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Investigating translation proficiency – A study of the knowledge employed by two engineers in the translation of a technical text

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Die vorliegende Fallstudie beleuchtet verschiedene Variablen der Übersetzungskompetenz. Zwei Berufsübersetzer mit technischer Ausbildung wurden gebeten, eine Bedienungsanleitung aus dem Französischen ins Schwedische zu übersetzen und dabei laut zu denken. Im Mittelpunkt stand die Erforschung der Interaktion zwischen ihrem linguistischen und extralinguistischen Wissen anhand der bei der Übersetzung einer komplexen Nominalphrase verwendeten Übersetzungsstrategien und Übersetzungsprinzipien. Die Ergebnisse deuten darauf hin, dass extralinguistisches Wissen den Übersetzungsprozess nur erleichtern und mangelndes linguistisches Wissen kompensieren kann, wenn Letzteres ein Mindestniveau erreicht. Mangelndes linguistisches Wissen lässt sich auch nicht kompensieren, indem Übersetzer auf Übersetzungsstrategien und –prinzipien zurückgreifen, die sich bei der Übersetzung aus einer Sprache, in der sie über grösseres Wissen verfügen, erfolgreich erwiesen haben. Ebenso wenig stellt eine technische Ausbildung eine Garantie für Qualität bei der Übersetzung von technischen Texten dar. Die Ergebnisse sind aufschlussreich für Forschung und Ausbildung.

Schlagwörter: Übersetzungskompetenz, Übersetzungsstrategien, Übersetzungsprinzipien, technische Übersetzer, Französisch-Schwedisch.

Conceptual frame of reference¹

The present study takes a fresh look at some of my reflections within the framework of a research project in which 20 participants had been asked to translate a user guide from French into Swedish, and from French into German (Künzli, 2003). Two of the participants distinguished themselves from their colleagues in that they were neither trained translators nor linguists, but engineers. It seemed promising to study their translation processes and their written translations in more detail by focussing on the part of the material that had caused the most problems for the 20 participants: technical terms. I do this here by analysing the data of the two engineers in the light of the model of translation proficiency proposed by Cao (1996). I wish thereby to make an empirical contribution to the debate that has occupied professional translators and translation researchers for a long time: do you have to be a medical doctor to translate medical texts; or a lawyer to translate legal texts; or an engineer to translate technical texts? Or, correspondingly: is an education in

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the field of civil engineering a sufficient prerequisite for achieving quality in technical translation?

In order to collect the data, the participants were asked to perform the translation task while thinking aloud. The verbalisations were transcribed in what are termed think-aloud protocols (TAPs) and analysed in parallel with the written translations. TAPs have been used as a method for investigating the cognitive and affective dimensions of translation for twenty years or so (see Jääskeläinen, 1999; Krings, 1986; Künzli, 2003, for example). Their use has raised a number of questions and objections, in particular regarding the effect of the instruction to think aloud on the cognitive processes of the participants and on the completeness of the protocols. Ericsson & Simon (1984/1993) have shown, however, that TAPs yield valid data if certain conditions are met during data collection: (1) the participants are asked to verbalise only the contents of their working memory rather than to describe or interpret their thoughts; and (2) there is no delay between the task execution and the thinking-aloud, i.e., the participants think aloud *while* accomplishing the task.

I will analyse here how the participants processed the following segment of the source text (see also the Appendix):

La prise téléphonique doit se trouver à 1,50 m maximum, la prise électrique standard monophasée 220-240 V, 50-60 Hz à 2 m maximum 'the telephone jack has to be at a maximum distance of 1.5 m, the 50-60 Hz 220-240 V single-phase standard electrical socket at a maximum distance of 2 m'.

The main function of this excerpt is to describe the position of the machine in relation to the outlets to which it must be connected, and the technical properties of these. In what follows, I will focus on the extended noun phrase *la prise électrique standard monophasée 220-240 V, 50-60 Hz*. The data show that it presents several problems concerning: (1) structural differences between French and Swedish in the formation of technical terminology; (2) conventions regarding the placement of technical details in user guides; and (3) comprehension problems in the case of insufficient knowledge in electrical engineering. The first two types of problems have to do with linguistic knowledge, and the third one with extralinguistic knowledge.

Cao's (1996) model of translation proficiency offers a theoretical framework for studying how these different types of knowledge might be interacting in the translation process. The model is based on Bachman's (1990) model of communicative language ability and takes into account three main variables: translational language competence, translational knowledge structures, and translational strategic competence (planning, executing and assessing a translation task). Within the variable of translational *language* competence, Cao mentions on the one hand a sound knowledge of lexis, syntax, and the semantic rules of both the source and target languages as well as a

knowledge of the rules of cohesion and rhetorical organisation (termed *organisational* competence, comprising a *grammatical* competence and a *textual* competence); on the other hand, she mentions the knowledge necessary to perform appropriate linguistic functions in a given context (termed *pragmatic* competence, comprising an *illocutionary* competence and a *sociolinguistic* competence). In this paper, I will examine two subcomponents of translational language competence: translators need to possess a *grammatical* competence, i.e., be able to recognize and produce grammatically correct sentences, understand their propositional content and arrange the words in sentences that express propositions; and translators also need to have *sociolinguistic* competence, i.e., recognize the conventions that govern a given domain and thus be capable of performing appropriate linguistic tasks in a given context for a given receiver. Translational *knowledge structures* are based on general knowledge (knowledge of the world) and knowledge of a given subject matter (in the present case, electrical engineering). Translation is in the first instance a linguistic act. It is linguistic competence that is paramount. However, one might assume that the translation of a text that calls upon specific extralinguistic knowledge is easier for translators who possess this type of knowledge. All in all, it is the interaction between the different types of knowledge or competencies that characterize communicative language use that allows translators to get the message across. To my knowledge, no empirical study has so far been conducted using Cao's model as a starting point for describing translation performance.

Let us get back to the linguistic problems mentioned above. Charaudeau (1992, p. 44) and Riegel, Pellat, and Rioul (1999, pp. 148-149) mention that in extended noun phrases, the constituents that are furthest from the noun modify the grouping made up by the noun and the closer constituents. For example: the attributive past participle *monophasée* modifies the constituents *la prise électrique standard*, whereas *standard* modifies *la prise électrique*, but not *monophasée*. Also, in Romance languages, the attributive elements very often follow the modified noun, while they precede it in Germanic languages (Stolze, 1999, pp. 68-76), for example: *Témoin détecteur d'incident de frein* vs. *bromsstörningskontrollampa*. The extended noun phrase illustrates furthermore the preferred way in which the French language forms technical terminology, i.e., through noun phrases of the type 'noun + adjective' (Muller, 1985, pp. 194-196). This association of a noun and an adjective is the simplest type of syntagmatic compound. In the present case, we have *la prise électrique* as the basic noun phrase, to which are added other constituents used as adjectives (*standard, monophasée, 220-240 V, 50-60 Hz*). What about Swedish? It appears that where French resorts to the noun phrase of the type 'noun + adjective', to the prepositional phrase completing a noun phrase (example: *câbles de renforcement des filets de bord des rangées WF et RF*) or to the direct construction with N2 (deletion of the relation mark, for example, *bloc*

alimentation instead of *bloc d'alimentation*), Swedish, as a Germanic language, prefers compound nouns in the form of juxtapositions of nouns or the type 'adjective + noun' (see, e.g., Muller, 1985, p. 195; Nordman, 1992, p. 54). The knowledge of these linguistic mechanisms is part of the translator's *grammatical* competence.

In the case of a user guide addressed to the broad general public, one might moreover ask the following question: do translators have the right to omit technical details if they believe that these will mainly confuse the users? This question raises the problem of manufacturer liability (Stolze, 1999, p. 151). User guides have to take into consideration the level of general education and perspicacity that can be expected from non-professional users. This is why Reichert (1993, p. 91) recommends flexibility regarding technical terms, whenever translators believe that the general public will not comprehend them easily. Concretely, he suggests the omission of terms considered superfluous or the explanation of essential ones in a footnote or an appendix. My data indicate that in user guides published by Swedish companies for the broad general public, technical details often figure in an appendix called *Tekniska fakta* 'Technical facts' rather than the body text. Therefore, in the present case one would indicate *eluttag* in the body text, whereas technical specifications in the form of the attributive elements *standard, enfas, 220-240 V, 50-60 Hz* would be given in an appendix. The knowledge of these conventions is part of the translator's *sociolinguistic* competence.

The importance of translational knowledge structures or extralinguistic knowledge and the problems that might arise if such knowledge is lacking emerges from the explanations above. Extended noun phrases are frequent in technical texts. The longer the term, the smaller the number of people will be who are familiar with it (Muller, 1985, pp. 196-197). It is therefore not surprising that most participants in the present study seemed confused by the expansions *standard, monophasée, 220-240 V, 50-60 Hz*. Dancette (1995, p. 188) has studied the influence of linguistic and extralinguistic knowledge on translation and comprehension experimentally and quantitatively. Among the results of her research, she mentions the emergence of a threshold effect: if the translator's linguistic and extralinguistic knowledge does not come up to a minimum level, the translation cannot exceed a certain quality threshold.

Studying the features of a written translation does not allow us to attribute any given errors to the lack of a specific type of knowledge. This is why here I will study translation proficiency both at the level of the written translation and that of the translation process; more specifically, at the level of translation strategies and translation principles. Regarding the concept of *translation strategy*, I follow Chesterman (2000, p. 89), who views strategies as forms of textual manipulation, observable by comparing the result of the act of translation, i.e., the target text, with the source text. He distinguishes three

groups of strategies: (1) syntactic/grammatical strategies, (2) semantic strategies, and (3) pragmatic strategies. Examples are:

- *Transposition*: A grammatical strategy based on a change of word class (for example, rendering the phrase *prise électrique* by *eluttag*, the adjective *électrique* being transposed into a noun);
- *Emphasis change*: A semantic strategy consisting in altering the thematic focus (for example, putting the attributive elements *220-240 V, 50-60 Hz* into parentheses);
- *Omission*: A pragmatic strategy entailing an information change (for example, omitting the attributive element *monophasée*).

One may set up the hypothesis that differences in the use of strategies can be explained by variations in translation proficiency. For example, a lack of language competence might express itself in the use of the strategy of literal translation, the translator trying to remain as close as possible to the structure of the source text. However, it is equally possible that he or she might prefer the strategy of omission in such a case. Again, omissions may reflect the activation of sociolinguistic and extralinguistic knowledge, the translator having decided that the omitted term is irrelevant. This is why I will use think-aloud protocols in parallel with the analysis of translation strategies in order to investigate more reliably the reasons beneath the choice of a given strategy.

Jääskeläinen (1999, pp. 178-183 and pp. 233-236) identifies three types of verbalisations appearing in TAPs as revealing *translation principles*, i.e., rules of conduct guiding translation processes: (1) procedural comments, (2) declarations indicating global strategies, and (3) comments revealing the participants' professional identity. For example, one participant says that in Sweden, electrical sockets in offices and apartments are all single-phase. Thanks to his extralinguistic knowledge, he concludes that this information can be omitted in the translation: it would only confuse the user. If this type of verbalisation appears systematically in his decision processes, one may interpret it as revealing a global strategy. It consists in adapting the target text to the needs of the users who are not necessarily experts in technology. It seems reasonable to assume that translation principles vary according to the translator's proficiency. More specifically, one may assume that translation principles express themselves both at the level of linguistic knowledge (for example, as rules of conduct for the processing of problems that result from structural differences between source and target language); and extralinguistic knowledge (for example, the more familiar the translator is with the concepts referred to in the source text, the more confidence he or she has in proceeding with the translation).

In what follows, I will examine translation proficiency through the choices made by the participants in terms of translation strategies and principles during the processing of the extended noun phrase *la prise électrique standard monophasée 220-240 V, 50-60 Hz*. To do this, I will apply Cao's (1996) model of translation proficiency and focus on two professional

translators with comparable profiles: both are professional translators with an educational background not in linguistics or translation, but in the engineering sciences. Earlier research on the interaction between linguistic and extralinguistic knowledge has been based on both a different population and different methods (see Dancette, 1995). I am aware of the limits of my study. I have conducted a qualitative research project, a case study: I am only aiming to investigate some variables of translation proficiency.

Method

Table 1 gives an overview of the profile of the two participants (the names are fictitious).

Table 1: Participants' characteristics

Name	Joakim	Kristina
Age group	51+	41-50
Languages	Swedish English German French Dutch Italian	Swedish Finnish English German French
Specialisations	Technical texts IT	Patents Chemistry
Background and experience	Engineer 7 years of experience as a freelance translator	University degree in engineering sciences 5 years of experience as a freelance translator
Process of acquisition of the French language	Formal acquisition: 5 years in grammar school	Informal acquisition: Spent 5 years in a French-speaking country

Table 1 shows that the participants are comparable. It is only with respect to the process of acquisition of the French language that Joakim might have an advantage over Kristina. Indeed, he has had some formal training in French, whereas Kristina declares having learnt French by living for some years in a

French-speaking country. My basic postulate, according to which both participants possess the minimum level of extralinguistic knowledge required to successfully accomplish the translation task, is founded on the following observations: (1) their educational backgrounds, (2) their specialisations, and (3) the source text (it is a user guide written for the *broad general public*, in which technical terms figure that can be considered *basic* for translators with a technical education).

The participants were asked to translate a text from French into Swedish while thinking aloud. It was a user guide for a telephone with fax and answer-machine function from France Télécom (see Appendix). Within the category of technical texts, user guides are the genre most frequently translated (Schmitt, 1999, pp. 9-10). One of the user guide's main functions is to describe the technical functions of the machine (Mårdsjö, 1992, pp. 39-42). These descriptions often refer to complex realities and use technical terminology. The descriptive sequence that is the object of the present study (*la prise électrique standard monophasée 220-240 V, 50-60 Hz*) reflects this characteristic.

The sessions with the participants were conducted at their homes, which are their usual places of work. They had access to a computer, parallel texts (user guides for similar products in Swedish) and other information sources they would normally use in their work. While they were translating and thinking aloud, I made a note of their use of information sources. When they had finished the task, the participants were asked to fill in a questionnaire, providing additional information on their training and work experience. At the end of the session, I conducted a brief interview. All translations were revised by a technical translator and by an engineer.

Results

Table 2 gives the translation and the strategies used by the participants in order to translate the extended noun phrase *la prise électrique standard monophasée 220-240 V, 50-60 Hz* (emphasized in **bold**).

Regarding the group of syntactic/grammatical strategies, Table 2 reveals the presence of transpositions associated with compressions. Both participants render the noun phrase *la prise électrique* by a compound noun: *eluttag* and *väggkontakt*. A more literal translation with *elektriskt uttag* would have been possible, but less idiomatic. This example illustrates one of the differences between French and Swedish in the formation of technical terms mentioned above.

Table 2: Translations and use of strategies

Name	Joakim	Kristina
Translation	Telefonjacken måste finnas inom 1,5 m avstånd, och eluttaget (220-240 V, 50-60 Hz) på högst 2 meters avstånd.	Telefonkabeln bör finnas på högst 1.50 m avstånd, och standard enfasväggkontakten 220-240 V, 50-60 Hz på högst 2 m.
Types of strategies	Transposition (G3) Hyponymy (S3) Compression (S6) Emphasis changes (S7) Omissions (Pr3)	Literal translation (G1) Transpositions (G3) Compressions (S6)

Note. The abbreviations in parentheses correspond to Chesterman's (2000, chap. 4) classifications. For example, G3 refers to strategy type n° 3 of the group of syntactic/grammatical strategies (= group G), S6 to strategy type n° 6 of the group of semantic strategies (= group S), and Pr3 to strategy type n° 3 of the group of pragmatic strategies (= group Pr).

A third strategy appearing in Kristina's translation is that of literal translation. Literal translation is mentioned in works on technical translation as a possible way out of comprehension problems (Bédard, 1986, p. 92). It is therefore not surprising to find it among the strategies used by the participants (see Künzli, 2003, p. 80 and pp. 96-97). However, one would not necessarily have expected Kristina, who has a technical education, to use this strategy for this very reason. Indeed, her translation follows very closely the structure of the French source text. The faithfulness to the structure of the source text and source language is such that the translation contains forms which infringe the rules of the Swedish language. Kristina puts *standard enfasväggkontakten* in two words, whereas the *Skrivregler för svenska och engelska från TNC* 'Writing rules for Swedish and English from TNC' (2001, p. 68) specify that in Swedish, compound nouns are to be written in one word, irrespective of the number of constituents. Kristina's translation contains numerous other examples of structural calques. Thus, I have mentioned that in extended noun phrases, the elements which are furthest from the noun modify the grouping made up by the noun and the nearer elements. We have also seen that attributive modifiers very often follow the noun in Romance languages, while they precede it in Germanic languages. The most natural order to render the French attributive modifiers into Swedish would therefore be *enfasstandardeluttag*. Yet Kristina follows the French model by writing *standard enfasväggkontakt*. The sheer length of the compound noun

enfasväggkontakt – three, even four elements, the attributive noun *standard* having erroneously been separated from the compound noun – is interesting. Thus, on the basis of her corpus of specialised texts written in Swedish, Nordman (1992, p. 54) mentions that compound nouns with two constituents are the most frequently occurring, except in the domain of computer sciences, where those with three constituents predominate. These observations indicate that Kristina may have some uncertainties concerning what is grammatically correct and idiomatic Swedish.

The reaction of the revisers to her translation is not very favourable. The technical translator-reviser comments that it would not have been necessary to follow the source text that closely. The engineer-reviser declares that the expression *standard enfasväggkontakten* is incomprehensible. He proposes a solution in which he omits the attributive noun *standard*, while putting the constituents *monophasée, 220-240 V, 50-60 Hz* into parentheses. Overall, the criterion of ease of reading prevails over that of strict faithfulness to the information given in the source text.

Let us now look at Kristina's TAP (I have translated the verbalisations into English; however, source-text segments verbalised by the participants in French are maintained in French.):

- [1] *[Kristina] la prise électrique standard monophasée / oh hold on now / single-phase hm hold on now (she looks up monophasée in a parallel text) / hm standard hm / standard / oh! yes yes yes! standard hm wall jack maybe one should / wall socket monophasée let's take / well (she looks up monophasée in Engström's French-Swedish technical dictionary) monophasée I wonder let's see / I'm sure it's not in here / mo- mo- / mono- / monom- no / yes! monoph-single- single-phase / standard single-phase wall- wall- single-phase / single-phase / wall socket hm / two hundred twenty to two hundred forty volts / now we have to think hm [...] the telephone jack should be / at a maximum distance of / one and a / and I would write and the standard single-phase jack at two / at you have to repeat that hold on / comma / fifty to sixty hertz / at / a maximum distance of two meters / two meters now now you have to the telephone at a maximum distance of / the telephone should be at a maximum distance of of one and a half meter the standard wall jack at a maximum distance of two meters / [...] it's called socket and not jack! / you can't write jack / I don't think that sounds good*

The reason underlying Kristina's decision to opt for the strategy of literal translation does not explicitly emerge from the above TAP excerpt. Kristina seems to be entirely focused on finding equivalents for the different constituents of the extended noun phrase *la prise électrique standard monophasée 220-240 V, 50-60 Hz*. There are no verbalisations indicating that she asks herself if the best way to render the constituents is to copy the model of the French source text. Nothing either indicates that she asks herself if it is necessary to render them all.

Kristina is specialised in the translation of patents. She mentions several times that it is very important not to change anything when one translates patents. Yet our source text does not fall into the genre of patents. Even if Kristina must be aware of this, she seems to transfer to the present text the *global strategy* she applies to the translation of patents. The following excerpt shows this:

[2] *[Kristina] that is not good at all but what else is there? for one is also always afraid that one / and it is important in the case of technical patent texts one is not allowed to change anything at all / [...] / that is that that is not good that is not good at all we have to take it later*

Excerpt [2] contains a verbalisation that tells us something about her *professional identity*. By saying *for one is also always afraid...*, Kristina shows not only that she lacks confidence, but also that she does not have a very clear idea of what is expected of her as a translator. Of course, this does not allow us to claim that it would be the same in a routine task. By *routine task*, I mean a translation task in a language couple in which this translator is used to working (in the present case, Finnish-Swedish or English-Swedish). The adverb *always* could, however, be an indicator of the fact that she is never very sure of what she is doing, even if the present task certainly enhances her feeling of uncertainty.

All things considered, however, Kristina's TAP illustrates above all her lack of competence in both the source and the target language. Her shortcomings in French are reflected in the fact that she applies to the present task a *global strategy* she is familiar with and which allows her to stick closely to the structure of the source text in order not to get lost in what she must regard as risky interpretations. They also reveal themselves in the form of a great number of dictionary consultations for items that are, actually, quite common (see also Künzli, 2003, pp. 146-148). The data suggest that Kristina does not possess a sufficiently developed *grammatical* competence to allow her to formulate linguistically accurate sentences in Swedish (choice of words, forms and arrangements). Her translational behaviour also indicates that she has shortcomings at the level of her *sociolinguistic* competence. She does not seem capable of determining which of the possible options is the most appropriate one in the given context. Neither does she seem to be able to hear what sounds natural in Swedish. Naturalness of language use is mentioned among the subcomponents of sociolinguistic competence in Bachman's (1990, p. 95) and Cao's (1996, p. 330) models. Likewise, the global evaluation of Kristina's translation by the revisers challenges this translator's capacity of expressing herself in a natural, native-speaker like way.

The data from the questionnaire and the interview confirm the hypothesis regarding the underlying reasons for Kristina's decision to opt for the strategy of literal translation and to transfer to the present task the global strategy that she applies to the translation of patents. She declares not having followed any formal learning process of the French language; she has picked it up informally while working for some years in a French-speaking town. Also, French comes last among her working languages (see Table 1).

Of course, one cannot expect that a technical education automatically results in a sound extralinguistic knowledge in all technical fields. However, one may reasonably assume that the technical concepts referred to in the extended noun phrase *la prise électrique standard monophasée 220-240 V, 50-60 Hz* constitute basic terms for a translator with a university degree in the engineering sciences (see Bédard, 1986, p. 106). It thus appears as if Kristina fails to compensate for her lack of linguistic knowledge by making use of her extralinguistic knowledge.

Let us now come to Joakim. His translation of the extended noun phrase *la prise électrique standard monophasée 220-240 V, 50-60 Hz* (see Table 2) is based on both the omission of the constituents *standard* and *monophasée* (which entail shifts within the hyponymy relation) and the emphasis change (use of parentheses) regarding the information on the number of volts and Hertz. As we will see, these omissions are not the result of an avoidance strategy: Joakim knows both how to render the constituents *monophasée* and *standard* and in what order. These omissions are rather prompted by the activation of his sociolinguistic and extralinguistic knowledge. These same competencies play a role in his decision to move the information about the number of volts and Hertz to the background. The translation is approved by both revisers without reservation. Here is the relevant TAP excerpt:

- [3] *[Joakim] here it says the single-phase electrical outlet but I have never ever seen anything else but a single-phase electrical outlet (he laughs) in a in an office or in an apartment that's why I take the liberty of deleting single-phase hm / I will put hm comma and / well yes it has to be standard yes that's obvious I don't have to write that in a user guide for the Swedish public / and hm electrical outlet and then I take the liberty of putting hm parentheses here hm there are none in the source text the contents in the parentheses figure in the source text but not the parentheses as such / two hundred twenty dash or hyphen difficult to say here they put hyphen so I continue like that two hundred forty hm V as in volt comma hm fifty hyphen sixty Hertz / [...] / it does say here meter abbreviated to m in the source text but I believe that one can go to the trouble of writing meter because there might be somebody who overlooks this and it is so little trouble to write four letters twice instead*

These verbalisations clearly illustrate that extralinguistic knowledge “kills uncertainty” in relation to the source text (Bédard, 1986, p. 100) – provided that the participant has sufficient linguistic knowledge, as we have seen.

Joakim omits first the element *monophasée*, claiming that he has never seen an electrical socket in an apartment or in an office that does not use single-phase current. This element seems to be so obvious or redundant to him that he laughs. Moreover, he stresses that the constituent *standard* is not essential either to the Swedish user. He then announces his decision to put the information on the number of volts and Hertz in parentheses, without, however, justifying this decision. One thing seems certain though: he does not try to solve a translation problem by simply shifting information to the background. Maybe he believes that the technical details moved to the background are of secondary importance. Indeed, in order to correctly install the machine, the users have to know above all that they need to connect the machine to two outlets, a telephone jack and a wall socket, and that the distance between the machine and the outlets must not exceed a certain distance.

Another reason for the observed translational behaviour may be Joakim's intention to write a translation that is easy, even pleasant to read. It is in these terms that he motivates his decision to render the abbreviation *m* of the French original by writing it out in full in Swedish, i.e., *meter*. One may interpret these verbalisations as revealing *global strategies*. Thus, it seems that Joakim believes that when translating user guides for the broad general public, (1) the adaptation of the target text to the context of the target audience prevails over faithfulness to the information given in the source text, and (2) the target text must be adapted to the needs of its audience, who are not necessarily technical experts. The analysis of other segments of his TAP reveal that we are in the presence of global strategies: similar verbalisations appear systematically. The translational behaviour of Joakim also reflects the recommendation given in the literature on how to deal with terms that are considered superfluous or liable to confuse the audience of the text. It shows an interaction between his linguistic knowledge, more precisely his sociolinguistic competence (decision to omit certain technical details of the source text in the specific context of a user guide addressed to the broad general public in Sweden) and his extralinguistic knowledge.

Finally, the verbalisations in excerpt [3] can be interpreted as an implicit positive self-evaluation, i.e., as comments reflecting the *professional identity* of Joakim. They show that when it comes to the translation of technical vocabulary, Joakim has confidence in his decisions. Moreover, he takes on the role of a communicator trying to get a message across. The laughter could be interpreted as an implicit criticism of the author of the source text; as indicating that Joakim might believe that he knows better the needs of the broad general public to whom this user guide is addressed.

Contrary to Kristina, Joakim has had a formal education in French. Therefore, he certainly has acquired a basic grammatical competence in this language.

French is not the only Romance language figuring among his working languages either; he also lists Italian. What is more, he explicitly states in the questionnaire that he even draws upon his knowledge of Italian – and Latin – when he works from French into Swedish. The hypothesis that he has a more sound knowledge of French than Kristina is furthermore strengthened by the fact that he resorts more rarely to dictionaries to look up relatively common terms. Finally, the global evaluation of his translation by the revisers suggests that he is capable of expressing himself in idiomatic Swedish.

Discussion

The observations above suggest that the choice of a translation *strategy* and the presence of a translation *principle* are connected to the translator's degree of linguistic and extralinguistic knowledge. They also reveal the usefulness of Cao's (1996) model of translation proficiency in describing specific subcomponents of the knowledge and competencies involved in professional translation. More specifically, the results suggest that extralinguistic knowledge can only facilitate the translation process and compensate for a lack of linguistic knowledge if the latter is at a minimum threshold level. A lack of linguistic knowledge cannot either be compensated for by applying translation strategies and principles that have proved successful when the translator is working from a language of which he or she has a better knowledge, so it seems. These results confirm the conclusions drawn by Dancette (1995, p. 188) from her experimental and quantitative study on the comprehension processes in translation. The description of threshold effects, i.e., the fact that it is necessary to have a minimum level of linguistic and extralinguistic knowledge in order to be able to translate and comprehend, is one of the main results of her research.

The present data allow us, however, to see this question in a new light. Dancette (1995) had recruited trainee translators. My sample, on the other hand, comprises not only professional translators, but translators with a technical education. They have, in theory at least, the necessary extralinguistic knowledge in order to successfully accomplish the translation task. Yet, as we have seen, an education in the field of engineering sciences does not amount to the same thing as being able to provide quality in technical translation. This observation is anything but banal. Many translators state having had the experience that potential clients give priority to extralinguistic knowledge (documented, e.g., in the form of a technical education), to the detriment of an education in the languages involved. The fact that Kristina has been able to work as a freelance translator without being able to present a document certifying her knowledge of French testifies to this – whereas the data collected within the framework of a new research project (Künzli, 2005)

shows that the acquisition of sound linguistic knowledge allows translators to embark with more facility and confidence upon tasks for which they may not, in the beginning, have the necessary extralinguistic knowledge. For example, it is thanks to their knowledge of the grammatical differences between two languages in the formation of technical terminology that translators will be able to detect semantic nuances, find initial solutions and finally determine, with circumspection, which of the problems they will be able to solve on their own before approaching subject-matter experts who will be able to compensate for their possible lack of extralinguistic knowledge.

The results have a variety of potential implications. When it comes to research, they illustrate, once more, that it is by taking into account translators' mental processes that one can get a more precise picture of the pathways that lead to a certain translation solution. The interest of case studies resides precisely in the fact that they are in general based upon a combined use of methods in order to investigate one and the same phenomenon from different perspectives. In the present study, I had access to two main sources – the written translations and the TAPs – as well as to various secondary sources (the logbook documenting the participants' use of information sources, the questionnaire, the interview and the evaluations of the revisers). Furthermore, the results could be relevant to translator training. They suggest that trainee translators benefit from a systematic integration of contrastive lexicology, grammar and pragmatics in translation courses. Cao's (1996) theoretical model of translation proficiency appears useful not only in accommodating for empirical data on translation performance, but also in teaching translation. Thus, trainers could set up translation exercises allowing trainees to develop each of the specific subcomponents of translational language competence (grammatical, textual, illocutionary and sociolinguistic competence). Even if translators translate texts and not isolated words or sentences, trainers should not turn a blind eye to the more basic aspects of the act of translation, such as the interpretation of the source language's morphology or syntax and its reproduction in the target language. Neither should one assume that the mastery of these aspects is given or cannot be developed. The present study also reveals the important role played by the translator's *grammatical competence* not only when he or she is working with two structurally distant languages (say Chinese and Swedish), but even in translation between more closely related languages. Grammatical competence has, however, received little attention in translation research so far.

Let me finish with some comments about future directions. I have mentioned translational strategic competence as a variable to be considered within translation proficiency. However, I have deliberately excluded it from the analyses. Bachman (1990) and Cao (1996) stress that the identification of the role played by strategic competence in accomplishing linguistic tasks is not easy.

Strategic competence refers to the planning, execution and assessment functions in determining the most effective means of achieving a communicative goal (Bachman, 1990, pp. 107-108). It influences the act of translation insofar as one may presume that there are some translators who make better use of their linguistic and extralinguistic knowledge than others. Even if the testing and measuring of this variable is not easy, the present results offer at least some indications on how to proceed, for example, by examining the way in which the translator makes use of the information obtained from consulting information sources. I had distributed to the participants parallel texts written in Swedish. Swedish equivalents of the extended noun phrase that were the object of the present study figured in these user guides. Yet it turned out that the female translator did not make use of this information. One may ask oneself if this was due to a shortcoming in her strategic competence or if, due to her lack of linguistic knowledge, she would not, in any case, have been capable of identifying the most efficient way of successfully accomplishing the translation task. More precisely, that her lack of knowledge of French would not have allowed her to relate the information found in the parallel texts written in Swedish to the French source text. Finally, even if the translational behaviour of the female translator with a technical background revealed numerous uncertainties, one should refrain from viewing the acquisition of translation proficiency as a linear process leading automatically to perfection. Indeed, her translation and her verbalisations show that she managed to activate certain types of knowledge and competencies. It therefore appears desirable to set up experiments in which participants are asked to accomplish at least two different translation tasks. Not only would this provide us with better opportunities for taking into consideration within-subject variability, it would also give us a more just appreciation of each individual translator's knowledge and competencies.

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Appendix: The French source text

INSTALLER GALEO 4710

GALEO 4710 doit être placé à l'écart de toute zone de chaleur excessive et d'installation d'air conditionné. Il doit être protégé contre les vibrations, la poussière, l'humidité, les projections d'eau ou de produits, le rayonnement électromagnétique, et son accès doit être aisé.

La prise téléphonique doit se trouver à 1,50 m maximum, la prise électrique standard monophasée 220-240 V, 50-60 Hz à 2 m maximum.

1. Tournez votre appareil de façon à voir sa face gauche.
2. Branchez le cordon du combiné téléphonique au connecteur (A).
3. Branchez le cordon de ligne téléphonique au connecteur (B), d'un côté, et dans la prise téléphonique murale, de l'autre.
4. Insérez la petite fiche du bloc alimentation dans le connecteur (C): ouvrez le capot avant et le capot arrière. La petite fiche étant branchée sur le connecteur (C), faites passer le cordon dans le passe-fil (D). Refermez les capots arrière et avant.
5. Branchez la fiche du cordon secteur du bloc alimentation dans une prise de courant murale aisément accessible.

Votre appareil est maintenant sous tension.