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CAPTURING TRANSLATION PROCESSES TO ACCESS METALINGUISTIC AWARENESS

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Abstract: Despite the economic importance of translation work, research can hardly keep pace with current developments, especially the use of electronic resources. A growing body of literature on writing processes in various languages and domains (e.g. journalism, education) has provided insight into how professionals and students use language and language resources. However, the questions of how translators use electronic, non-electronic, and internal linguistic resources and of how novices and experts differ in this regard remain to be investigated in detail. A multi-method approach called progression analysis, which combines ethnographic observation, interviews, computer logging, screenshot recordings, and cue-based retrospective verbalizations, has been used to explore differences between novice and expert journalists and lends itself ideally to the domain of translation. Progression analysis captures diverse aspects of translation processes as students and professionals translate and revise their texts and allows us to access their metalinguistic awareness in order to gain insight into their translation competence. The realization of this awareness in different strategies for translating to and from the translator's dominant language is highlighted for the language combination German and English, and differences between novices' and experts' awareness of their revision processes and resource use are identified.

Keywords: translation process, metalinguistic awareness, novice, expert, German–English

1. INTRODUCTION

What do translators do when they translate and do they know why they are doing it? Understanding translation processes is crucial not only for educational institutions, but also for multilingually-dependent governmental institutions and companies. The issue has multiplied exponentially in the European Union, with its 23 official languages and an estimated cost of multilingualism in 2005 (with

only 20 languages) of EUR 1123 million. Although in recent years English has become the accepted lingua franca of business and academe, the need for well-trained professional translators and multilingual technical writers has actually increased in Europe as more companies reach outside of their language areas. Translation has become an economically important industry, and research can hardly keep pace with its developments, especially with respect to the use of new tools and electronic resources by increasingly technology-savvy cohorts of students and professional translators.

Until fairly recently, much of the empirical research into translation processes was based on think-aloud methods, retrospective verbal protocols (RVPs), and/or comparisons of various drafts of a translation. These techniques have brought the field forward significantly, although they also suffer from certain limitations (see Bernardini 2002; Hansen 2005, 2006; Jääskeläinen 2002; Jakobsen 2003; Krings 2001, 2005; Lörscher 2005; Tirkkonen-Condit 2002). With the advent of computers in text production and translation work, computer keystroke logging in combination with think-aloud and/or retrospective protocols opened up opportunities to monitor processes with much less impact on the usual behavior of the translator or writer involved (e.g. Buchweitz and Alves 2006; Englund Dimitrova 2006; Göpferich 2008; Heiden 2005; Jakobsen 2003; Jarvella et al. 2002; Leijten and Van Waes 2006; O'Brien 2006; Perrin 2001, 2002, 2003, 2006; Sullivan and Lindgren 2006; Van Waes and Leijten 2006). In most research of this type, all of the keystrokes and cursor movements are recorded in a log file as writers or translators perform certain tasks on the computer.

Despite their usefulness in tracking micro-changes in an emerging translation, keystroke logging techniques provide little or no information about what resources a translator refers to or what the translator is doing when not entering text into the computer. The computer logs basically reflect the writing process involved in translating. Monitoring all the changes that take place on the computer screen, however, makes it possible to infer other processes that occur during translation, such as when a person pauses to open up an on-line thesaurus to look for a word. Continuous screenshot recording is invisible and non-intrusive and has been used in various investigations of writing and translation processes (e.g. Asadi and Séguinot 2005; Degenhardt 2006; Ehrensberger-Dow and Massey 2008).

Combining various techniques makes it possible to examine translation processes from different perspectives to gain more insight into the competence and resources that translators draw on as they work. Progression analysis, a method combining ethnographic observation, interviews, computer logging, graphical representations of writing processes (progression graphs), and cue-based RVPs, has proven valuable in studies of the writing processes of journalists, communication professionals, and schoolchildren (e.g. Gnach et al. 2007;

Perrin 2003; Perrin and Ehrensberger-Dow 2006, 2008). The progression graphs allow us to detect problematic points in an emerging translation, and the computer logs provide detailed information about the process at those points. If the translators also indicate what they did at those points and why (for example, during a cue-based RVP), we can infer some of the strategies they use to deal with such problems. By adding information from the other sources of data, such as the screenshot recordings, we can describe their practices (e.g. reading farther in the source text, re-reading the target text, revising other sections of the target text, revising that section of the target text, thinking about the problem, looking up terms, checking for parallel texts, doing relevant research, etc.) and make inferences about their metalinguistic awareness of what they do.

2. MULTILINGUAL TRANSLATORS IN SWITZERLAND

Although professional translators usually translate into their L1, many are expected to be competent in more than one language combination and also to be able to translate into their L2 since there are simply not enough qualified native speaker translators in many countries to meet business and government needs. From an unquestioned acceptance of the primacy of the native speaker (cf. Davies 2003), the trend is towards increasing recognition of the value, quality, and reality of writing in and translation into L2 (Adab 2005; Campbell 1998; Pavlović 2007; Pokorn 2005, 2007). Investigations into translation processes in a country such as Switzerland,[1] where many employers require various combinations of German, French, Italian and/or English, should include comparisons between translating into and out of both the L1 and L2 whenever possible.

In the undergraduate translation program at our university, all the students have very high competence in at least three languages: their first or dominant language (L1) and their other study languages (L2). For example, a student raised in Swiss German with the language combination German, English, and Italian might also be quite proficient in French but not have chosen it as a study language. As educated multilingual adults, our students and professional translators in Switzerland have probably developed a fairly high level of metalinguistic awareness (cf. Bialystok's 1991 research with bilingual children or Jessner's 1999 review of research with multilinguals), which can be defined here as: the ability to reflect upon and manipulate language(s); a sensitivity to what is implied rather than stated; and an analytical attitude towards language. The question explored in the present paper is whether metalinguistic awareness is positively related to translation competence and if so how it can be fostered.

3. TRANSLATION COMPETENCE AND METALINGUISTIC AWARENESS

The multilingualism of translators in Switzerland certainly meets one of the requirements for translation competence, but bilingual (or multilingual) competence alone is not enough, as the PACTE model of translation competence makes clear. The PACTE group has proposed a holistic model comprising six interacting sub-competences or components (2003, 2005, 2007, 2008). Three of them are probably common to all multilingual producers of texts: the bilingual and extra-linguistic sub-competences and the psycho-physiological components. However, three sub-competences are assumed to be specific to translation: translation-knowledge sub-competence, instrumental sub-competence, and strategic sub-competence.

The translation-knowledge sub-competence, involving knowledge of translation principles and the profession, is presumably acquired during translation training and/or gained through professional experience. The instrumental sub-competence, made up of research and information technology skills, has been found to be a major feature distinguishing the problem-solving decisions taken by expert translators from those of non-experts (PACTE 2005), which confirms results obtained from similar investigations (see Fraser 1999; Kussmaul 1995; Livbjerg and Mees 2003; Tirkkonen-Condit 2005). On the basis of such findings, our institute has introduced courses dedicated to tools and research techniques, with positive effects on student performance (Massey, Riediger and Lenz 2008). The strategic sub-competence, which controls the entire translation process, is where translators' metalinguistic awareness might be expected to be an important factor.

In the next section, we present some preliminary findings about translators' metalinguistic awareness of revision processes and resource use. Since we are interested in the role of metalinguistic awareness in translation competence during normal translation work routines, we have chosen progression analysis, a rather complex methodology that has the advantages of being relatively non-invasive for the translators involved and thus producing ecologically valid results (see above). Progression analysis allows us to trace the development of the emerging translation, all of the revisions to the text as well as all of the search terms and electronic resources that are accessed during the translation process. In particular, the cue-based RVPs provide us with information about why certain decisions, revisions, searches, etc. are made during the translation process as well as the translators' awareness of what they are doing and why. This data allows us to gain insight into the cognitive processes involved in translation work.

4. METALINGUISTIC AWARENESS OF REVISION PROCESSES

The first set of translation processes analysed and discussed below are part of the corpus from the ZHAW *Capturing Translation Processes* project.[2] One of the processes was from a beginner (a translation student at the end of the 2nd year of a 4-year undergraduate translation program) and the other one was from a staff translator who was participating in a professional development seminar. They translated the same short German news text about defective Chinese products being taken off the market in the EU from their L2 into their L1 (English) on computers in our institute. All screen events were recorded with *Camtasia Studio* screenshot software, and their keystrokes were logged in order to, for example, produce progression graphs (see *Figures 1* and *2*). Immediately after their translation processes, the beginner and the professional translator were shown a replay in real-time of the screenshot recordings and asked to verbalize what they saw themselves doing. A researcher was present to record everything the participants said in an audio voice-over digital file linked to the screenshot recording and to prompt them to continue if they stopped commenting.

The progression graph in *Figure 1* shows the sequence of revisions (i.e. insertions and deletions) that the beginner made during a 20-minute translation process. The y-axis represents the relative position of a revision in the final translation and the x-axis represents the relative order in time that a revision is made. The jagged trace of the first sentence (revisions 1 to 17) indicates that the beginner went back and forth within that sentence before moving on to the next.

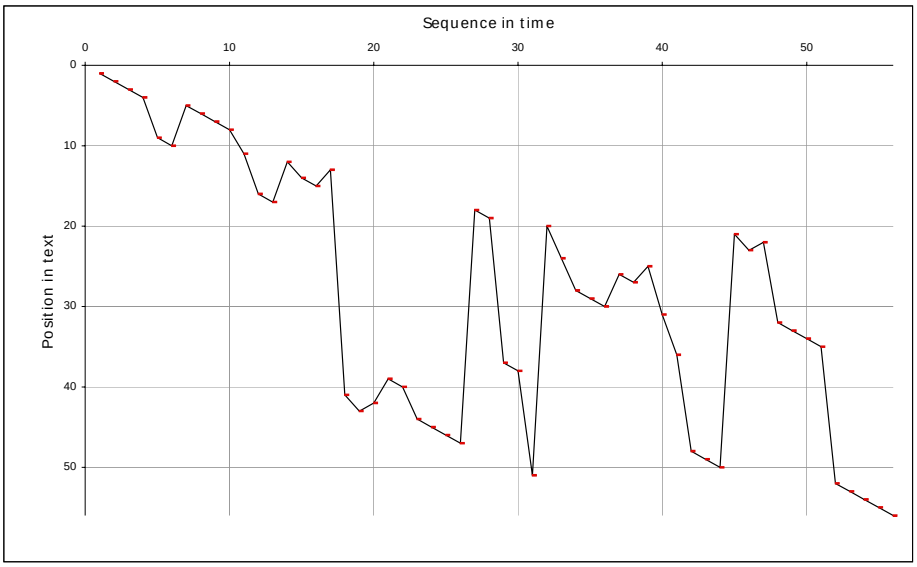

Figure 1. Progression graph of a beginner translator's process (UE0516BegDE)

Some of the beginner's comments in the cue-based RVP, as she viewed a screenshot recording of what she had done, suggested a certain level of metalinguistic awareness of the difficulties the first sentence presented, but little sophistication. For example, in her comment "*The first sentence is hard because I didn't know how to get into the text*", she refers to the difficulty of starting to translate the text (quite typical of novices) but does not specify why she thinks that is the case. She notices a misinterpretation on her part when she comments "*Then afterwards I realized that it wasn't just toys …*" and of the difficulty of trying to find an equivalent for a German expression "*… and this uhm 'aus dem Verkehr gezogen' was really strange so I went to go and check … I knew I couldn't take 'taken out of the traffic'. So I went to Leo*[3]." Another of the comments about this sentence suggests that her external search might have triggered something in her English mental lexicon, although she did not express it that way "*but as I was going through the other words I had a thought … you talk about taking off the shelves … circulation …*".

The second sentence of the same text seems to have presented even more problems, if the jagged progression from revisions 18 to 51 is interpreted as reflecting interruptions in the flow of translation. The beginner's comments about this section of the text indicate an awareness of linguistic terminology ("*At the beginning, the time adverbial … I think I decided to give her capitals ....*") and a certain degree of analytical ability ("*I had to get this lady in too. So, then, I did decide to put her first because it's kind of normal in English*"). However, they are very focused on superficial features of the text and suggest that she was not always aware of what she was doing or why (e.g. she says "*oh, that's a good idea*" and laughs as she sees a change she made and comments that "*it's still a rather heavy sentence but it took a lot of cutting and pasting to get it there …*").

In contrast to the beginner's, the progression graph of the professional reveals a very smooth process in the first and second sentences (see F*igure 2*; revisions 1 to 46) and a much higher level of translation competence, since all of the text was translated in 20 minutes, compared with only about half of the text by the beginner in the same length of time. The jump at the end of the progression graph (revisions 137–139) indicates when the professional translated the title of the text: a good translation strategy, since waiting until one is familiar with the contents of a text usually makes it easier to provide an appropriate title. Aside from the title, the most noticeable irregularity in the professional's progression graph is at the beginning of the sixth sentence (revisions 96–105). His comments about this part of the text reflect a much more sophisticated degree of metalinguistic awareness of the intricacies of both languages than any of the beginner's do:

> "And the next sentence again, I wondered how to start it, because of the emphasis of 'Besonders für Kleinkinder'. To get the 'in particular' in ex-

actly the right place. And the fact also, that it's in the subjunctive, because it's reported speech by the commissioner, which is also tricky to render in English."

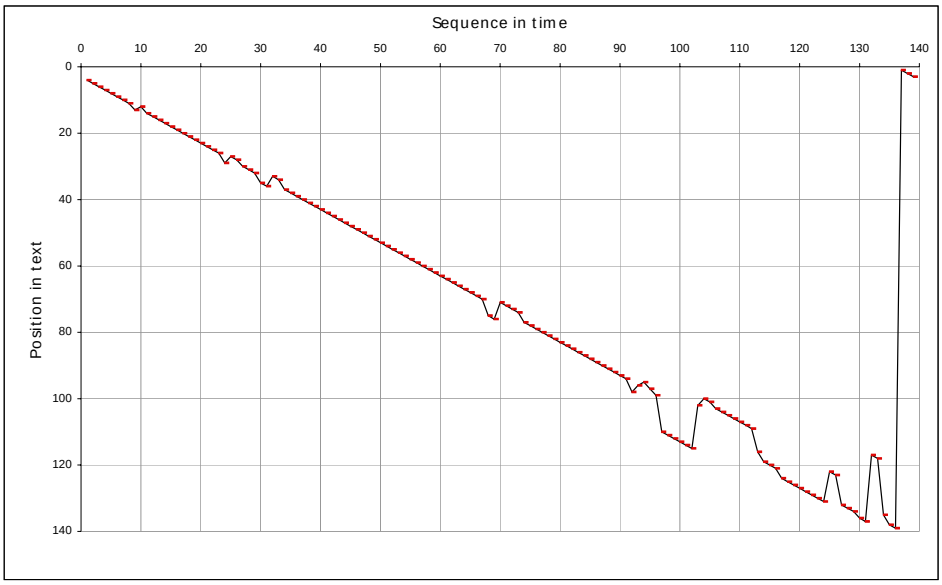

Figure 2. Progression graph of a professional translator's process (Pro09DE)

He also seems very aware of his translation-in-progress:

"But meanwhile, you see, while I was thinking about that, I went to the easy bit of the sentence, which was right at the end: '… said the EU Commissioner' or just simply 'the Commissioner', because we already know that she's an EU Commissioner."

This professional translator's routine of deleting the German text word-by-word with a particular keystroke combination[4] after he finishes translating each proposition or sentence allows him to catch and correct an omission: "*And I had to go back, when I saw – just before I deleted 'Kleinkinder' – that it was 'Kleinkinder' and not just 'Kinder'*." Although he does not mention it explicitly as a translation strategy, this particular IT skill is presumably an efficient aspect of his instrumental sub-competence.

5. METALINGUISTIC AWARENESS OF RESOURCE USE

Another aspect of the instrumental sub-competence that we have examined in some detail in our project concerns resource use and research skills (Ehrensberger-Dow and Massey 2008). A terminological translation problem in the same text, "EU-Schnellwarnsystem RAPEX", had to be recognized as such (strategic sub-competence) and then solved (instrumental sub-competence). The students in our undergraduate translation program complete a course on research techniques, so it is not surprising that practically all of those who translated this text recognized the need to research this term and did so (see *Table 1*). Almost all of the more experienced, 4th-year students (UE03) were also successful and very fast, taking 20 seconds or less to find the correct term, although only a third of the 2nd year students (UE05) were.

Table 1
Search results and durations for the student translators (translation into L2; standard solutions for "*EU-Schnellwarnsystem RAPEX*" given in bold)

Students	Search results in final versions of target texts	Search duration
4th-year:		
UE0310	**RAPEX, the EU rapid alert system**	16 sec.
UE0311	**EU rapid alert system RAPEX**	12 sec.
UE0313	**RAPEX, the EU rapid alert system**	7 sec.
UE0314	EU's rapid warning system	2 minutes
UE0315	**EU rapid alert system RAPEX**	20 sec.
UE0317	**the EU rapid alert system RAPEX**	16 sec.
UE0321	**the EU rapid alert system RAPEX**	16 sec.
2nd-year:		
UE0501	**RAPEX (the EU rapid alert system** […])	48 sec. + 32 sec.
UE0502	the EU warning system RAPEX	20 sec.
UE0503	the EU rapid warning system RAPTEX	10 sec.
UE0506	the EU alarm system RAPEX	(no search)
UE0509	the quick EU warning system RAPEX	24 sec. + 13 sec.
UE0511	RAPEX, the early warning system of the EU	11 sec. + 71 sec.
UE0515	**the EU Rapid Alert System** […] **RAPEX**	28 sec. + 21 sec.
UE0524	**RAPEX, the rapid alert system** of the EU	10 sec.
UE0528	the EU warning system RAPEX	24 sec.

A sampling of typical comments from the cue-based RVPs reflects differences in metalinguistic awareness related to translation ability (and presumably competence). The 2nd-year students focused on the compound word and used

on-line bilingual dictionaries (e.g. "*Well, then there was this 'Schnellwarnsystem', let's check if it exists.*" UE0503). The successful 4th-year students recognized that the acronym RAPEX was the key to discovering an equivalent in English and were able to judge sources appropriately (e.g. "*And then I looked up RAPEX … one of the first hits was the EU site, which is certainly trustworthy*." UE0310). Even the unsuccessful 4th-year student seemed to recognize what she should have done ("*I suppose I could have also looked for RAPEX but I'm looking in Leo here, since Leo is quite European …*" UE0314).

The professionals who translated this text did not do research as often as the 4th-year students did: for example, just four of seven researched the RAPEX term and only three of those were successful. Their translation processes in this corpus were obtained as part of a professional development course, and they were away from their familiar workplaces and computers, which may have made them less inclined to use the resources at their disposal. These professionals were also quite a bit older on average than the students (44.6 years and 25.8 years, respectively) and may not have been as quick to exploit computer resources as the younger cohorts of translators were.

However, a comment in the cue-based RVP of the same professional we discussed earlier suggests another possible explanation. His search was very quick (11 sec.) yet unsuccessful. He recognized his mistake ("*because I first thought of 'early warning system' … but it's actually 'rapid alert system' … so it's a mixture of what I guessed and what it actually is*" PRO09DE), although he did not go so far as to speculate that his preconceptions might have been detrimental to translation quality in this case. The professionals (but not these students) translated into their L1, which may have made them more inclined to rely on their internal linguistic resources and less inclined to use external resources to do careful research.

To test the hypothesis that preconceptions might be more likely when translating into the L1, we analyzed the translation processes of a parallel English text into German by other groups of students. Relatively few of the 2nd-year students researched the term "*the rapid alert system, Rapex* [sic]" (8/19) and only half (4/8) of the 4th-year students did. As discussed elsewhere (Massey and Ehrensberger-Dow, submitted), this may have also been due to the form of the technical term in the English source text, since it was capitalized like a name rather than being written as an acronym.

However, the cue-based RVPs suggest a relative lack of metalinguistic awareness when translating into the L1, at least concerning this particular aspect of instrumental sub-competence. For example, one of the successful 4th-year students here ultimately did use a strategy similar to the 4th-year students translating into their L2 but only after first trying an on-line bilingual dictionary, just as the less experienced students did:

> "hmm … 'alert system' is familiar to me … Leo doesn't give me anything useful … I had a quick look at Google but didn't see anything useful. I tried to paraphrase it and then thought: better check Google again quickly. And then I found it on the EU site." (UE0304)

Another 4th-year student seemed to have been successful only by stumbling on the correct term in a later search ("I see that it's called 'Warnmeldesystem' on an official site and that's good enough for me. <laughs> … oh … I see in this newspaper article that it's called something else" UE0312).

6. CONCLUSIONS

Examining and combining various sources of data (from keystroke logs, recordings of screen events, intermediate and final translations, and cue-based RVPs) through progression analysis has highlighted translators' metalinguistic awareness of two aspects of their competence: revision and resource use. Our results suggest that metalinguistic awareness seems to mirror translation competence. Recognizing translation problems, compensating for the limitations of internal resources, and knowing which external resources to access (and when) all seem to be aspects of translation competence. As translation competence develops, this knowledge presumably develops into metalinguistic awareness, providing us with a window onto translators' minds and guiding our choices in planning the curriculum of translation training programs for students and professionals.

Using screenshot recordings to trigger translators' comments and insights into their translation processes is one way to discover how aware they are of what they do and of at least some of the strategies that they might have used. As in Perrin and Ehrensberger-Dow (2006), strategies here refer to the conscious ideas about how decisions are to be made during the translation process so that a target text has a great probability of taking on the intended form and fulfilling the intended function. However, it relies on translators' being able to articulate what they were doing and why and their remembering what they were thinking about during pauses in the process. It is one way of gaining access to their metalinguistic awareness but has the major disadvantages of being time-consuming and potentially producing artifacts rather than revealing mental processes (e.g. when people provide textbook explanations of what they were doing while translating).

One of the newest attempts to view translation processes from the producer's perspective is through eye-tracking, which records what word or part of the screen a person is attending to at any particular time and traces reading paths and activity during pauses in the translation process. Other methods such

as keystroke logging and RVPs have recently been combined with eye-tracking in attempts to understand the role of monitoring during translation and the cognitive load of different types of translation tasks (Andersson et al. 2006; Dragsted and Gorm Hansen 2007; O'Brien 2006; Rydning and Janyan 2008; Sharmin et al. 2008). The progression analysis described in the present paper can be supplemented with eye-tracking in order to capture diverse aspects of translation and revision processes. As well, metalinguistic awareness can be accessed in different ways to identify which are most likely to reveal the strategies translators use when they encounter challenges translating from and into their L1 or L2.

More research is clearly needed to explore the use of internal and external resources as students, novices, and experienced professionals translate different types of texts from and into various languages. As we expand our corpus, we will use theoretical sampling[5] based on the core concepts that emerge in our analyses to identify further interesting cases to examine and analyze in more detail. This will release hidden expert knowledge, allowing inferences to be made about the practices and strategies that guide translation processes, considerations translators might make, and the awareness that translators have of what they are doing. The results should contribute to validating existing models of translation competence (e.g. Göpferich 2008:155; PACTE 2003:60) and allow us to develop systemic measures to optimize education and training, workflow efficiency, and output quality at all levels of competence.

Notes

[1] A complicating factor in the German-speaking part of Switzerland is medial diglossia, in which Swiss German is used for virtually all spoken interactions (except with foreigners or Swiss from the other language areas) and standard German is used for written communication.

[2] We would like to express our appreciation to the professional translators, teachers, and students who have contributed to our corpus.

[3] Leo is an online bilingual dictionary available at http://dict.leo.org/.

[4] The combination Ctrl-Delete (or Ctrl-Backspace) deletes whole words instead of single letters.

[5] As explained by Strauss and Corbin (1998: 202), theoretical sampling means that sampling, "rather than being predetermined before beginning the research, evolves during the process".

References

Adab, B. 2005. Translating into a Second Language: Can We, Should We? In: Anderman, G. & Rogers, M. (eds) *In and Out of English: For Better, for Worse*. Clevedon: Multilingual Matters. 227–241.

Andersson, B., Dahl, J., Holmqvist, K., Holsanova, J., Johansson, V., Karlsson, H., Strömqvist, S., Tufvesson, S. & Wengelin, A. 2006. Combining Keystroke Logging with Eye-tracking.

In: Van Waes, L., Leijten, M. & Neuwirth, D. (eds) *Writing and Digital Media*. Oxford: Elsevier. 166–172.

Asadi, P. & Séguinot, C. 2005. Shortcuts, Strategies and General Patterns in a Process Study of Nine Professionals. *Meta* Vol. 50. No. 2. 522–547.

Bernardini, S. 2002. Think-aloud Protocols in Translation Research. *Target* Vol. 13. No. 2. 241–263.

Bialystok, E. 1991. Metalinguistic Dimensions of Bilingual Language Proficiency. In: Bialystok, E. (ed) *Language Processing in Bilingual Children*. Cambridge: Cambridge University Press. 113–140.

Buchweitz, A. & Alves, F. 2006. Cognitive Adaptation in Translation: an Interface between Language Direction, Time, and Recursiveness in Target Text Production. *Letros de Hoje* Vol. 41. No. 2. 241–272.

Campbell, S. 1998. *Translation into the Second Language*. New York: Addison Wesley Longman.

Davies, A. 2003. *The Native Speaker: Myth and Reality*. Clevedon: Multilingual Matters.

Degenhardt, M. 2006. CAMTASIA and CATMOVIE: Two Digital Tools for Observing, Documenting and Analysing Writing Processes of University Students. In: Van Waes, L., Leijten, M. & Neuwirth, D. (eds) *Writing and Digital Media*. Oxford: Elsevier. 180–186.

Dragsted, B. & Gorm Hansen, I. 2007. Speaking your Translation: Exploiting Synergies between Translation and Interpreting. In: Pöchhacker, F., Jakobsen, A. L. & Mees, I. M. (eds) *Interpreting Studies and Beyond*. Copenhagen: Samfundslitteratur Press. 251–274.

Ehrensberger-Dow, M. & Massey, G. 2008. Exploring Translation Competence by Triangulating Empirical Data. *Norwich Papers* Vol. 16. 1–20.

Englund Dimitrova, B. 2006. Segmentation of the Writing Process in Translation: Experts versus Novices. In: Sullivan, K. & Lindgren, E. (eds) *Computer Keystroke Logging and Writing: Methods and Applications*. Amsterdam: Elsevier. 189–201.

Fraser, J. 1999. The Translator and the Word: The Pros and Cons of Dictionaries in Translation. In: Anderman, G. & Rogers, M. (eds) *Word, Text, Translation. Liber Amicorum for Peter Newmark*. Clevedon: Multilingual Matters. 25–34.

Gnach, A., Wiesner, E., Bertschi-Kaufmann, A. & Perrin, D. 2007. Children's Writing Processes When Using Computers. Insights Based on Combining Analyses of Product and Process. *Research in Comparative and International Education* Vol. 2. No. 1. 13–28.

Göpferich, S. 2008. *Translationsprozessforschung: Stand – Methoden – Perspektiven*. Tübingen: Narr.

Hansen, G. 2005. Experience and Emotion in Empirical Translation Research with Think-aloud and Retrospection. *Meta* Vol. 50. No. 2. 511–521.

Hansen, G. 2006. Retrospection Methods in Translator Training and Translation Research. *Journal of Specialised Translation* Vol. 5. 2–41.

Heiden, T. 2005. Blick in die Black Box: Kreative Momente im Übersetzungsprozess: eine experimentelle Studie mit Translog. *Meta* Vol. 50. No. 2. 449–472.

Jääskeläinen, R. 2002. Think-aloud Protocol Studies into Translation. An Annotated Bibliography. *Target* Vol. 14. No. 1. 107–136.

Jakobsen, A. L. 2003. Effects of Think aloud on Translation Speed, Revision, and Segmentation. In: Alves, F. (ed) *Triangulating Translation: Perspectives in Process Oriented Research*. Amsterdam: John Benjamins. 69–95.

Jarvella, R. J., Jensen, A., Halskov Jensen, E. & Skovgaard Andersen, M. 2002. Towards Characterizing Translator Expertise, Knowledge and Know-how: Some Findings Using TAPs and Experimental Methods. In: Riccardi, A. (ed) *Translation Studies: Perspectives on an Emerging Discipline*. Cambridge: Cambridge University Press. 172–197.

Jessner, U. 1999. Metalinguistic Awareness in Multilinguals: Cognitive Aspects of Third Language Learning. *Language Awareness* Vol. 8. No. 3. 201–209.

Krings, H. P. 2001. *Repairing Texts: Empirical Investigations of Machine Translation Post-Editing Processes* [edited and translated by Koby, G. S.] Kent, OH: The Kent State University Press.

Krings, H. P. 2005. Wege ins Labyrinth – Fragestellungen und Methoden der Übersetzungsprozessforschung im Überblick. *Meta* Vol. 50. No. 2. 342–358.

Kussmaul, P. 1995. *Training the Translator*. Amsterdam: John Benjamins.

Leijten, M. & Van Waes, L. 2006. Inputlog: New Perspectives on the Logging of On-line Writing. In: Sullivan, K. P. H. & Lindgren, E. (eds) *Computer Key-Stroke Logging and Writing: Methods and Applications*. Oxford: Elsevier. 73–94.

Livbjerg, I. & Mees, I. M. 2003. Patterns of Dictionary Use in Non-domain-specific Translation. In: Alves, F. (ed) *Triangulating Translation: Perspectives in Process Oriented Research*. Amsterdam: John Benjamins. 123–136.

Lörscher, W. 2005. The Translation Process: Methods and Problems of its Investigation. *Meta* Vol. 50. No. 2. 597–608.

Massey, G. & Ehrensberger-Dow, M. submitted. Investigating Demands on Language Professionals: Methodological Challenges in Exploring Translation Competence. *Bulletin suisse de linguistique appliquée (Special issue)*.

Massey, G., Riediger, H. & Lenz, S. 2008. Teaching Instrumental Competence in an E-learning Environment: a Swiss Perspective. In: Dimitriu, R. & Freigang, K.-H. (eds) *Translation Technology in Translation Classes*. Iasi: Institutul European. 175–183.

O'Brien, S. 2006. Pauses as Indicators of Cognitive Effort in Post-editing Machine Translation Output. *Across Languages and Cultures* Vol. 7. No. 1. 1–21.

PACTE Group 2003. Building a Translation Competence Model. In: Alves, F. (ed) *Triangulating Translation: Perspectives in Process Oriented Research*. Amsterdam: John Benjamins. 43–66.

PACTE Group 2005. Investigating Translation Competence: Conceptual and Methodological Issues. *Meta* Vol. 50. No. 2. 609–619.

PACTE Group 2007. Zum Wesen der Übersetzungskompetenz. Grundlagen für die experimentelle Validierung eines Ük-Modells. In: Wotjak, G. (ed) *Quo vadis Translatologie? Ein halbes Jahrhundert universitäre Ausbildung von Dolmetschern und Übersetzern in Leipzig. Rückshau, Zwischenbericht und Perspektiven aus der Aussensicht*. Berlin: Frank & Timme. 327–342.

PACTE Group 2008. First Results of a Translation Competence Experiment: "Knowledge of Translation" and "Efficacy of the Translation Process". In: Kearns, J. (ed) *Translator and Interpreter Training: Issues, Methods and Debates*. London: Continuum. 104–126.

Pavlović, N. 2007. Directionality in Translation and Interpreting Practice: Report on a Questionnaire Survey in Croatia. *Forum* Vol. 5. No. 2. 79–99.

Perrin, D. 2001. Wie Journalisten schreiben. Ergebnisse angewandter Schreibprozessforschung. In: Mast, C. & Russ-Mohl, S. (eds) *Journalismus* Vol. 40. Constance: UVK.

Perrin, D. 2002. Investigating Writing Strategies in the Workplace. In: Levy, C. M. & Olive, T. (eds) *Contemporary Tools and Techniques for Studying Writing*. Dordrecht: Kluwer Academic. 105–117.

Perrin, D. 2003. Progression Analysis (PA): Investigating Writing Strategies at the Workplace. *Journal of Pragmatics* Vol. 35. 6. 907–921.

Perrin, D. 2006. Progression Analysis: An Ethnographic, Computer-based Multi-method Approach to Investigate Natural Writing Processes. In: Van Waes, L., Leijten, M. & Neuwirth, C. (eds) *Writing and Digital Media*. Amsterdam: Elsevier. 173–181.

Perrin, D. & Ehrensberger-Dow, M. 2006. Journalists' Language Awareness: Inferences from Writing Strategies. *Revista Alicantina de Estudios Ingleses* Vol. 19. 319–343.

Perrin, D. & Ehrensberger-Dow, M. 2008. Progression Analysis: Tracing Journalistic Language Awareness. In: Burger, M. (ed) *L'analyse linguistique des discours des médias: théories,*

méthodes en enjeux. Entre sciences du langage et sciences de la communication et des medias. Québec: Nota Bene.

Pokorn, N. 2005. *Challenging the Traditional axioms. Translation into a Non-mother Tongue*. Amsterdam: John Benjamins.

Pokorn, N. 2007. In Defence of Fuzziness. *Target* Vol. 19. No. 2. 327–336.

Rydning, A. F. & Janyan, A. 2008. Eye Movement Recordings as a Tool for Studying Mental Simulation of Speed in Text Processing by Professional Translators. *Forum* Vol. 6. No. 1. 59–74.

Sharmin, S., Spakov, O., Räihä, K.-J. & Jakobsen, A. L. 2008. Where and for How Long do Translators Look at the Screen while Translating? *Copenhagen Studies in Language* Vol. 36, 31–51.

Strauss, A. & Corbin, J. 1998. *Basics of Qualitative Research. Techniques and Procedures for Developing Grounded Theory*. Thousand Oaks: Sage.

Sullivan, K. & Lindgren, E. 2006. Digital Tools for the Recording, the Logging and the Analysis of Writing Processes. In: Van Waes, L., Leijten, M. & Neuwirth, D. (eds) *Writing and Digital Media*. Oxford: Elsevier. 153–157.

Tirkkonen-Condit, S. 2002. Process Research: State of the Art and Where to Go Next? *Across Languages and Cultures* Vol. 3. No. 1. 5–19.

Tirkkonen-Condit, S. 2005. The Monitor Model Revisited: Evidence from Process Research. *Meta* Vol. 50. No. 2. 405–414.

Van Waes & Leijten, M. 2006. Logging Writing Processes with Inputlog. In: Van Waes, L., Leijten, M. & Neuwirth, D. (eds) *Writing and Digital Media*. Oxford: Elsevier. 158–165.