Where and for how long do translators look at the screen while translating?

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Abstract

Eye movements were tracked of students, with and without touch-typing skills, while they translated three short texts of different levels of complexity under three different time constraints. The aim was to chart the distribution of visual attention between source and target texts, and to study how visual attention was affected by text complexity and time pressure. Participants with touch-typing skills were found to attend more to on-screen text than those without. Further it was shown that time pressure affected fixation duration on the source text, while text complexity affected the number of fixations on the source text. Also, touch typists made more direct, on-screen transitions from the source text to the target text and back than non-touch typists. Overall, average fixation duration was consistently longer in the target text area than in the source text area.

1. Introduction

Eye tracking is only just starting to be applied to translation research, but promises to yield much new insight. Our exploratory and essentially naturalistic experiment was designed to study the effects of time pressure and text complexity – separately and in combination – on the fixations of a number of translators drawn from a group of subjects with supposedly comparable translation skills. It was hypothesised that touch typists would have an advantage over less skilled typists in that they would be able to devote more constant visual attention to text on the screen. As a result of this, it was expected that skilled typists might be less affected by the combination of increasing time pressure and text complexity than students who were less skilled, but we were uncertain to what extent this would emerge from their gaze behaviour. Our main interest was to see how visual attention would be distributed and managed under constraints that are part of many translators' everyday experience.

After the background to our study (section 2), we outline our research design and the technological apparatus used to collect the data (section 3). In section 4 the results and statistical analyses are presented, interspersed with comments mainly on observational and methodological issues. In our discussion and conclusion in sections 5 and 6, we comment on our interpretation of the data and on how the findings add to our knowledge about translators' visual behaviour. In the conclusion the main results are summarised and ways are suggested in which this exploratory study could be followed up by further studies.

2. Background

Eye tracking, when studied in connection with reading, has generally been applied to reading of individual words, sentences or texts (Rayner & Pollatsek 1989, Rayner 1998, Radach *et al.* 2004). Research has on the whole focussed on individual words or sentences or on a single text. (Hyönä *et al.* 2003 is a notable exception.) In the case of on-screen translation, the translator's visual attention is constantly shifted between two texts, a source text and the translator's emerging target text. This is equally true of touch-typist and non-touch typist translators. The possibility of tracking the translator's gaze pattern across the source and target texts has opened up an exciting new research field, which can draw on existing reading research up to a point but needs to develop its own body of knowledge in view of the specific constraints that apply to translation. Similarly, there is a need to build new knowledge about the way in which emerging written text is monitored visually. Knowledge of this kind is critically important for constructing translation support tools based on gaze information.

Text complexity has frequently been shown to affect the cognitive effort of readers and translators, the speed with which meaning is constructed and represented, and the experience of time pressure (e.g. Davison & Green 1988, Shreve & Diamond 1997). The eye-mind assumption launched by Just & Carpenter (1978, 1980) led us to assume that these effects would be reflected in translators' eye movements.

While the effect of time pressure on simultaneous interpreters has long been studied, little research has been done on the effect of time pressure on translators working in the written modality. Jensen (1999, 2000) found that increasing time pressure caused translators to shorten the time spent on initial orientation and to abandon end revision rather than change the pace of translation drafting. She also found that time pressure resulted in degradation both with respect to the manner of text production and the choice of translation strategies for all of her groups of experimental subjects (professional translators, professionals (but non-translators), and translation novices). In similar experiments, de Rooze (2003) found that the quality of his subjects' translations deteriorated when they had to translate more than 200 words per 10 minutes. Surprisingly, the quality of translation was higher for 25% of his participants when translating under time pressure. Martin (2006) demonstrated similar time pressure effects. The studies by Jensen, Martin and de Rooze were all based on keystroke logging, which captures the time course of translation output and is well suited for studying degradation effects on output. However, this was not the aim of our study, which focussed on tracking translators' gaze behaviour as a means of giving us insight both into the mental effort that goes into comprehending a source text (the translation input) and into how a translation is produced.

3. Method

3.1 Participants

Twenty-one participants took part in the experiment (6 males and 15 females). All were second-year students (or higher) at the University of Tampere studying English translation as their major or minor subject. Participants were asked to produce translations that were as good as possible within the given time limit.

3.2 Apparatus

A Tobii 1750 remote eye-tracking device was used to track the users' gaze on its integrated 17 inch TFT colour monitor (with 1024 x 768 pixels' resolution). The experiment was recorded with ClearView and Translog. For the present report only ClearView data were analysed. The combined heat maps showing the areas in the source text that received most visual attention, in terms of overall fixation duration, were produced by means of the iComponent tool (Špakov 2008).

3.3 Procedure and design

First, participants were informed about the test procedure; subsequently, the eye tracker was calibrated for the participants' eyes. The distance between monitor and participant was 50 to 60 cm. No head support, chin rest or bite bar was used.

Each participant then translated three short texts with different complexity levels – one easy and two more difficult – from English into Finnish. Text 2 was judged to be more complex because it had more low-frequency lexical items than Text 1 and because it posed several lexical challenges to translation into Finnish. The higher complexity of Text 3 over Text 1 derived from its greater structural complexity as a result of anaphoric expressions and appositions, and the contrastive structural problems facing a Finnish translator. Each of the three texts was about 70 words in length.[1]

The experiment began with a warm-up copying task of a text, also about 70 words long. The time frame for the translation of each text was 6, 5 and 4 minutes. The sequence of time was constant for each participant, but the sequence of texts was different. Texts were presented in the order T1-T3-T2, T3-T2-T1 and T2-T1-T3, where T1 was the easy text and T2 and T3 the more difficult texts. Flesch-Kincaid reading scores for the texts were 57, 24 and 33, respectively. (On this scale, higher scores indicate that the passage is easier to read while lower scores designate more difficult passages.) Grade-level readability scores also showed a clear distinction between Text 1 on the one hand (11.5) and Texts 2 and 3 on the other (18.3

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[1] The exact number of words were 75 (T1), 67 (T2), and 73 (T3), with 4.88, 5.70, and 5.33 characters per word on average. The percentage of words with very high frequency (K1 words) was 79, 79, and 75, respectively, while the percentage of less frequent words (K2-K20) was 19, 21, and 22. Full texts in Appendix A.

and 14.8). (On this scale, higher scores indicate increased difficulty.) As far as translational difficulty is concerned, our experience told us that T1 would be a good deal easier than T2 and T3.

Each text was translated seven times under all three time constraints. During the experiment, text appeared in the upper (source-text) half of the screen and participants wrote their translation in the lower (target-text) half of the screen (Figure 1).

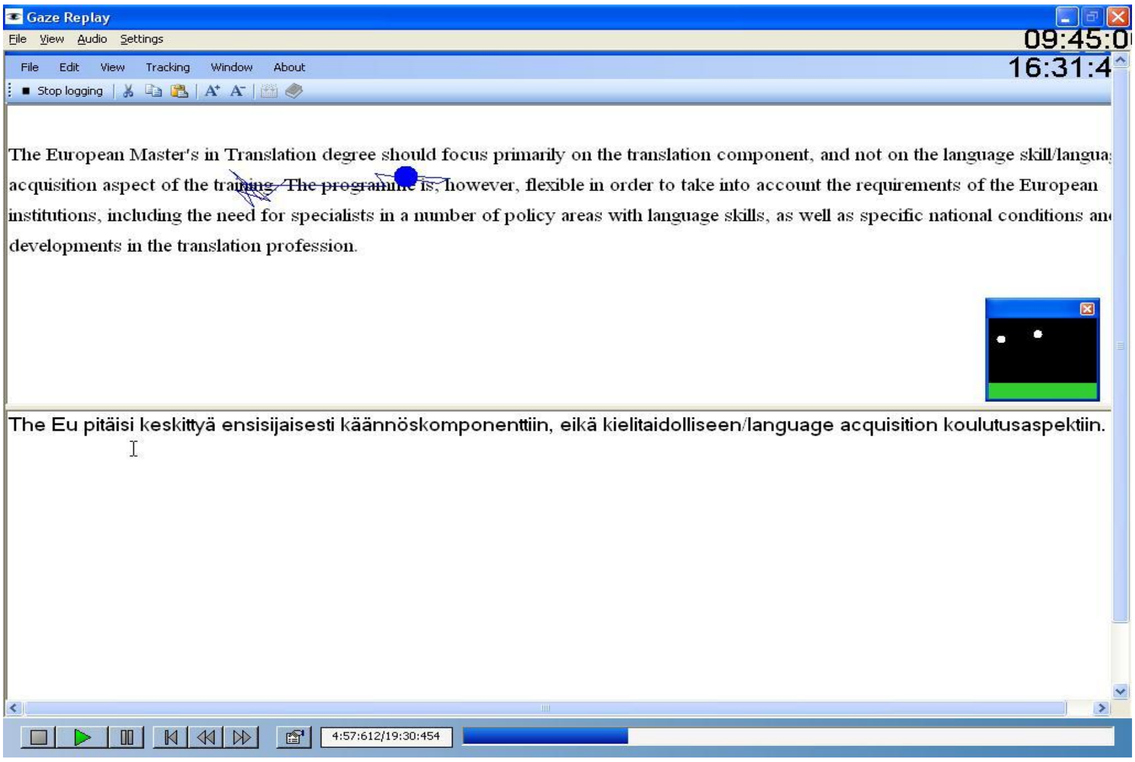

Figure 1. Source and target text screens (ClearView Gaze Replay)

After translating, all participants filled in a background questionnaire. In addition, they were subjected to a language level test (DIALANG) to ensure that they were at more or less the same level (C1) of proficiency in English. The whole experimental procedure took about an hour. The total time to translate the texts for each participant was 15 minutes.

4. Results

Data from 18 participants were used for analysis (7 touch typists, 11 non-touch typists; 3 male, 15 female). Data from the remaining three participants were discarded owing to poor eye-tracking quality. Our 18 participants were distributed across three groups, each consisting of six participants, who translated the three texts in the same sequential order (groupwise) and under the same time conditions (groupwise), but with unequal numbers of touch typists and non-touch typists in the groups. Our main interest was to see how fixation duration and the fixation count (our dependent variables) would co-vary with time pressure, text complexity and typing skill (our independent variables). We analysed participants' visual attention to the source and target text areas separately, and also the participants' eye movements on (and off) the screen, in order to correlate our findings with typing skill. For this analysis, normalised fixation counts and transition counts were used.

The statistical analysis of test data involved paired samples *t*-test, independent samples *t*-test, one-way ANOVA and repeated measures ANOVA.

4.1 Participants' behaviour during translation

An observational analysis of the recorded data was conducted to study the participants' gaze behaviour during translation. This was done by watching the gaze replay of each participant in ClearView. Though participants had been selected from a well-defined population of translation students, their behaviour in the translation tasks showed little consistency. Six participants read all three texts before embarking on the translation. Two participants read two texts, but not the third, and two participants read only one. The remaining eight participants either read (and translated) the source text sentence by sentence or in smaller segments. During translation, all participants read or re-read the source text segment by segment whether or not they had previously read the whole paragraph or sentence.

After completing the translation, most participants undertook some revision of their target text, correcting it where necessary. Sometimes they read the whole sentence from the source text and compared it with the translated text; sometimes this process was performed on smaller chunks. Some participants fine-tuned their translation by reading their own text only.

Often participants made corrections while drafting their translation even if such revision might jeopardise their ability to finish the translation in time. Nine participants completed all the tasks within the set time frame; four were only able to finish two tasks; and five only one. All participants were able to finish Text 1 in time under all time constraints, but only ten were able to finish their translation of Texts 2 and 3 in time. One participant did not finish Text 2 within 6 minutes. Three failed to complete either Text 2 or 3 within 5 minutes, and six failed to complete either Text 2 or 3 within 4 minutes. Texts 2 and 3 were both left unfinished in 5 instances and therefore appeared to be equally difficult to participants. Participants who were able to perform their translation quickly enough to leave them time for revision did not always spend the remaining time revising, but just looked randomly at or off the screen. No correlation was found between completion and typing skill. Touch typists left six translations unfinished; non-touch typists only four.

4.2 Difference in visual screen attention between touch typists and non-touch typists

Based on their observed typing skills, participants were divided into two groups, touch typists and non-touch typists. The group of touch typists consisted of seven participants, the other of eleven. Figure 2 shows the distribution of total viewing time on the screen (both halves) during translation by all the participants.

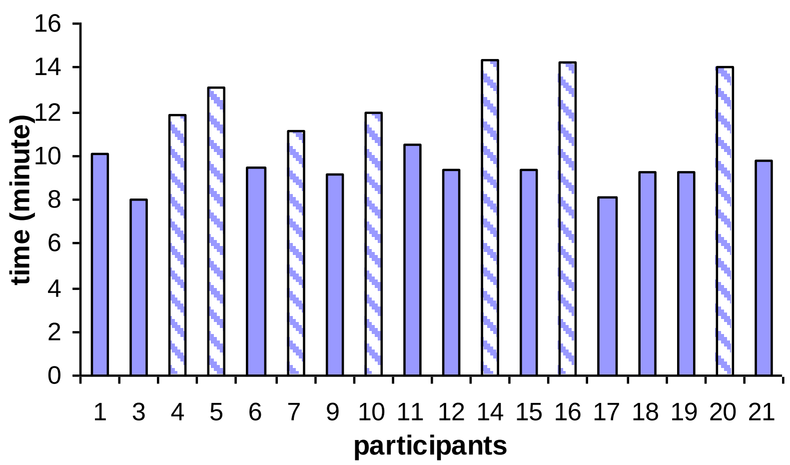

Figure 2. Distribution of total time spent on the screen by all the participants. The striped bars represent touch typists while the solid bars indicate non-touch typists

The total on-screen viewing time for the group of touch typists averaged 12.94 minutes and (as expected) was higher than that of non-touch typists, which was 9.29 minutes (Figure 2). The difference is highly significant with $p < .0001$, $t = 7.56$, $df = 16$. It is likely that the group of non-touch typists did not spend as much time looking at the keyboard and therefore were able to devote more visual attention to the screen.

The average fixation count on both the target and source screens for all the tasks (and normalised per person per minute) was higher for touch typists than for non-touch typists.

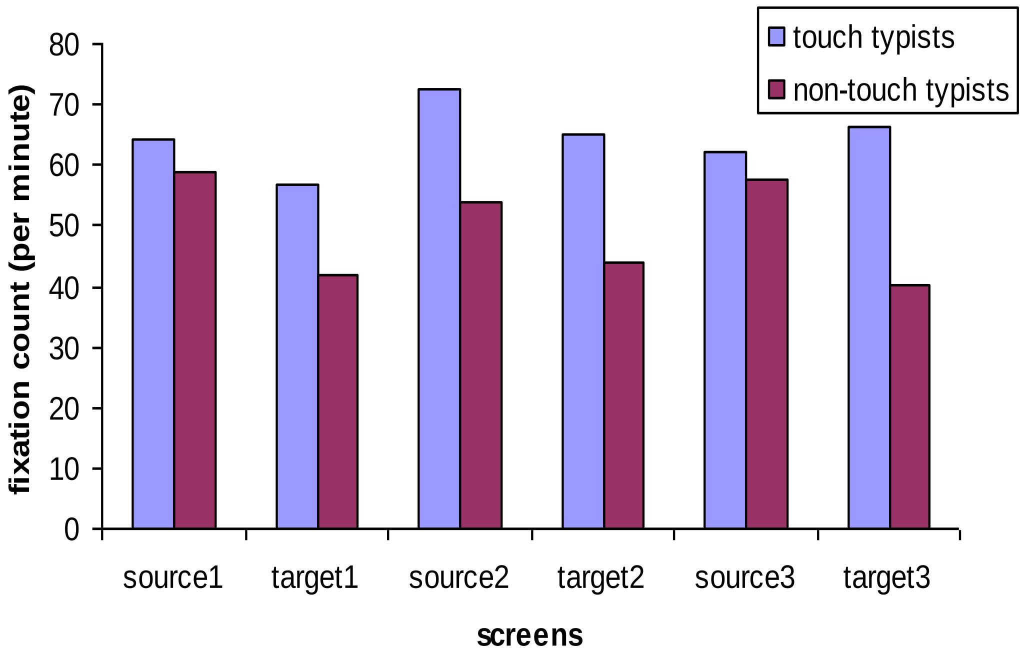

Figure 3. Average number of fixations per minute by touch and non-touch typists on Texts 1, 2 and 3 (separately for source and target areas).

This is not surprising considering their longer overall on-screen gaze time. According to the independent samples *t*-test, the difference was significant for the target screen (with $p < .01$, $t = 3.424$, $df = 16$), but not for the source screen.

With respect to the average duration of fixations on both halves of the screen (Figure 4), a paired samples *t*-test showed that touch typists had significantly lower average fixation durations than non-touch typists (with $p < 0.05$, $t = -3.732$, $df = 5$). The difference for the target screen was close to being statistically significant, with $p = .06$, $t = -1.997$, $df = 16$.

This could give touch typists a double advantage over non-touch typists. They have more overall on-screen gaze time available, and –

perhaps because this allows to be more focussed on the screen – their fixations can be shorter.

Typing skill, therefore, was significantly correlated both with the duration of fixations and with the fixation count during translation.

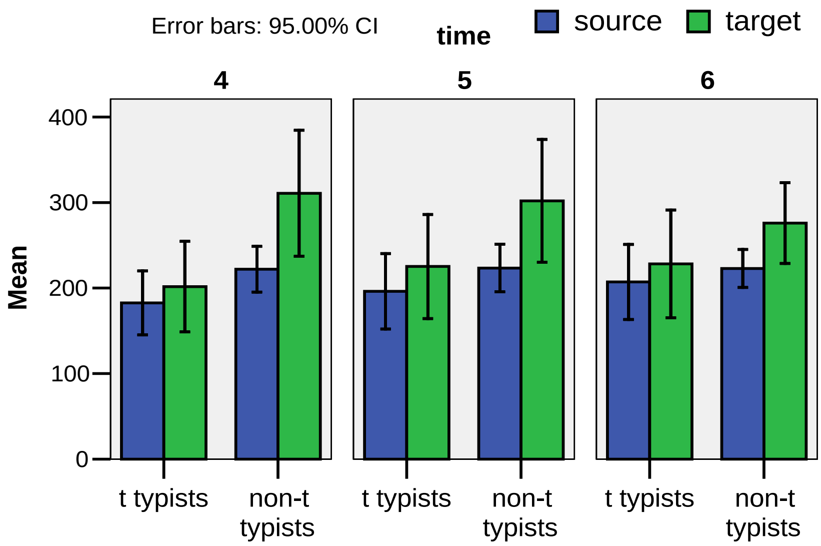

Figure 4. Average fixation duration on source and target areas under different time constraints by touch and non-touch typists. The average fixation duration of non-touch typists on the screen was 260 milliseconds (ms); for touch typists it was 207 ms.

4.3 Difference in transitions by group

4.3.1 Transitions by touch and non-touch typists between source and target screens

According to independent-samples *t*-test, touch typists had significantly more transitions per minute from source to target screen than non-touch typists in all the tasks (with $p < 0.01$ and $df = 16$). For 6, 5 and 4 minute tasks the test statistics values were $t = 3.252$, $t = 3.189$ and $t = 3.699$, respectively.

Touch typists also made more transitions per minute from the target to the source screen than non-touch typists in all the tasks. According to independent-samples *t*-test the results are significant with $p < 0.01$ and $df = 16$. Test statistical values for 6, 5 and 4 minute tasks were $t = 3.423$, $t = 3.428$, and $t = 3.722$, respectively.

When averaging all the tasks (Figure 5), we found the same trend for results in both transitional directions. The independent-samples *t*-test showed that touch typists had significantly more transitions per minute than non-touch typists in both the directions S-T ($t = 3.711$, $df = 16$, $p < 0.01$) and T-S ($t = 3.888$, $df = 16$, $p < 0.01$).

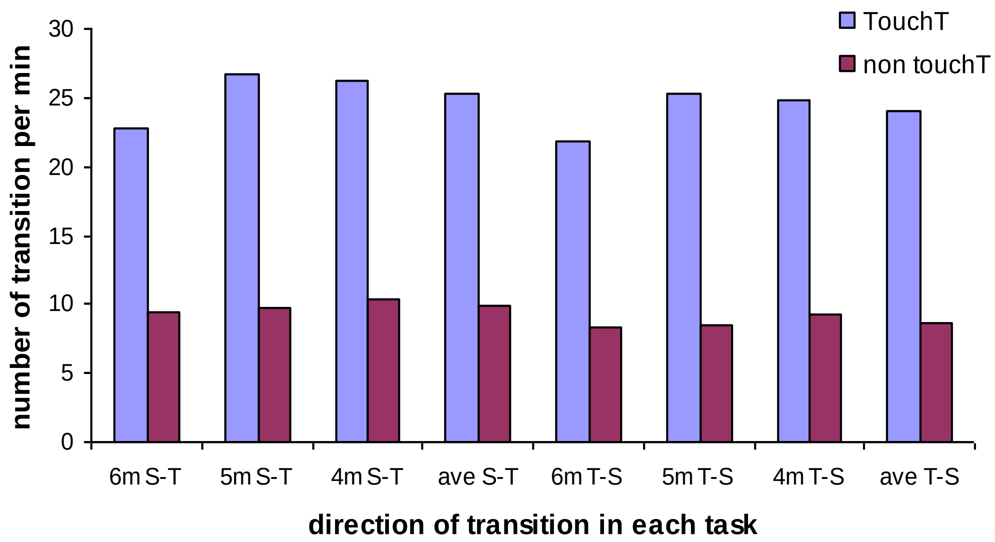

Figure 5. Number of transitions by touch and non-touch typists between source and target screens (both directions) under three time conditions.

4.3.2 Transitions with off-screen intervals by touch and non-touch typists

Transitions involving off-screen intervals for a minimum of 500 ms were counted. There was no upper threshold. Four directions of transitions were taken into account: S-O-S, S-O-T, T-O-S, and T-O-T, where 'S' stands for source screen, 'T' for target screen and 'O' for outside the screen. Thus S-O-S means a transition of the gaze that travels from the source text area to outside the screen and then returns to the source text screen again.

The count of transitions with off-screen intervals showed that non-touch typists made many more transitions than touch typists, in all four directions. According to the independent samples *t*-test, the differences were significant in the 6-minute task for directions S-O-S ($t = -2.720$, $df = 16$, $p < 0.05$) and T-O-S ($t = -3.354$, $df = 16$, $p < 0.01$); in the 5-minute task for directions S-O-S ($t = -2.151$, $df = 16$, $p < 0.05$) and T-O-T ($t = -2.769$, $df = 16$, $p < 0.05$); and in the 4-minute task for directions S-O-S ($t = -2.895$, $df = 16$, $p < 0.05$), TOS ($t = -2.639$, $df = 16$, $p < 0.05$) and TOT ($t = -2.253$, $df = 16$, $p < 0.05$).

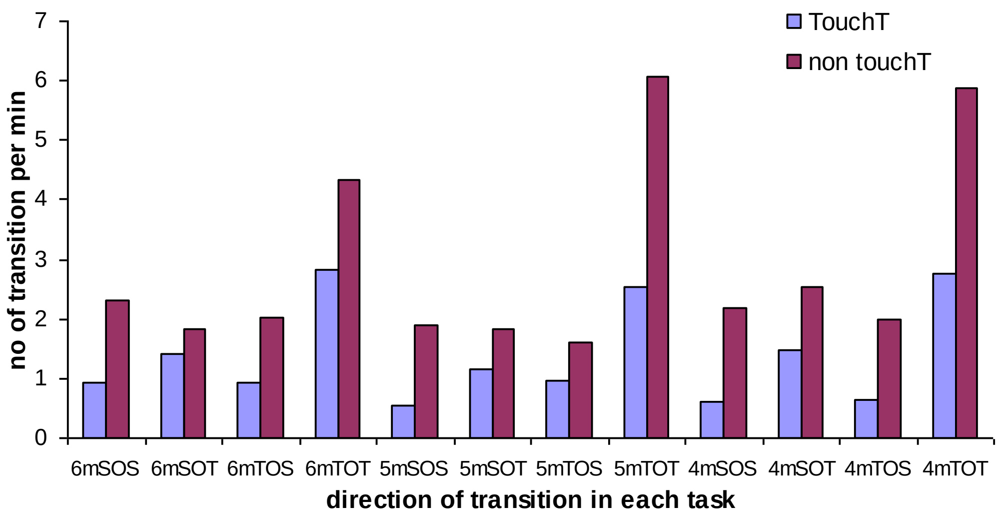

Figure 6. Number of transitions between text areas with off-screen intervals by touch and non-touch typists under three time conditions.

In all the directions of transitions, the off-screen duration per minute was higher for non-touch typists than for touch typists. One way ANOVA found that the differences were significant for all four directions: S-O-S ($F_{1,16} = 7.757$, $p < 0.05$), S-O-T ($F_{1,16} = 17.044$, $p < 0.01$), T-O-S ($F_{1,16} = 8.334$, $p < 0.05$), and T-O-T ($F_{1,16} = 17.994$, $p < 0.01$) (Figure 7).

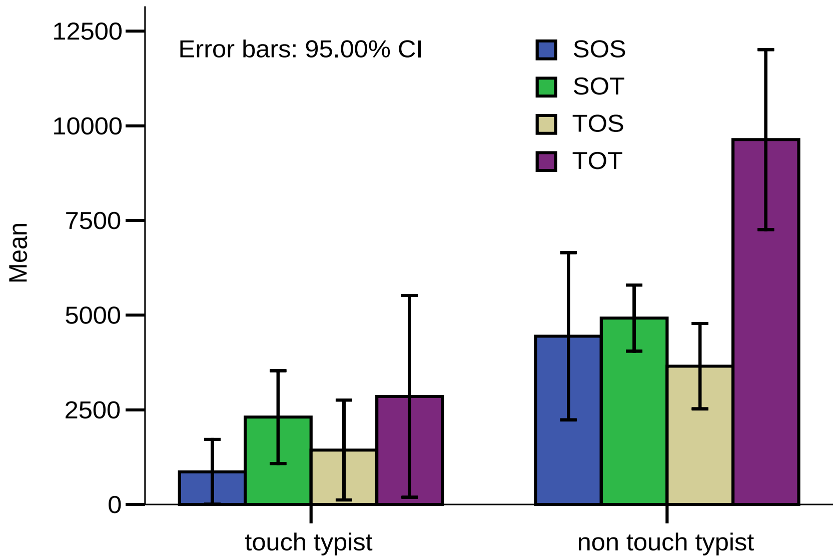

Figure 7. Total duration in ms per minute of transitions with off-screen intervals for all the tasks by touch and non-touch typists.

The obvious main reason why non-touch typists spent more time outside the screen was that their gaze travelled more frequently to the keyboard.

A paired samples *t*-test found that the total duration of transitions per minute for all the tasks in the direction S-O-S was significantly lower (t = - 3.117, df = 17, $p < .01$) than that in the direction T-O-T. We do not have observational data to help explain why this was the case, but it is probable that the O's in S-O-S's were instances when participants' gaze went off-screen to allow the person to think about a word, and that the O's in T-O-T's were intervals of visual attention to the keyboard.

The total duration of transitions in the direction S-O-T was found to be significantly higher than in the direction T-O-S, t = 2.242, df = 17, $p <$ .05. Evidently, the distance (in time) the eyes travelled after leaving the source text screen until they returned to the target text was longer than the distance covered in the opposite direction. This makes good sense, intuitively, since – as hinted above – many participants would have gone from reading the source text (S) to looking at the keyboard while typing the translation (O), and then looking at what they had typed on the screen (T). After monitoring their typing, participants either returned to reading the source text directly (T-S) or, occasionally only, looked at the keyboard before returning to the source text (T-O-S).

4.4 Effect of time pressure

Figure 8 presents the average viewing time per minute on the screen during each task under different time-pressure constraints. Though the time pressure was different for each task, the viewing time per minute (for all participants) was almost the same.

Figure 8. Viewing time per minute on the screen for each task

Analysis of the data from all 18 participants did not yield statistically significant results (t = 1.874, df = 17 and p = 0.078.). On closer inspection, it turned out that one participant's viewing time deviated radically from that of the other 17. When this person was removed, and the viewing time for the remaining 17 participants was recalculated, the average duration of fixations on the source text decreased significantly under time pressure. Paired samples *t*-test found that the average fixation duration during the six-minute task (216.8) was significantly higher than for the four-minute task (203.5) with $p < 0.01$, $t = 2.908$, and $df = 16$.

Time pressure was not found to affect the duration per minute of off-screen attention; nor did it influence the fixation count per minute.

4.5 Effects of text complexity

Figure 9 presents the average viewing time per minute on each text. We found that the viewing time was longer for the complex texts than that for the easier text.

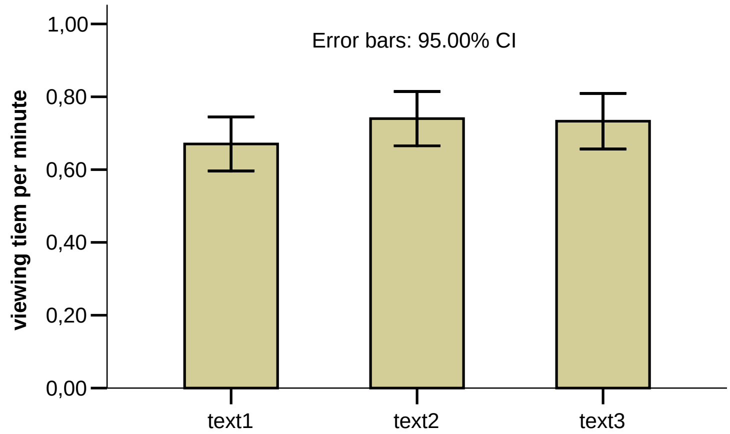

Figure 9. Viewing time per minute on the screen for each text

Repeated measures ANOVA found a significant effect of text complexity on normalised fixation count of the source text with $p < .05$, $F_{2,34} = 3.439$. More specifically, the average fixation count per minute was significantly higher in the complex texts than in the simpler text. A paired samples *t*-test showed that the source text with complex vocabulary (Text 2) had a higher fixation count than the easy text (Text 1) with $p < .05$, $t = -2.212$, $df = 17$. For the structurally complex source text (Text 3) the fixation count was also significantly higher than for Text 1 with $p < .05$, $t = -2.690$, $df = 17$.

Table 1 presents the average fixation count per minute and the average fixation duration in milliseconds on the source text in each of the three texts.

Table 1. Average fixation count per minute and fixation duration (source text)

	Text 1	Text 2	Text 3
Fix. count	49.73	64.69	67.30
Fix. duration	213.09	210.42	212.88

It appeared that while reading the source text for translation, translators had more fixations in complex text (whether it was the result of complex vocabulary or complex structure) than in simple text. The fixation duration times, however, were almost identical.

Figure 10 presents ‘heat maps’ of the three source texts for one group of participants who translated the same sequence of texts (3, 2, 1) under the same time pressure conditions (6, 4, 5 minutes). Each map visualises the total fixation time (the “sum of gaze duration and regression time”, Hyönä *et al.*: 331) for this group of participants. The upper text in Figure 10 is the structurally difficult one (Text 3), the middle text is the lexically difficult Text 2, and the bottom one is the easier Text 1. The heat maps were produced with the iComponent tool (Spakov 2008) with the same sensitivity level, brightness and hiding level for each screen. The white blotches represent the screen areas that received the longest overall duration of fixations. Visually the heat maps support the statistical results showing that the complex texts were fixated more intensely than the simpler text. The time allowed to translate the complex texts for this group was six and four minutes, while they were allocated five minutes for the simple text. Though the participants had more time to look at the simple text, it received fewer fixations than the lexically more difficult text above it. Evidently, the more complex texts required readers to make more regressions in order to grasp the meaning and produce a translation.

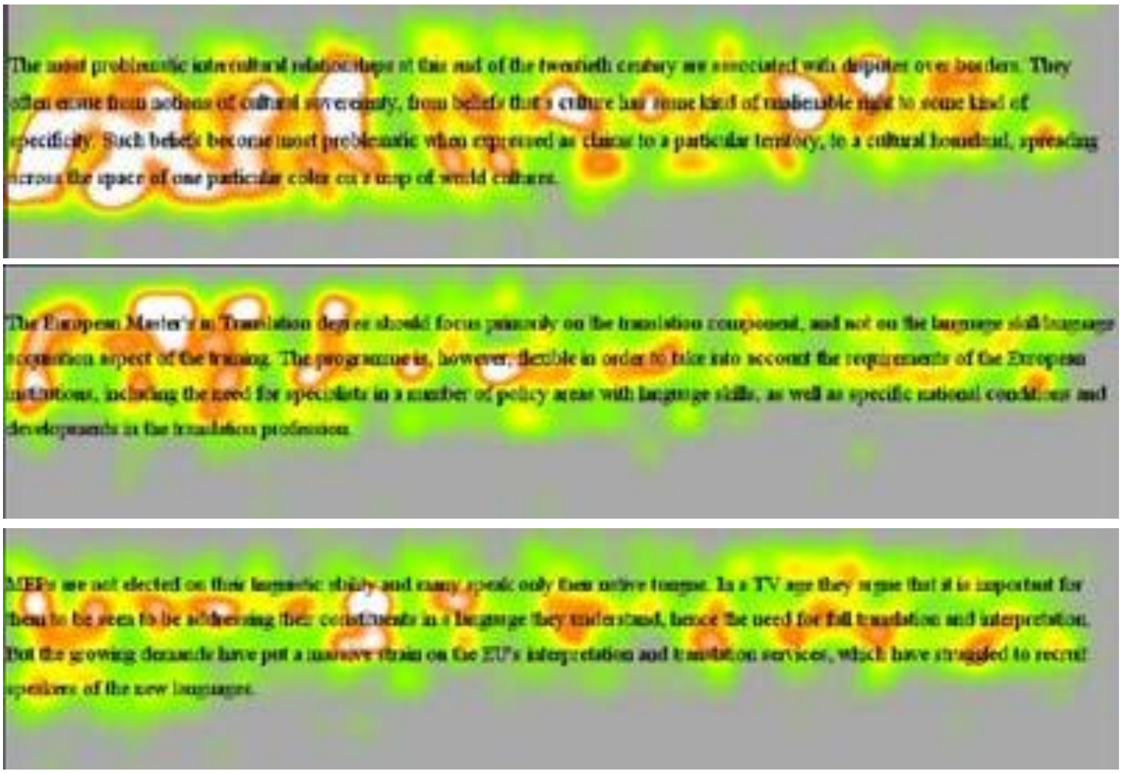

Figure 8. Heat maps showing intensities of area fixations for one group of participants. From the top: Text 3, Text 2, Text 1.

4.6 Gaze behaviour on source and target screen

Figure 11 shows the frequency distribution of the fixation duration by all participants on the source and target text areas. Fixation durations less than 100 ms were omitted from the analysis, and the upper limit was set at 1000 ms. Figure 11 illustrates that the frequency of fixations with relatively short duration (100-200 ms) was higher in the source area than in the target area.

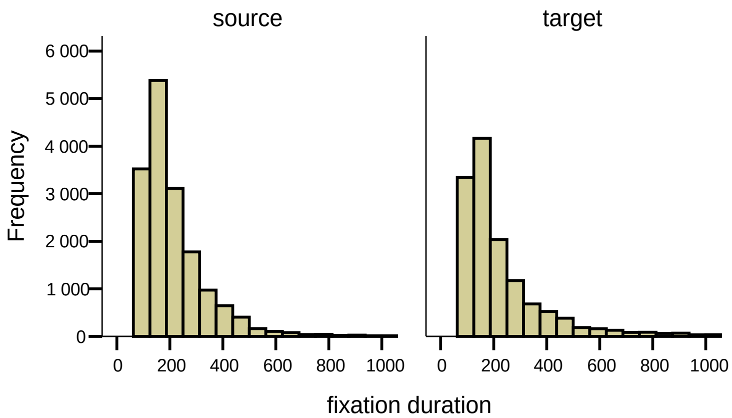

Figure 11. Distribution of fixation duration (in ms) on source and target text areas by all the participants.

Overall, the average fixation duration for all participants and all tasks was higher on the target screen (266 ms) than on the source screen (212 ms). This difference was found to be highly significant with $p < .01$, $t = -3.454$, $df = 17$ (Figure 12).

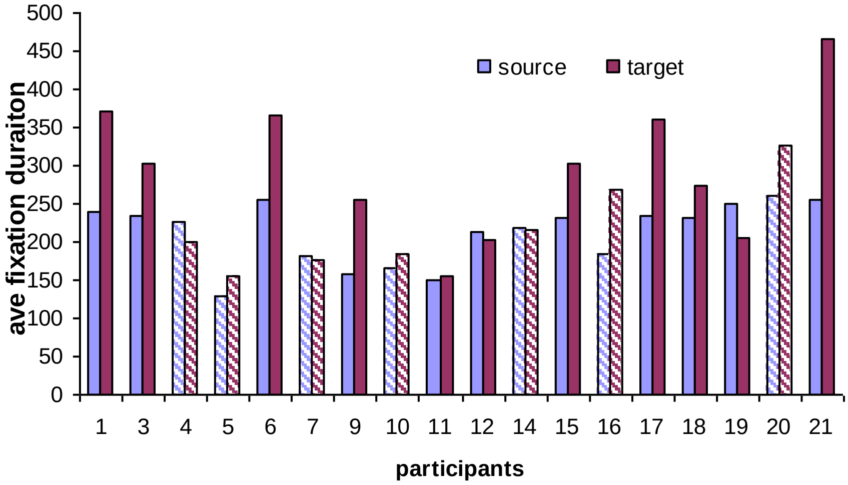

Figure 12. Average fixation duration on source and target area for all the tasks

More specifically, fixation duration was significantly higher on the target screen than on the source screen for all the tasks regardless of time pressure with $p < 0.01$ and $df = 17$ (Figure 13). Paired samples *t*-test values for the six, five and four-minute tasks were $t = -2.955$, $t = -3.280$, and $t = -3.360$, respectively.

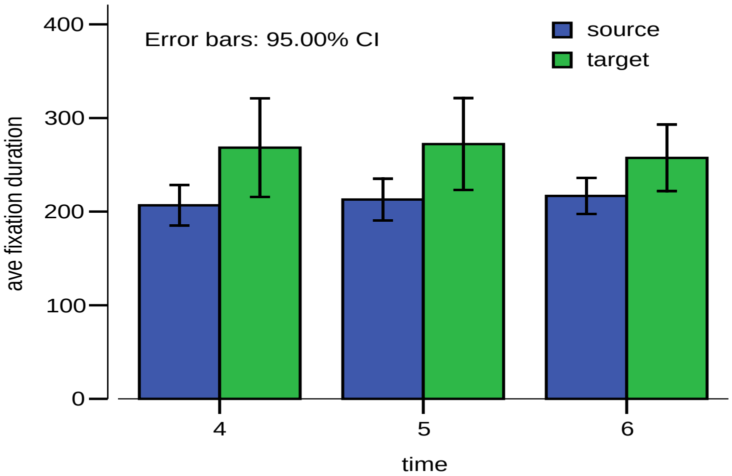

Figure 13. Average fixation duration on source and target area during different time constraints.

Furthermore, the average fixation count per minute for all the tasks on the source screen was higher than for the target screen with $p < .05$, $t = 2.291$, $df = 17$. There were differences under all three time constraints, but the paired samples *t*-test only found the difference in the six-minute task to be significant, $t = 2.305$, $df = 17$ and $p < 0.05$.

Thus, in our population of Finnish translation students, we found that, independently of time pressure and text complexity, the target text received fixations with longer duration than did the source text, though there were numerically fewer fixations (per time unit) than on the source text.

5. Discussion

The main effect found of the group difference in typing skills was as expected. Touch typists attended visually to text on screen, whether source text or emerging target text, more than did non-touch typists. The fact that touch typists did not have to look at the keyboard allowed them to make more direct and more rapid transitions between the source and target text areas on the screen. By contrast, non-touch typists frequently had to move their eyes off the screen to the keyboard. Somewhat surprisingly, however, we found no evidence that the difference resulted in touch typists being significantly less affected by time pressure and text complexity. For this reason, only the overall effects of time pressure and text complexity have been reported.

The only significant effect of time pressure on fixations was the average duration of fixations in the source text area, which was lower than in the target text area. This indicates that it is easier for translators to adapt their reading-for-comprehension to variable time constraints, whereas it is more difficult for them to adapt their reading-and-monitoring of the target text, possibly because this process has to await text being typed. Translators may not be able to adapt their typing speed as flexibly as they are able to adjust the speed with which they read for comprehension. In a translation study comparing reading of someone else’s text versus reading of one’s own emerging text, Holmqvist *et al.* (2007) found that fixation durations were significantly longer while reading one’s own emerging text than when reading somebody else’s text. This result is in line with our findings that fixation duration is longer on the (own) target text than on the source text.

Text complexity was found not to affect fixation duration, which remained constant irrespective of time constraint. However, there was a significant difference between the number of fixations on the simple text and the two more complex texts. It would appear that complexity requires more fixations regardless of whether it is the result of lexical items or syntax. Schnitzer and Kowler (2006) similarly found that difficult text was read with a higher frequency of regressions and longer (~10ms) intersaccadic pauses than simple texts.

Our finding that fixations on the target text were longer than on the source text was very systematic. The fact that our participants had more fixations on the source text than on the target text is consistent with the findings by Jakobsen and Jensen (this volume) and probably reflects that, unlike what seems to be the case with professional translators, translation students struggle rather heavily with comprehending source text in a foreign language.

6. Conclusion

Our study resulted in several robust findings concerning

- the (limited) usefulness of touch typing
- the extent to which translation students' visual attention was affected by time pressure
- the extent to which fixation frequency was affected by text complexity
- the ways in which visual attention was distributed across source and target text areas
- how transitions were made between the two on-screen texts
- the various directions participants' gaze travelled when it went off-screen

One line of research we would like to pursue in continuation of the work presented here is to test more exactly what advantages, if any, a touch-typing translator has over one who is not touch-typing. Translators who dictate their translations might be included for comparison in such a study. This research would require more careful pre-experimental screening of participants than undertaken for the present study. We would also like to further validate our findings concerning the relative distribution of visual attention to the source and target texts, e.g. by manipulating the on-screen position of the text windows. The concept of text complexity is very slippery indeed and also needs to be more carefully controlled in future research.

Nevertheless, we are convinced that there is much valuable insight to be gained from experimenting at the level of granularity such as in the present experiment, i.e. with continuous reading and translation of authentic texts by participants performing their tasks in an environment that is simultaneously a fairly naturalistic setting and a high-tech lab with intensive monitoring of behaviour.

Our findings add insight into the special kind of reading that translators engage in as they create and align an emerging target text with a source text. Such insight is critically important both for creating efficient gaze-based translation support applications of the kind envisaged in the Eye-to-IT project and for a better understanding of translation.

Acknowledgements

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Appendix A

First text item (easy)
Cost in translation: EU spends €1bn on language services.
The Independent, 1 March 2007,
http://news.independent.co.uk/europe/article1178569.ece

But MEPs are not elected on their linguistic ability and many speak only their native tongue. In a TV age they argue that it is important for them to be seen to be addressing their constituents in a language they understand, hence the need for full translation and interpretation. But the growing demands have put a massive strain on the EU's interpretation and translation services, which have struggled to recruit speakers of the new languages.

Second text item (harder, vocabulary)
Commission launches cooperation with universities in translator training.
EU press release, 18 October 2006.
http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/1417&format=HTML&aged=1&language=EN&guiLanguage=en

The European Master's in Translation degree should focus primarily on the translation component, and not on the language skill/language acquisition aspect of the training. The programme is, however, flexible in order to take into account the requirements of the European institutions, including the need for specialists in a number of policy areas with language skills, as well as specific national conditions and developments in the translation profession.

Third text item (harder, structure), Anthony Pym; Alternatives to Borders in Translation Theory (1993), http://www.tinet.org/~apym/on-line/alternatives.pdf

The most problematic intercultural relationships at this end of the twentieth century are associated with disputes over borders. They often ensue from notions of cultural sovereignty, from beliefs that a culture has some kind of unalienable right to some kind of specificity. Such beliefs become most problematic when expressed as claims to a particular territory, to a cultural homeland, spreading across the space of one particular color on a map of world cultures.