found that most translators trained themselves to use TM but that this was a time-consuming process and the effort involved in learning the software acted as a disincentive; however, those who used it regularly reported gains in productivity, consistency and quality (Fulford 2001; Fulford and Granell-Zafra 2005; Lagoudaki 2006).

Only a small number of scholars have set out to study aspects of *how* translators use TM. Bowker (2005), for example, studied the relationship between productivity, or speed of translating, and quality, by comparing translators not working with a TM to those using a TM and those using a TM which contained errors. Elsewhere, Bowker (2007) examined the impact of TM on features of textuality, noting that processing the text in sentence units, as encouraged by TM, has a detrimental effect on textual cohesion. Bowker concluded that training in TM use is crucial if translators are to become critical users. Kenny (1999) also called for research on how TM tools can change the task of the translator, observing, for example, that students implement time-saving tricks when working with TM, e.g. by not selecting target-text syntactic structures which would make those segments more difficult to re-use. O'Brien (2006) researched the cognitive loads of TM use, showing that cognitive loads were lightest when translators processed matches that were exact, but increased incrementally for fuzzy matches and unmatched segments. Also interested in translation processes, Alves and Liparini Campos (2009) found, among other things, that translators using TM are more inclined to use, unedited, the solutions proposed by the TM if they are placed under time pressure, and that their decisions are more likely to be taken by first considering (external) support resources and then making judgements drawing on own (internal) knowledge.

As indicated here, research on TM use has been quite limited and has tended to focus either on attitudes related to uptake of TM or ways in which TM use may influence the translation process or the translation output, linguistically or cognitively. While there is certainly considerable scope for further work in those areas, this paper differs from previous research in that it seeks to explore the interaction between translators and TM software. This focus requires a conceptual framework which is sociological, rather than linguistic or cognitive. In the next section I argue that Andrew Pickering's approach provides a conceptualization which facilitates this exploration.

2. Pickering's 'mangle of practice' and 'dance of agency'

Translation studies is increasingly interested in the agency of translators and interpreters (e.g. Kinnunen and Koskinen 2010; Milton and Bandia 2009; Wolf and Fukari 2007); the translator is studied as an actor whose choices and behaviour are motivated, not just by linguistic or cognitive factors, but by social and ideological ones too. Translation scholars drawing on sociological models have tended to focus on translation or interpreting activities where social relevance is immediately obvious, for example, interpreting for asylum seekers (e.g. Inghilleri 2007), translating or interpreting in situations of conflict (e.g. Baker 2006), translating or interpreting for activist organizations (e.g. Boéri 2008). In these and other studies, human agency is the focus of attention, and little interest is shown in the action of the material or non-human. Many scholars in science and technology studies (STS), by contrast, seek to account, in various ways, for the range of components or agents involved in constituting science and technology – social, human, material, technical, conceptual - and for the interactions between components or agents. Proceeding from the assumption that translation studies could benefit from a broader base of sociological influences and a consideration of the role of the material and the technical in translation practice, I introduce below the model of human and non-human agency offered by Andrew Pickering. Pickering's approach has been successfully applied, among others, to the study of the implementation of information systems in organizations, and may therefore offer a productive conceptual approach to the study of translators and translation technology.

Pickering (e.g. 1993, 1995, 2008a, 2008b) sets out to develop a theory to account for the emergence of science and technology. In this emergence, he gives a prominent role to non-human, i.e. material, agency, and sees science and technology as emerging like laundry which has been wrung through a mangle. The 'mangle of practice' represents the dialectic of resistance and accommodation which is brought to bear on scientific and technological advances. Resistance can be offered by any entity, including material objects; this can be seen particularly well in the course of many scientific experiments, in which apparatus and other material objects offer resistance to the smooth running of the experiment or to the gathering or analysis of relevant data. Accommodations are made by the scientist to overcome or avoid resistances, and the interplay of human and non-human agency as they interactively stabilize each other is termed the 'dance of agency'. This process of mutual adjustment to achieve stabilization is also likened to the tuning of a car radio or engine. One of Pickering's examples (2008a) which illustrates this well is that of the Mississippi and its levees and

weirs. A dance of agency is performed by the engineers and the river; the engineers try to control the river by raising levees and building weirs, while the river rises above the levees or tears away at the weir's structure as it tries to flow its natural course.

The mangling process is 'temporally emergent' and 'posthumanist'. By 'temporal emergence' Pickering (e.g. 1995 *passim*) means that the contours of human or material agency are not decisively known in advance; they emerge in the course of (scientific) practice, just as the mangled laundry will assume a different and unpredictable shape as it emerges from the mangle. It is not possible to predict in advance where resistances will be encountered and what will play a constitutive role in the development of the science or the technology, or any course of events. By 'posthumanist', Pickering signals that the analysis of practice is decentred; it does not foreground human agency but looks at how human agency is intertwined with non-human/material agency and how the two are mutually productive of one another. Agency, understood thus, is not confined to intentional actions performed by humans and is not a property which is inherent to some entities but not others; instead, it is temporally emergent. Finally, the 'mangle' perspective relies on a performative idiom of science, rather than a representative idiom, that is to say, science is studied as it emerges in practice, in real-time, not as it is reported retrospectively.

Pickering (1995) employed this approach in a set of four case studies relating to scientific discovery and technological innovation in the first instance. However, he has emphasized in more recent work that it is "a coherent and productive approach across the humanities, social sciences, and beyond" (Pickering 2008b: v) and he sees the extension of the mangle by other scholars to other fields as vindication of his claim that it is a 'theory of everything', while pointing out that this is not "a claim to have found the fundamental equations of culture and practice […] but rather an argument for a shift in interpretive sensibilities, an argument that scholars should take an interest in decentered and emergent processes" (Pickering 2008b: viii).[1]

Among the areas in which the notion of the mangle has been applied, information systems (IS) and software development are of most relevance to the current study. Much research by IS scholars focuses on the implementation of information technology (IT) in organizations and the impact of IT on various aspects of an organization, ranging from business processes to performance of individual employees. The introduction of the same IT

[1] See Baird (1999) for a critique of the 'theory of everything' aspiration. Pertinently, Scheid (2008) argues that Pickering's mangle is itself tied to its own specific contexts of emergence.

system into similar organizations can have vastly different consequences, some of which can be unpredictable and/or undesirable. One argument to explain why systems sometimes fail is that system development is often considered as technical change rather than socio-technical change; i.e. the human and organizational aspects are not addressed at all, or only implicitly, or in an ad-hoc fashion, when the system is being developed (Doherty and King 2005). The need to move away from traditional, polarized perspectives of technological determinism or social determinism and to consider instead the interplay between the technological and the social has led some IS scholars (e.g. Jones 1999; Chae and Poole 2005; Rose and Jones 2005) to adopt Pickering's mangle of practice as a useful conceptual framework within which to situate their research. Jones (1999) and Rose and Jones (2005) refer to a 'double mangle' and a 'double dance of agency' to account for the situation in IS development in which "human agents seek to channel material agency to shape the actions of other human agents" (Jones 1999: 297).

Also within the computational field, Marick (2008) looks at two different ways of producing software. The conventional approach starts with a list of requirements for the product and specification of the interface. Then the product and its architecture are designed, and the final step is the writing of the program or code to satisfy all the requirements. This process, Marick argues, produces errors, where requirements are ambiguous or are ignored, where design specifications do not meet requirements, etc. An alternative model is the agile software development model. This is a bottom-up approach in which a product director, who is a specialist from the user domain, specifies the features needed, and developers seek to implement these iteratively, making changes to the program each time. Marick (*ibid*.) argues that this approach does not lead to a badly designed product but rather a product which is designed to accommodate change. The programming is performative rather than representative. The code often resists change and the programmers have to accommodate the resistance; the programmers tune themselves and the code so that a requirement can be met. The dance of agency therefore involves the software developers and the product director but also the code and the programming or design rules which emerge in the process. The software is supposed to be functional throughout, so that a certain interactive stability is achieved with each iteration of the program, not just at the end of the process when the program is ready to be shipped. In this way, Marick (*ibid*.) finds that the agile way of working can be readily mapped onto Pickering's mangle.

These conceptualizations of the development and implementation of information systems or software illustrate the mangle's potential usefulness when we try to understand a slightly different situation: the interaction between translators and TM software. It offers a conceptualization which encourages a focus on the interplay of agency, which is emergent and which is not confined to or centred on the human actor.

3. Translators, TM use and technical support forums

The aim of this section is to explore the concept of the dance of agency in TM use, i.e. the interplay of translator and software agency, the dialectic of resistance and accommodation which emerges in TM use as the technological and the social interactively stabilize one another. To assess the usefulness of this conceptualization it is necessary to apply it to translation activity and to the use of TM in translation practice. One source of data which provides an insight into TM use is online technical support forums. Of particular interest here are those threads or discussions in which users post many times a day, seeking help and support in a technical forum, as they attempt to perform a particular task, with that assistance then provided by the community of translators who are performing similar tasks at the same time. It can be argued that these posts are performative in their own right, i.e. they are part of practice, and the writing of them can be viewed as performance.[2] One of the findings of TM surveys (Fulford 2001; Fulford and Granell-Zafra 2005; Lagoudaki 2006) was that most translators have no formal training in the use of TM and are self-taught. And, as is clear from several forum posts, translators often feel they receive inadequate support from the TM software developers. Thus, the posters rely on the forum to facilitate or improve their own or someone else's further interaction with the TM software. For those translators who post on the forum, the posting itself can therefore be seen as an important part of their practice of using the TM.

The idea of written contributions to a debate performing different ontologies is central to Jensen and Markussen's (2008) 'mangle-inspired' study of the debate surrounding the Mårup Church in Denmark and its protection from coastal erosion. They analyze different sides of the debate, seeing the articulated arguments, not as representations of different political ideologies but as part of "ontological *performances*" (Jensen and Markussen 2008:

[2] This is an argument at the heart of John Law's (2002) study of the design, construction and eventual cancellation of the TSR2 military aircraft in Britain in the 1950s and 1960s, in which Law uses stories about the aircraft as "a way of helping to perform the aircraft. The stories *participate* in the aircraft" (Law 2002: 6, author's emphasis).

131, authors' emphasis), that is to say, the actors draw on specific versions of reality – ontological configurations – to articulate their different positions and to give them a basis for constructing a particular choice. For example, a Preservation Act which refers to the beauty of the landscape is interpreted by the governmental representative as justification for allowing erosion to take its course, i.e. nature would be prioritized; at the same time, the human-centred Friends of Mårup Church group use the same legislation to argue that the existing landscape should be preserved, i.e. the coastline and the Church would be protected, so that people could continue to enjoy the area's beauty. Along similar lines, I propose to examine the forum posts[3] as communicative acts which perform ontological configurations.

The discussion thread in question concerns the new version of a TM tool produced by SDL – *SDL Trados Studio 2009* – which was launched in June 2009 and marketed as the "culmination of 25 years of solid translation technology expertise" and "as a truly game-changing product set to revolutionize the way translators and project managers work" (SDL 2009). The choice of thread was inspired by the research on IS design discussed above, in which the introduction of new systems or software was an important focus, but was also prompted by much discussion in translation communities about this new product. As noted by SDL (2009), their software is "established as the defacto standard for translation software" and boasts "over 170,000 licenses worldwide". Thus, the launch of a new and substantially redesigned product attracts attention. There are 90 posts in this thread, with 5,615 views at the time of writing, making it one of the most heavily contributed to and most often viewed in that particular section of the forum in question.[4] The thread initiator (T1) posts 17 times. Two other posters (T2 and T3) are prolific, posting 21 times each, usually in direct response to T1 or in dialogue with one another. Most other contributors (also identified by number below) post once or twice each. 80 of the 90 messages were posted between 2 and 8 November 2009. I focus on two specific aspects in my mangle-inspired reading of the posts: (i) the interaction between T1 and his TM (ii) the reciprocal tuning of the technological and the social within the TM and language services industry.

[3] Although the forum is public and access is completely unrestricted, I have viewed it as a support forum and as a virtual community and have applied to it the same research ethics procedures as interactions in offline social settings, e.g. by requesting permissions to quote from posts for this paper. Only one poster expressed a preference for anonymization of his contribution; to comply with that request, all contributors have been anonymized.

[4] The views expressed by participants of the online forum and quoted or paraphrased here are those of the participants and are not intended to inform readers about any merits or shortcomings of the software itself.

3.1 Translator–TM interaction

By focusing on T1, the thread initiator, and his initial accounts of using the new software for the first time, we consider the dance of agency enacted between T1 and the TM software, with the material agency of the software, as emergent and unpredictable, shaping T1's own actions. The thread starts humorously and ironically, immediately telling us something about how T1 anticipates his interaction with the software:

> The sun was shining and the weather lovely, so what better thing to do on a Sunday than to install SDL Studio 2009 T31 and start working on a new, urgent project. Masochist? Me? (2/11/09)

As noted by Rose et al. (2005: 146), any exercise of agency has to be understood in the context of the situational conditions which make it possible and which frame its subsequent interpretation; in this case, the personal history of interaction between T1 and TM software is one element which shapes his expectations regarding the new TM product and is also relevant to our understanding of how his interaction with the new product unfolds. Although we can only assess this very crudely using the online forum data, we can see that T1 has sought advice on Trados/SDL Trados products regularly since 2004, posting 170 messages in total, many of which are related to specific problems he encountered when installing and using software. On this occasion, contrary to T1's expectations and the expectations he attributes to his readers, he reveals that the installation experience was positive.

T1 initially recounts his first experiences with the software by writing in the second person: "you start by […] then you […] open your […] export your […] open […] import […]" (2/11/09). Here he is describing a part of the procedure which worked smoothly, and, for him, the human agent is in total control of the software. In the same post T1 then presents some of the problems he encountered, and immediately the software assumes human qualities: "It took some time and Studio does not remember where you store stuff, so you've got to watch out there, but it works". The software's forgetfulness presents resistance in the accomplishment of this aim but the user can accommodate this by being vigilant. More serious problems follow and these are attributed to the software, now not only exhibiting cerebral functions but also volition and a desire to control on its own terms: "the Editor does not handle docs; it imports them alright, but then wants to store everything in its own […] format". T1 continues by outlining that, despite doing what he was supposed to do as user, the software did not cooperate and did not offer assistance: "no help, no further explanation" (2/11/09) . Left to his own devices, T1 takes actions to solve the problem, recounted in the

first person in that same post: “I solved that issue by exporting the TM and importing it into Trados 2007 again”.

The post continues to reveal how T1 worked with various components of the software. The interaction showed signs of being promising but also problematic, i.e. it stalled or came to a halt, due to the lack of cooperation of the software: “How was working with Autosuggest? Great! I loved it, but alas, after closing and opening the project AutoSuggest stopped working. It just didn't pop up anymore, whatever I did”. The interaction also proved to be unreliable, due to the software imparting incorrect information to the user. The user, on the other hand, did what was required of him, and also knew better than the software: “How was working with MultiTerm. Apparently easier than before, but alas, not reliable. Sometimes there is a thin red line in the left pane to indicate MultiTerm has found something and sometimes it simply shows nothing, althought [sic] I knew the term to be there”.

In a subsequent post (2/11/09) T1 renames the software *SDL Stupido* and enumerates ten aspects of the software which he finds problematic. Most of these indictments refer to *Studio*’s behaviour viz-à-viz the user, and most involve *Studio* not doing something that is expected by T1, e.g.: “it does NOT go to […]” or “Studio does not remember […]”. However, in some cases, the software’s failing is that it does not prompt the user to interact in a certain way with the software: “it does not ask you to open a MultiTerm file […] it does not ask you to open an AutoSuggest dictionary […]”. Its lack of cooperation is also clear when, instead of performing these functions, it is “staring you blankly in the face”. Thus, for T1, not only does the software fail to fulfil the user’s expectations in these respects, but it also makes it difficult for the user to act effectively, e.g. to choose a menu item, and sometimes it is necessary for the user to tell the software something “time and time again”. On only one occasion does T1 find that a problem is caused by human error; he acknowledges that a checkbox was not checked, but implies software interference: “For the life of me I can't remember unchecking it, but there it is”. In a later post (2/11/09), T1, like several other users, shows emotional responses to the software: “I’m scared to death of letting Stupido manhandle my TM’s”, but he finds a way of lessening the perceived risk: “I could copy them first, of course, so that’s what I’ll do, then”.

T1’s experience with the software, as glimpsed here, can be read as the dialectic of resistance and accommodation which is the mangle of practice. He, as the human user, emerges as knowledgeable, well-intentioned and cooperative, obligingly doing everything he is supposed to, while the software and its interface and component parts emerge as

recalcitrant, uncooperative, unreliable and prone to error. Only by T1 carrying out additional actions in the face of each resistance can the interaction progress so that he achieves his aims in practice. The mangling process appears as temporally emergent, i.e. the contours of human or machine agency are not known in advance and cannot be predicted but instead emerge in the course of practice. In this case, T1 does not predict some of the actions of the software as he endeavours to complete his translation task and, the software does not accommodate some of T1's actions.

This insight into the interplay between T1 and the *SDL Studio* software contrasts quite sharply with the experiences of some other users. T2, for example, outlines how T1's behaviour has, in his view, probably caused most of the errors, not the software: "In my experience Studio is as reliable as any other software. No problems so far, when I have no errors on my side" (2/11/09). In his posts about interacting with *Studio*, T2 tends to foreground human agency, seldom attributing any actions, positive or negative, to the software, e.g. "For a simple project […] just open the document, show TM and you're done. And for more complicated projects you can save templates" or "you can update the TM as you work or when you finish" (2/11/09). He instead sees certain actions and questions on the part of T1 as "illogical" (2/11/09) and extols the virtues of taking some time to customize the software setup initially so that it then functions as desired.

T1 recognizes that the conditions in which his interaction takes place are different from T2's and also acknowledges that they help to shape the outcome of his interaction. Thus, for example, he states that he and T2 have "totally different expectations when it concerns professional software" (2/11/09). In addition, in the same post, T1 perceives his own "strong urge to try things" and "scatterbrain" character traits as playing a role. While not verifiable here, it is possible that aspects of T1's projected self-image have emerged, at least in part, through his previous difficulties with TM software; extending this idea further, one could anticipate that this self-image will also influence his future TM experiences.

The reciprocal tuning of human and material agency can itself reconfigure human intentions; this may be observed in T1's eventual decision to return to a previous version of the tool. Although he had initially intended to use the new software, his interaction with the new software results in a return to that more trusted and familiar interaction: "Who would have thought I'd start loving the old work mule again, eh?!" (2/11/09). Another such reconfiguration is seen in the way T1 later embarks on testing alternative software products

and in his eventual abandonment of the new product altogether, judging that "some people are not compatible with some programs" (3/11/09).

Thus, the ontological configurations of T1 may be contrasted with those of T2. Their realities of interacting with the same software product appear to be radically different and these different ontologies are performed in their posts and discussions, in which they fail to reach consensus or agreement. Space restrictions do not permit discussion of T3 and other posters at this point but it is possible to subject those posts to a similar reading. I draw on some of their posts in the section below to address wider issues pertaining to the role of technology in translation.

3.2 Reciprocal tuning of technological and social worlds

The second strand of the mangle-inspired reading of the posts focuses on how the material feeds back upon and alters the social domain (Pickering 2005b). Here we move beyond T1's experience and focus on reciprocal tuning of technological and social worlds of the language services industry.

The language services industry can be seen as the 'surface of emergence' (a Foucauldian term appropriated by Pickering (1995: 21)) for the TM technology, that is to say, the industry provided the conditions for the development of TM and has, in turn, been reconfigured by that development. The SDL company is a good example of this. Now a "world leader in global information management" (SDL 2009), it began as a more modest translation and localisation company and, in the 1990s, developed a TM tool for its own translators to use which was also exploited commercially. By 2005 SDL had acquired Trados, the then market leader in TM and it set about integrating the SDL and the Trados TM tools into a unified product. Thus, the language services industry had initially perceived a need for a tool which would reduce repetition and increase consistency as translation and localisation jobs became ever more complex, but TM and the development of TM tools have now become important parts of the language services industry in their own right. SDL claims that 80% of the world's professional translators are now using their TM software (SDL n.d.). Training in TM is considered an essential or desirable component in most translator training programmes, and TM compilation, maintenance and management now represent areas of activity and employment for linguists. Thus, we can say that the language services industry, out of which TM emerged, has itself been substantially reconfigured by that development of TM. The technological and the social, conceptualized as hanging together and interactively

stabilizing one another, "become parts of a unitary, but heterogeneous, assemblage" (Pickering 2005a: 365) which is the current language services industry.

What of the reciprocal tuning of the social and the technological in the specific case of *SDL Studio 2009*? SDL (2009) claims to have carried out the "most extensive beta program in the industry, with over 1,000 companies and thousands of testers actively participating". The new software is also reported as including "over 100 suggestions submitted through the dedicated site for customer ideas: ideas.sdltrados.com" (ibid.). This gathering of ideas and beta testing in the translation community could be seen as a tuning of the **technological into the social**; the software has been "designed to satisfy the needs of all translation professionals – translators, project managers, reviewers or terminologists" (ibid.). While it is beyond the scope of this paper to investigate the extent to which needs of translators have been explicitly incorporated into the software design, the online forum reveals some translators' perspectives on this matter. T1, on the one hand, believes that the developers "thoroughly lack insight into the mind of the regular user" (2/11/09). T2, by contrast, outlines how he joined in the beta testing of *Studio:* "[b]eing part of the beta test team was my way to contribute to improve the product" (4/11/09).

With reference to SDL's gathering of ideas from users, T3 sees two possible scenarios: (i) SDL does not implement ideas from translators and is perceived by translators as "arrogant" or (ii) SDL implements the most popular ideas and people complain about the software being "over-complicated" (2/11/09). He believes that the software is indeed complex in its range of options but argues that "it's not because SDL wanted *Studio* to be complicated, it's because the users did" (3/11/09). T4 attributes a greater level of responsibility to the company however: "A software company can't just accept 200 ideas, throw them at CAT tool and then, if the result make [sic] everybody confused, step back and say 'not my fault, you asked for it'" (4/11/09). Instead, T4 sees it as SDL's responsibility to select the most desirable functions and implement them in the most user-friendly way. T4 does not claim to know how to do this: "it's not my job, I am a translator. I don't ask SDL engineers how to translate" (4/11/09). For T4, in the dance of agency between software developers and translators, the attempted accommodation of the software to the translators has, in fact, produced resistances for the software users.

Contributions to the forum thread also signal the tuning of the **social into the technological**; T5 asks "what makes so many Trados users so blind about *SDL Studio 2000*" (2/11/09). He describes himself and fellow translators as being " used to finding workarounds

and time-consuming tricks" and as "terrified of changes and very reluctant to try other options" (2/11/09). Here the software is perceived as imperfect but the users adapt to its imperfections, or accommodate those resistances, and would rather live in hope than opt for terrifying technological change. As seen above, the implementation by SDL of various features, whether asked for by translators or not, results in the software performing in ways which are not familiar to translators, not anticipated and not welcomed by them. Translators, faced with this level of complication, adapt their ways of working to those complexities, tuning their practice to the perceived limitations of the technology, or indeed they adapt by abandoning this product and changing to other products.

An additional tuning of the social emerges, perhaps less predictably, in the categorization by translators, of themselves and others, into those who need extensive functionality in a TM and those who do not. The categorization results in a clear – and mutual – distancing of one set (those who work on complex projects and need some of the advanced functionality) from those who 'just translate'. T1 says: "most linguists are by default not very computer-savvy. Are linguists the only ones who know that?" (2/11/09). He then suggests that a "foolproof", "simple and reliable" version of the software is required. T2 argues (2/11/09) that "you don't have to be computer savvy" to use the TM, and T3 also says (2/11/09) he is "no computer guru" but had no problems. At noted above, T2 (2/11/09) introduces into the discussion the idea that you can either just use the basic functions or tailor the software to your own needs. Later (4/11/09) T3 also suggests to T4 that what T4 is looking for is a "Starter Edition, where you simply receive a project, translate it and sent [sic] it to your P[roject] M[anager]. No project creation possibilities, limited settings, etc. etc.". T3 follows that remark by asserting "Well, this wouldn't be enough for me, but may be good enough for you if you don't have any direct clients". Other translators, like T6, also assert their need for software that is usable "in a basic version without having followed a 3 day course" (4/11/09). T6, who describes himself in the same post as "an ignorant technical translator" is given a "very simple solution" by T7 and is told not to use the software (4/11/09): "Nobody can force you to use any particular software application - on the other hand, if those who are capable of using it gain in terms of efficiency, that's your problem. Your call." T8 also finds the software too complicated and asserts that this level of complexity – in his view generated by the software companies and translation agencies because they want to impress their clients – reflects a view of translators as "geeks with zero social life" (6/11/09). For T8, the software will not be practical if it cannot make processes

quicker and simpler – "or they can issue a 'light' version for the translators, and keep the heavy version for the eternal bachelors" (6/11/09). T3 suggests that T8 use other software which will probably "perfectly suit your [T8's] needs" (6/11/09).

These extracts serve to illustrate the split among the users which emerges temporally as they situate their own interaction with TM relative to that of others and relative to the demands placed on them by their employers, agencies and the industry in general. Any commonalities of their translational and professional practice fade into the background as one group struggles to accommodate the resistances of the TM, while the other group's easy accommodation of those resistances renders them less capable of understanding their colleagues' struggle, and less sympathetic to it. This lack of mutual understanding produces antagonistic judgements and differentiated perceptions of translators' abilities, roles and responsibilities, determined by degree of interaction with the technology. Thus, this mangle-inspired reading of the posts gives an insight into the reciprocal tuning of the social and the technical, both in the developmental route of the TM tool and in consideration of how translation technology is being transformed by and is in turn, transforming the language services industry.

4 Methodological challenges of the dance of agency

In this section I would like to examine some of the shortcomings of this mangle-inspired reading of the online forum data but also highlight the value of this conceptualization of translation practice. As noted above, Pickering is interested in real-time understanding of practice, rather than a retrospective approach, or one which bases its understanding of agency solely on accounts written from the perspective of human agency. I argued that posting to the forum is a performative act; however, there is no disputing the fact that the interaction between translator and technology is being accessed solely through an account of that interaction, but one provided by the translator and produced from the perspective of the translator; we have thus moved away from the decentring of the human which is so central to Pickering's model. This indicates something of a mismatch between the conceptual framework and the methodological approach. To describe the reading as 'mangle-inspired' is accurate but I certainly cannot claim for it the status of 'pure mangle'. Some may wish to argue that the flaw is in the conceptualization itself, particularly in relation to the notion of non-human agency. It may therefore be useful to clarify this notion before concluding with some suggestions as to how we might proceed on a different methodological basis.

Pickering's notions of human and non-human agency are often contrasted with those of Giddens (in his structuration theory, e.g. 1986) and Latour (in his actor network theory, e.g. 2005). Proponents of Pickering's approach see some deficiencies in both Gidden's and Latour's ways of handling agency. In particular, structuration theory privileges human agency and does not accommodate material agency, while actor-network theory assumes a certain symmetry between human and non-human agency, not distinguishing between them (for an IS-related discussion, see Jones and Karsten 2008). By contrast, Pickering's focuses more on the interplay between the two agencies, for which no symmetry is assumed. However, as Pickering himself acknowledges, the notion of material agency is not readily accepted by many who see intention as a core component of agency; he conceives of non-human agency as "material powers and performances" (2005a: 359) and does not attribute intention or will to material objects. Orlikowski (2005: 185) suggests that it would then be more helpful to speak of "human agency" and "material performativity". Extending this to the study of translators and TM, we might reformulate our focus as being the intertwining of human agency and technological performativity. Of course numerous other scholars have addressed the question of (human and material) agency and there are also approaches and models which seek to accommodate a greater degree of complexity. Rammert (2008), for example, in his model of distributed agency, offers differentiation of human agency and technological action by their degree, as well as a typology of inter-agency between humans and technology. His aim is to produce a gradual model of agency with levels of causality, contingency and intentionality. Space constraints do not allow me to explore such models in greater depth but it is useful to recognize that a more nuanced notion of material or technological agency than has been presented here might ultimately prove more palatable or more useful to translation scholars. This paper may be seen as a first attempt to consider technological performativity of any kind in the study of translation practice and the translation profession; it is hoped that it will spark interest in further and more sophisticated elaborations of those key notions in due course.

What has emerged from this mangle-inspired reading of the online posts, in my opinion, is that it is possible to think about the interrelation of translation technology and translators in Pickering's terms, by and large, but it is not possible to investigate it adequately in translation practice using the current methodology. Methods are required which facilitate more direct access to the workings of the technology, not merely the translators' accounts of the technology's characteristics. In addition, a more direct access to the workings of the

translator is also required, not merely the translators' accounts of their own actions. It can be concluded that direct observation of the interaction of these two agents cannot be replaced by any stand-alone analysis of translators' written accounts of that interaction, however performative the accounts may be. In order to investigate this interplay as it emerges we must draw on ethnographic methods of inquiry. Direct observation and field notes could be combined with data collected from keystroke logging and/or eye tracking to give a fuller picture of the interaction. Keystroke logging and eye tracking are research methods often employed in the study of translation processes (e.g. in the Eye-to-IT Project (n.d.)), usually to analyze aspects of the cognitive processing of the translator, and usually without focusing explicitly on the emergent interaction of human and technology. In addition, eye-tracking and key-logging methods have mostly been confined to experimental settings; the mangle of practice requires the focus to shift to the translators' place of work and to the performance of routine tasks by translators using their own familiar tools, technology and resources. It should be noted that application of a more appropriate research methodology does not remove the challenge of decentring the human; this observational study of translator—TM interaction would have to resist the temptation to centre its observations on the translator, and the account of what is observed would, by necessity, be much more complex than if it focused on the translator alone.

At the level of the translation industry and community, the discussion above has raised issues which are also worthy of further investigation. While the forum posts point to certain aspects of the socio-technical processes of change in the industry and the community, STS scholars would certainly insist on a more systematic study – at first hand – of the industry and its processes and practices, within this mangle of practice framework. This would enable us to investigate what appear to emerge as trends in the forum data. For example, it might be concluded from the forum posts that a section of the translation community believes in technological determinism, i.e. that technology determines social change, that society is organized to meet the needs of technology, that the technology itself determines how it is used in society. From this standpoint, translation technology – its existence, availability, functionality – would be perceived as dictating how translators carry out their work. By extension, it would also determine, for example, how translators are trained. This technological determinism is illustrated by the forum contributors who indicate that they use technology which they do not find very helpful but feel compelled to continue using it because it exists and they are apprehensive of change, or where they anticipate

changes in the practices of agencies arising from new capabilities of the software. At the other extreme, social determinism – the belief that technology is shaped and determined by the society in which it is embedded – also appears to be in evidence in the forum posts, where translation technology is perceived by some contributors as serving software companies or translation agencies rather than being developed by or in the best interests of translators. It can be argued that both of these deterministic perspectives are detrimental to the translation community, in that they fail to account fully for the challenges and complexities of the integration of technology into the translation process. That is not to say that 'technological somnambulism' (Winner 1997) is to be advocated, i.e. that translators pay no attention to technology and take for granted its existence and use. Rather, the mangle approach to socio-technical change, by considering the tuning as reciprocal – social into technological and technological into social – offers a more realistic perspective which acknowledges the resistances encountered by translators but also recognizes their scope for accommodation. More detailed study of the development and implementation of translation technology would enable us to explore further this dialectic of resistance and accommodation. Greater sensitivity to, and a deeper understanding of socio-technical change in the workplace of the translator could, in turn, inform translator training and help to develop in translators a perspective on technology which is neither deterministic nor somnambulant but emergent and reflective.

In conceptualizing thus the manner in which translators and technology interact both individually and collectively, the researcher faces a not inconsiderable challenge which Pickering (2008a: 13) calls a "gestalt shift in our ontological awareness". The challenge of making this ontological shift is clear, even from this brief encounter with the mangle. Perhaps more modestly, Jensen and Markussen (2008: 156) believe that the mangle "might enable us to become more sensitive and responsive to the possibilities and difficulties of socio-material processes of change". It is hoped that this paper can be read as a tentative first step in achieving that goal, in the context of translation. It has proposed a new conceptualization of translator—TM interaction, giving a sense, through a 'mangle-inspired' reading of online forum posts, of the reciprocal tuning of the social and the technical to interactively stabilize the translation activity, translation product, translation community and translation industry. It has also explored some of the methodological implications and challenges of embarking on research which examines translation practices against this conceptual backdrop. I argue that translation studies could usefully pursue these explorations much further, drawing on the

conceptual and methodological tools offered by the neighbouring disciplines of science and technology studies and sociology of science, in what would, of course, be yet another dance of agency.

References

Alcina, Amparo. 2008. Translation technologies: scope, tools and resources. *Target* 20, no. 1: 79-102.

Alves, Fabio and Tânia Liparini Campos. 2009. Translation technology in time: investigating the impact of translation memory systems and time pressure on types of internal and external support. In *Behind the mind: methods, models and results in translation process research*, eds. Susanne Göpferich, Arnt Lykke Jakobsen and Inger M. Mees, 191-218. Copenhagen: Samfundslitteratur Press.

Austermühl, Frank. 2001. *Electronic tools for translators*. Manchester: St Jerome Publishing.

Baird, David. 1999. Internal history and the philosophy of the experiment. *Perspectives on Science* 7, no. 3: 383-407.

Baker, Mona. 2006. *Translation and conflict. A narrative account*. London and New York: Routledge.

Boéri, Julie. 2008. A narrative account of the Babels vs. Naumann controversy, *The Translator* 14, no. 1: 21-50.

Bowker, Lynne. 2005. Productivity vs quality? A pilot study on the impact of translation memory systems. *Localisation Focus* 4, no. 1: 13-20.

------. 2007. Translation memory and 'text'. In *lexicography, terminology, and translation. Text-based studies in honour of ingrid meyer*, ed. Lynne Bowker, 175-187. Ottawa: University of Ottawa Press.

Chae, Bongsug and Marshall Scott Poole. 2005. The surface of emergence in systems development: agency, institutions, and large-scale information systems. *European Journal of Information Systems* 14, no. 1: 19-36.

Dillon, Sarah and Janet Fraser. 2006. Translators and TM: an investigation of translators' perceptions of translation memory adoption. *Machine Translation* 20, no. 2: 67-79.

Doherty, Neil F. and Malcolm King. 2005. From technical to socio-technical change: tackling the human and organizational aspects of systems development projects. *European Journal of Information Systems* 14, no. 1: 1-5.

Eye-to-IT Project. N.d. Eye-to-IT: project summary. Online at: http://cogs.nbu.bg/eye-to-it/

(accessed 20/01/10).

Fulford, Heather. 2001. Translation tools: an exploratory study of their adoption by UK freelance translators. *Machine Translation* 16, no. 4: 219-32.

Fulford, Heather and Joaquin Granell-Zafra. 2005. Translation and technology: a study of UK freelance translators. *JoSTrans - The Journal of Specialised Translation* 4. Online at: http://www.jostrans.org/issue04/art_fulford_zafra.php (accessed 18/01/10).

Giddens, Anthony. 1986. *The constitution of society. Outline of the theory of structuration*. Berkeley, CA: University of California Press.

Inghilleri, Moira. 2007. National sovereignty versus universal rights: interpreting justice in a global context. *Social Semiotics* 17(2): 195-212.

Jensen, Casper Bruun and Randi Markussen. 2008. Mårup church and the politics of hybridization: on choice and becoming. In T*he mangle in practice. Science, society and becoming*, eds. Andrew Pickering and Keith Guzik, 129-59. Durham, NC: Duke University Press.

Jones, Matthew. 1999. Information systems and the double mangle: steering a course between the scylla of embedded structure and the charybdis of strong symmetry. In I*nformation systems. Current issues and future changes*, eds. Tor Jermud Larsen, Linda Levine and Janice I. deGross, 287-302. Laxenburg: International Federation for Information Processing.

Jones, Matthew R. and Helena Karsten. 2008. Giddens's structuration theory and informaton systems research. *MIS Quarterly* 32, no. 1: 127-57.

Kenny, Dorothy. 1999. Cat tools in an academic environment: what are they good for? *Target* 11, no. 1: 65-82.

Kinnunen, Tuija and Kaisa Koskinen. Eds. 2010. *Translators' agency*. Tampere: Tampere University Press.

Lagoudaki, Elina. 2006. *Translation memory systems. Enlightening users' perspective.* London: Imperial College London.

Latour, Bruno. 2005. *Reassembling the social. An introduction to actor-network-theory.* Oxford: Oxford University Press.

Law, John. 2002. *Aircraft stories. Decentering the object in technoscience*. Durham, NC: Duke University Press.

Marick, Brian. 2008. A manglish way of working: Agile software development. In *The mangle in practice. Science, society and becoming*, eds. Andrew Pickering and Keith

Guzik, 185-201. Durham, NC: Duke University Press.

Milton, John and Paul Bandia. Eds. 2009. *Agents of translation.* Amsterdam and Philadelphia: John Benjamins.

O'Brien, Sharon. 2006. Eye tracking and translation memory matches. *Perspectives: Studies in Translatology* 14, no. 3: 185-205.

Orlikowski, Wanda J. 2005. Material works: exploring the situated entanglement of technological performativity and human agency', *Scandinavian Journal of Information Systems* 17, no. 1: 183-86.

Pickering, Andrew. Ed. 1992. *Science as practice and culture*. Chicago: University of Chicago Press.

Pickering, Andrew. 1993. The mangle of practice: agency and emergence in the sociology of science. *The American Journal of Sociology* 99, no. 3: 559-89.

------. 1995. *The mangle of practice. Time, agency, and science.* Chicago: University of Chicago Press.

------. 2005a. Decentering sociology: synthetic dyes and social theory. *Perspectives on Science* 13, no. 3: 352-405.

------. 2005b. From dyes to Iraq: a reply to Jonathan Harwood. *Perspectives on Science* 13, no. 3: 416-425.

------. 2008a. New ontologies. In *The mangle in practice. Science, society and becoming,* eds. Andrew Pickering and Keith Guzik, 1-14. Durham, NC: Duke University Press.

------. 2008b. Preface. In *The mangle in practice. Science, society and becoming,* eds Andrew Pickering and Keith Guzik, vii-xiv. Durham, NC: Duke University Press

Rammert, Werner. 2008. Where the action is: distributed agency between humans, machines, and programs. In *Paradoxes of interactivity: perspectives for media theory, human-computer interaction, and artistic investigations,* eds. Uwe Seifert, Jin Hyun Kim and Anthony Moore, 62-91. Bielefeld: Transcript.

Rose, Jeremy and Matthew Jones. 2005. The double dance of agency: a socio-theoretic account of how machines and humans interact. *Systems, Signs & Action* 1, no. 1: 19-37.

Rose, Jeremy, Matthew Jones and Duane Truex. 2005. Socio-theoretic accounts of IS: the problems of agency. *Scandinavian Journal of Information Systems* 17, no. 1: 133-152.

Scheid, Volker. 2008. The mangle of practice and the practice of Chinese medicine: a case study from nineteenth-century China. In *The mangle in practice. Science, society and*

becoming, eds Andrew Pickering and Keith Guzik, 110-28. Durham, NC: Duke University Press.

SDL. N.d. SDL is on a mission... Online at: http://www.sdl.com/en/company/company/business-climate.asp (accessed 5/03/10).

------. 2009. SDL Trados Studio 2009: let the translation technology revolution begin. Online at: http://www.sdl.com/en/events/news-PR/2009/sdl-trados-studio-2009-let-the-translation-technology-revolution-begin.asp (accessed 5/03/10).

Singh, Vandana and Michael B. Twidale. 2008. The confusion of crowds: non-dyadic help interactions. In *Proceedings of the ACM 2008 conference on computer supported cooperative work*, 699-702. New York: Association for Computing Machinery.

Winner, Langdon. 1997. Technologies as forms of life. In *Technology and values*, eds Kristin Shrader-Frechette and Laura Westra, 55-70. Lanham, ML: Rowman and Littlefield.

Wolf, Michaela and Alexandra Fukari. Eds. 2007. *Constructing a sociology of translation*. Amsterdam and Philadelphia: John Benjamins.