＜博士学位論文要旨＞ **JAITS**

論文題目: Revising Text: An empirical investigation of revision and the effects of integrating a TM and MT system into the translation process

（和文タイトル: 修正する翻訳：翻訳プロセスにおける修正行為と、翻訳メモリおよび機械翻訳システムの使用が及ぼす翻訳プロセスへの影響に関する実証研究）

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学位取得の方法：課程
取得年月日：2012 年 3 月 31 日

Abstract

Recent IT development has brought a great deal of change into intercultural and interlingual communication, resulting in many new forms of translation activities that diverge from those of conventional translation. In the current GILT (Globalization, Internationalization, Localization, and Translation) industry, the volume of text to be translated keeps rising, and translators are under pressure to meet restricted costs and tight delivery times. To maximize efficiency, many translators and translator-users have turned to computer-assisted translation technologies such as translation memory (TM) and machine translation (MT).

When TM systems are used, the act of translation is focused on 'revising the existing translation.' Current machine translation also normally requires human editing of machine-generated target texts, so-called 'post-editing.' Consequently, the role of translators steadily moves away from 'translating' the source text from scratch to 'editing' TM matches or machine translation. Hence, the translation process is changed into a series of revision-like operations where revising activities (combinations of other-revision/self-revision) are emphasized, while the traditional activity of translating from scratch is minimized.

This shift in emphasis brought about by the use of technology is the main focus of this study which aims more specifically to investigate the revision processes of translators with different expertise levels on the one hand, and the way in which TM and MT systems influence translator behaviors on the other. To this end, the primary research questions have been set as: 1) How differently do translators with different expertise levels translate (revise) text? and 2) How does the

YAMADA Masaru, "Revising text: An empirical investigation of revision and the effects of integrating a TM and MT system into the translation process," *Interpreting and Translation Studies,* No.13, 2013. pages 161-164.

integration of TM and MT systems affect the translation (revision) process?

The research questions are evaluated through a series of experiments, in which five professional translators and eighteen students are tasked with translating short texts under different conditions. This study endeavors partly to make observations on the translation processes of translators under natural settings, and partly to assess the effects of integrating TM and MT systems. The twofold aim of the study is reflected in its experiment design, by which data are collected partly by a screen recording software program, partly in Trados Translator's Workbench, a TM system, and partly in Google Translate/Translator Tool Kit, a statistical machine translation system.

A comparative analysis will be carried out to identify the differences between professionals and students. In the analysis of the data from Trados Workbench, it will consider how the translation process will be shaped into a revision-focused activity. The experiments also concerns MT settings, where translators will perform post-editing of a 'quasi-text' that is generated by a statistical machine translation.

Apart from the detailed outcomes, the overall results indicate the following. The first research question as to how differently professional and student translators translate in an ordinary translating setting (human translation setting = HT setting) has been tested through a series of experiments looking at the variables of time and amount of 'revision' activity which in part define text production styles in translation. The results of revision time occupation under the HT condition showed that the students spent proportionally more time on revision than the professionals (44% vs. 24%). The overall GTM score (General Text Matcher, one of the automatic evaluation metrics that can measure in-between textual similarities = actual revision amount) in the professional group was 0.938, which exceeded the average score of the students, 0.771. By comparison, the professionals on average introduced far fewer modifications (smaller textual changes) than the students under the HT setting. The experiments found that the students in the HT setting were more revision-oriented translators than the professionals.

Then the study proceeded to its main interest of uncovering how the integration of a translation memory system would affect these baseline features of the revision process. When a TM was used, revision activity was generally reduced. The time spent on revision was reduced in both groups. The professional group spent on average 12.8% of their total translation time on the revision stage, which shows an almost 50% reduction from the HT case. The results for student translators are similar, dropping from 44% in the HT case to 19% in the TM case—an almost 50% reduction. The number of actual revisions also dropped with the reduction in revision. Both professional and student groups recorded a GTM score of over 0.95. Unsurprisingly, the overall results were in line with those of prior studies; its time allotment dropped by almost half, and the actual revision amount (textual modifications) was reduced as well.

It is worth noting, however, that the actual revision amount in the professional group in this

experiment did not show a significant decrease between the HT and TM cases. In other words, while the students underwent a more drastic shift in translation style from being revision-centered (HT) to very draft-oriented (TM), the professionals kept their original 'draft-oriented' style consistent through changes of environment. On the surface, it can be concluded from this observation that the integration of a translation memory reduces students' revision activity, but does not alter professionals' production style.

However, it was also found that the professionals' baseline translation speed (in the HT) was still faster than the speed of the students using a TM, and that they even achieved the same rate of productivity gain as the students. Therefore, one may speculate that those professionals seemed to have acquired an optimal way to maximize efficiency while working with a TM. That is to say, professionals who are highly experienced in the localization industry and translation-aided technology have stabilized their production style across all translating conditions by adjusting to TM-constrained environments. Over the 20 years since the advent of translation memory systems and experience in the localization industry, professional translators have been trained to be draft-oriented translators. This production style maximizes both adaptability to the TM/MT environment and compliance to the localization context. By condensing their text production work in the drafting phase, these translators minimize their revision work, leaving it for the independent post step of other team members, such as dedicated quality reviewers, who are working on the same localization project.

A next possible change that will exercise an influence on the draft phase in the translation process will be brought by machine translation (MT) or, to be more precise, MT plus post-editing. Indeed, when MT post-editing is implemented as a translation assistance strategy, human translators are aided with proposed 'quasi-texts' that are generated by the MT. This new form of translating activity will in turn bring up a question that concerns the acceptance of machine-translated texts, and how much human effort is necessary to improve such imperfect texts. If the quality of the raw MT output is high enough, the amount of revision effort will in theory be reduced, and vice versa. Sometimes, though, it is easier to translate the source from scratch than to edit the MT output. For translators, therefore, to revise the MT output or not will be the question.

This question of acceptance of MT output has been evaluated in this study in terms of productivity gain and compared to the threshold point at which the raw MT output will (not) support increased translation speeds, as seen in the TM operation. Translation technology is normally used in the IT localization field where productivity and efficiency are highly valued; thus, the analysis of the acceptance of MT post-editing was carried out based on these values.

The present research has found that translators seem to prefer modifying the MT output, rather than translating the source text from the beginning, if the quality of the MT output has a GTM score of 0.464 or higher, the same level of effort that is required for modifying TM below-70% matches. It

was found that revising MT-generated texts with a GTM above 0.483 results in translators having a more relaxed cognitive load as well as faster translation speed. In simulating a real-life professional setting in the case of English-Japanese translation, however, the mean GTM score the current statistical machine translation (SMT) can render is approximately 0.353. With the score being below the assumed threshold, the professional translators in the experiment did not feel it advantageous to switch their production style to its MT post-editing mode. From these results, it was established that MT post-editing of English-Japanese translations has not yet reached the point at which professional translators can experience ease of task and achieve faster speeds.

However, the localization of certain text types is steadily approaching practical use. SMT has raised the quality of translation very rapidly with its fast-growing corpora size. The size of aligned (comparable) corpora has been increasing daily through the Internet and networked translation memory. At its current rate of increase, the SMT can reach the threshold point of GTM 0.464 from its current level of GTM 0.353 within two to three years.

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