Behind the Mind

Methods, models and results in translation process research

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Towards a model of translation competence and its acquisition: the longitudinal study *TransComp*[1]

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Abstract

The first part of this article gives a short survey of how translation competence and its acquisition have been modelled so far and of what we know from expertise research about the cognitive processes involved in expert performance. Drawing on this, a model of translation competence is presented as a framework of reference for the research project TransComp, a longitudinal study which explores the development of translation competence in 12 students of translation over a period of three years and compares it to that of 10 professional translators. The model will be used to generate hypotheses to be verified in TransComp. In the second part of the article, the design of TransComp, the research questions asked, and the methods of measuring those features which are assumed to be indicators of central sub-competences of translation competence will be presented. The article concludes with information on the availability of the materials used for the study and the data collected in TransComp.

1. Translation competence acquisition – providing empirical evidence for our assumptions

The development of models of translation competence and, even more so, the development of models of translation competence acquisition is still in its infancy. One of the reasons for this is that investigating how translation competence develops is only possible by means of longitudinal studies,

[1] TransComp is funded by the Austrian Science Fund (FWF) as project No. P20908-G03 (September 2008–August 2011).

and longitudinal studies are extremely cumbersome and time-consuming. This also explains why longitudinal studies in the strictest sense of the term, involving the analysis of translation products and processes of the *same* persons *at regular intervals* during their training and later professional career, do not yet exist. When modelling translation competence and translation competence acquisition, we can so far draw on:

a) the results of studies comparing the translation processes of translation students with those of professional translators (for an overview, see Göpferich 2008: 168 ff.),
b) theoretical reflections on the components which make up translation competence, and
c) results of investigations into the development of expertise in various domains, such as playing chess, conducted by cognitive psychologists (cf. Ericsson/Smith 1991).

Below a short survey will be given of how translation competence and its acquisition have been modelled so far[2] and of what we know from expertise research about the cognitive processes involved in expert performance. Drawing on this, I will develop my own model of translation competence as a framework of reference for a longitudinal study of the development of this competence: TransComp. The model will also be used to generate hypotheses to be verified in TransComp. The design of this longitudinal study, the research questions asked, and the methods of measuring those features which are assumed to be indicators of central sub-competences of translation competence will be presented in the second part of this article. It concludes with information on the availability of the materials used and the data collected in TransComp.

2. Central components of a translation competence model

There is consent among translation scholars that translation competence is composed of several sub-competences. What sub-competences have to be taken into account, and how they can be defined, is still a matter of debate (see, for example, PACTE 2000; 2002; 2003; 2005; Shreve 1997; Wilss

[2] For a more detailed description of the existing translation competence and translation competence acquisition models, see Göpferich (2008: Ch. 6).

1992). There is no doubt, however, t-hat at least the following three play a decisive role: communicative competence in the source language and the target language, domain competence, and tools and research competence (see Section 2.3). Furthermore, there is general agreement that translation competence involves more than the sum total of these three – and perhaps other – sub-competences.

For both Hönig (1991; 1995) in his model of an ideal translation process (Fig. 1) and Pym (2003) in his "minimalist approach" to defining translation competence, translation competence is composed of two main sub-competences: (1) associative competence and (2) the competence to develop a "macro-strategy" (Hönig 1991; 1995) and to employ it consistently. Pym describes these two competences as follows:

> [T]he training of translators involves the creation of the following two-fold functional competence (cf. Pym 1991):
>
> The ability to generate a series of more than one viable target text (TT_1, TT_2 ... TT_n) for a pertinent source text (ST) [This corresponds to what Hönig calls associative competence.];
>
> The ability to select only one viable TT from this series quickly and with justified confidence. [This corresponds to Hönig's macro-strategy and the ability to employ it consistently.]
>
> We propose that, together, these two skills form a specifically translational competence; their union concerns translation and nothing but translation. There can be no doubt that translators need to know a fair amount of grammar, rhetoric, terminology, computer skills, Internet savvy, world knowledge, teamwork cooperation, strategies for getting paid correctly, and the rest, but the specifically translational part of their practice is strictly neither linguistic nor solely commercial. It is a process of generation and selection, a problem-solving process that often occurs with apparent automatism. (Pym 2003: 489)

What Hönig calls "macro-strategy" also appears at the heart of the PACTE group's translation competence model, to which I will return in Section 2.2, and in Risku's (1998) "cognition models of translation competence". To understand what Hönig means by "macro-strategy", we have to take a closer look at his model.

2.1 Hönig's model of an ideal translation process

According to Hönig's model (Fig. 1), translators first read the ST (upper right corner of the model). Their source-text reception, however, differs from that of ordinary readers in a non-translation-specific situation, since their text reception is influenced by the translation task they have in mind.

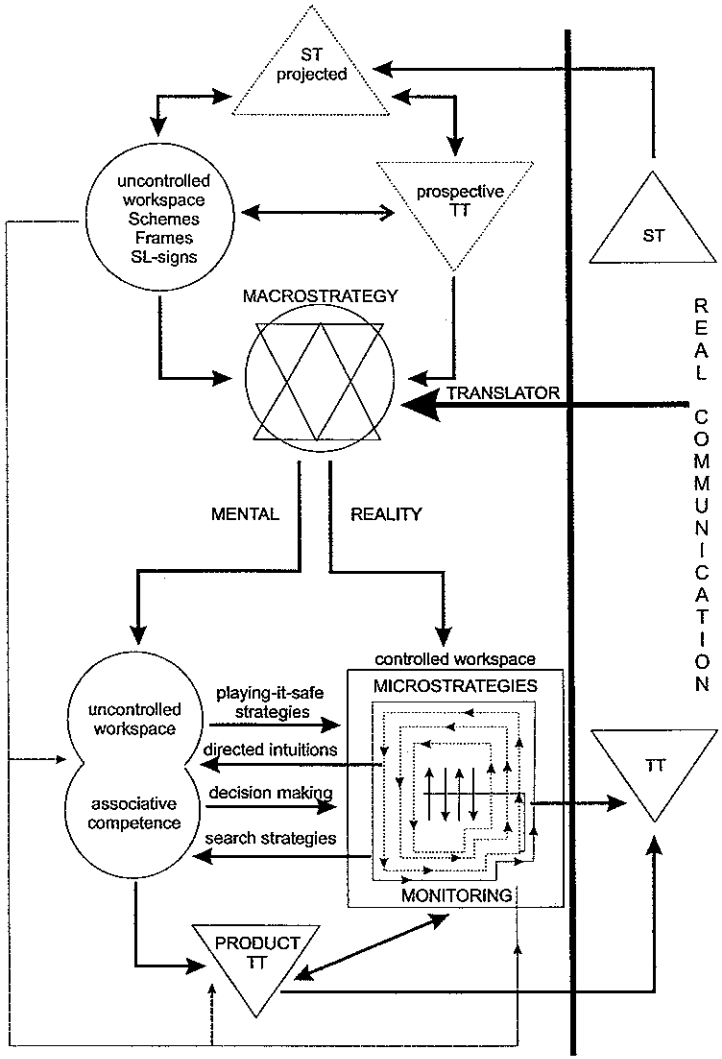

Figure 1. Hönig's model of an ideal translation process (Hönig 1991: 79; terminology adapted to Hönig 1995: 51)

The source text projected into the translator's mental reality becomes the object of mental processing or, to be more precise, further mental processing, because the first reception also involves mental processing. This occurs in two different workspaces: the uncontrolled workspace and the controlled workspace.

Processing in the uncontrolled workspace involves the activation of frames and schemes, which are structured domains of long-term memory, in associative processes (Hönig 1991: 79 f.; 1995: 55). These associative processes give rise to expectations with regard to the prospective target text. Expectations with regard to structure, style, and content of a text form part of any comprehension process; in translation, however, they are target-text-oriented (Hönig 1995: 55).

Using the projected source text, the prospective target text, and data from their uncontrolled workspaces, competent translators develop a translation macro-strategy. What goes into this macro-strategy are not only the characteristics that are decisive for the target text, such as its function, its audience, and the medium in which it will appear, but also the options that translators have for searching information and verifying their subjective associations, as well as for improving their subject domain knowledge (Hönig 1995: 56 f.). Developing such a macro-strategy may happen more or less automatically on the basis of the translator's professional experience, or "very deliberately, possibly with the aid of translation-relevant textual analysis" (Hönig 1991: 80). Ideally, the development of a macro-strategy precedes the actual translation phase, in which both the uncontrolled workspace and the controlled workspace are involved. In the controlled workspace rules and strategies are employed, for which Hönig (1995: 50; my translation) provides the following examples:

- Do not translate proper names.
- The English *continuous form* translates into German by adding *gerade*.
- *Government* means *Regierung*.
- Avoid repeating the same words in German texts.

These rules may lead to appropriate results in some cases, but not in all. To be able to decide whether a rule is applicable in a specific situation, translators again need a macro-strategy which controls the use of the micro-strategies to be employed. Without a macro-strategy, translators run

the risk of getting lost in the maze of micro-strategies in their controlled workspaces.

During the translation phase, the processes in the uncontrolled workspace are complemented by an associative competence (or "transfer competence"; Hönig 1991: 80), which comprises what some scholars, such as Harris/Sherwood (1978), have termed "innate translation ability".

Potential translation equivalents may become part of the target text ("Product TT" in Fig. 1) in four different ways (Hönig 1991: 80; see also 1995: 56):

(1) As a linguistic reflex stimulated by the first contact between the *projected st* [sc. source text] and semantic associations in the *uncontrolled workspace.*
(2) As an automatic transfer from the *uncontrolled workspace* after a macrostrategy has been worked out.
(3) As a product of a microstrategy applied in the *controlled workspace* which has been approved by *monitoring.*
(4) As a product of interdependent processes taking place in the *controlled* and *uncontrolled* workspaces, whereby the final approval can be either by uncontrolled ("automatic") or controlled ("cognitive") processes.

Decisions based on a macro-strategy thus, step by step, lead to a target text, each portion of which is evaluated by deciding whether it fulfils the requirements the translator has in mind. The target text leaves the translator's mental reality, can be handed over to the commissioner and become part of a real communication process (Hönig 1995: 56).

Hönig (1995: 56) does not claim that his model covers all relations and interdependencies, but emphasizes that most didactic approaches do not even take into account this minimal complexity. For Hönig the most important insight into translation processes provided by his model for translation pedagogy is the following:

> The main reason why many students and teachers of translation are frustrated is that they experience the complexity of their mental processes while translating, but try to relieve themselves of this complexity because they do not really understand the processes.
>
> What is symptomatic of such relief efforts is clinging to rules which are supposed to prove the absolute correctness of the way a certain word or phrase has been rendered.
>
> Typical signs of such relief efforts are striving for symmetrical matches between source-text and target-text units and using the term *equivalence.* (Hönig 1995: 57; my translation)

The relationship between the two central components of translation competence, *associative competence* ("Assoziationskompetenz"; Hönig 1995: 62) or "transfer competence" (Hönig 1991: 84) on the one hand and the ability to develop a macro-strategy and to employ it consistently on the other, can be described as follows. Transfer or associative competence is indispensable for translation; its use must be encouraged so that it can become part of the translator's self-confidence. According to Hönig (1995: 62), it is the driving force in translation processes, the 'engine' in the uncontrolled workspace. Translations which fulfil their functions, however, are achieved only when the results produced by this associative competence are subjected to a macro-strategy. It is only the consistent employment of such a macro-strategy that leads to real translation competence. Hönig (1995: 62; my translation) points out:

> It is only translation competence which gives translators the self-confidence needed to make use of their associative competence and to avoid subjecting their products to monitoring processes in the controlled workspace again and again.
>
> In other words: Translation competence enables translators to translate as well as they can on the basis of their associative competence. **Without** translation competence, they will definitely translate worse than they could.
>
> This also means, however, that translators who do not follow a macro-strategy but possess an extensive associative competence may translate better than translators who employ a macro-strategy (but lack associative competence).

2.2 The PACTE group's revised translation competence model

The PACTE group's first translation competence model dates back to 1998, but was revised soon afterwards (see PACTE 2007: 330). In the following, only the improved revised version shown in Fig. 2 will be presented. According to this model, translation competence, which the PACTE group defines as "the underlying system of knowledge, abilities and attitudes required to be able to translate", is composed of five sub-competences and psycho-physiological components.

These form "a system of competencies that interact, are hierarchical, and subject to variation" (PACTE 2002: 43; see also PACTE 2000: 100). The centre of the model is formed by the *strategic competence*, which the PACTE group (PACTE 2005: 610) defines as follows:

> The strategic sub-competence is the most important, solving problems and guaranteeing the efficiency of the process. It intervenes by planning the process in

relation to the translation project, evaluating the process and partial results obtained, activating the different sub-competencies and compensating for deficiencies, identifying translation problems and applying procedures to solve them.

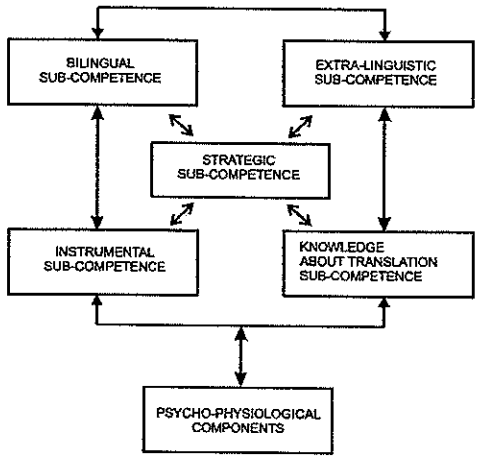

Figure 2. The PACTE group's revised translation competence model (PACTE 2002; 2005: 610; 2007: 331)

Comparing this concept to those in Hönig's model (Fig. 1) leads to the conclusion that strategic competence is nothing but the competence to develop an adequate macro-strategy and to employ it consistently. Like the strategic competence, the macro-strategy decides what specific sub-strategies need to be employed in a certain situation.

The fact that the macro-strategies and their sub-strategies are situation- and problem-dependent seems to be enough of a justification for the assumption that their development and selection do not involve purely "declarative knowledge", but mainly "operative knowledge" in the sense of Anderson (1983). Translation competence involves both declarative and operative (procedural) knowledge,[3] the latter being the more relevant of the two for the distinction between translation experts and translation novices (PACTE 2003: 42).

[3] What has to be taken into account in think-aloud studies is that according to Anderson (1983) declarative knowledge can easily be verbalized, clearly be defined, and is processed consciously, whereas operative knowledge is difficult to put into words, can only be possessed partly, is acquired only gradually by means of practical exercises, is processed automatically, and thus remains in the subconscious mind and is not available for verbalization (cf. PACTE 2000: 102).

By *bilingual sub-competence* the PACTE group means "pragmatic, socio-linguistic, textual and lexical-grammatical knowledge in each language" (PACTE 2005: 610) including "interference control", i.e., the ability to avoid interferences between the languages. They consider the relevant knowledge to be mainly procedural (PACTE 2003: 91 f.).

By extra-linguistic sub-competence the PACTE group means

> [p]redominantly declarative knowledge, both implicit and explicit, about the world in general and special areas. It includes: (1) bicultural knowledge (about the source and target cultures); (2) encyclopedic knowledge (about the world in general); (3) subject knowledge (in special areas). (PACTE 2003: 92)

Instrumental sub-competence is made up predominantly of procedural knowledge related to the use of documentation sources and information and communication technologies applied to translation: dictionaries of all kinds, encyclopaedias, grammars, style books, parallel texts, electronic corpora, etc. (PACTE 2003: 93; 2005: 619).

Knowledge about translation sub-competence comprises

> [p]redominantly declarative knowledge, both implicit and explicit, about what translation is and aspects of the profession. It includes: (1) knowledge about how translation functions: types of translation units, processes required, methods and procedures used (strategies and techniques), and types of problems; (2) knowledge related to professional translation practice: knowledge of the work market (different types of briefs, clients and audiences, etc.). (PACTE 2003: 92)

To my mind, this category comprises rather inhomogeneous components and therefore should be split up into two sub-competencies. As will become evident in my model (Fig. 3), I propose subdividing it into *translation routine activation competence*, which roughly includes the aspects listed under (1) in the quotation above, and the translator's self-concept, which differs in status from the other sub-competences. I will come back to its different status in Section 2.3.

Psycho-physiological components comprise cognitive and attitudinal components as well as psycho-motor mechanisms.

> They include: (1) cognitive components such as memory, perception, and attention and emotion; (2) attitudinal aspects such as intellectual curiosity, perseverance, rigor, critical spirit, knowledge of and confidence in one's own abilities, the ability to measure one's own abilities, motivation, etc.; (3) abilities such as creativity, logical reasoning, analysis and synthesis, etc. (PACTE 2003: 93)

They have a special status in the PACTE model because they are not translation-specific but form "an integral part of all expert knowledge" (PACTE 2003: 91).

2.3 My translation competence model

On the basis of the models mentioned above,[4] I have developed my own translation competence model, which forms the framework of reference for the longitudinal study TransComp (Göpferich 2007).

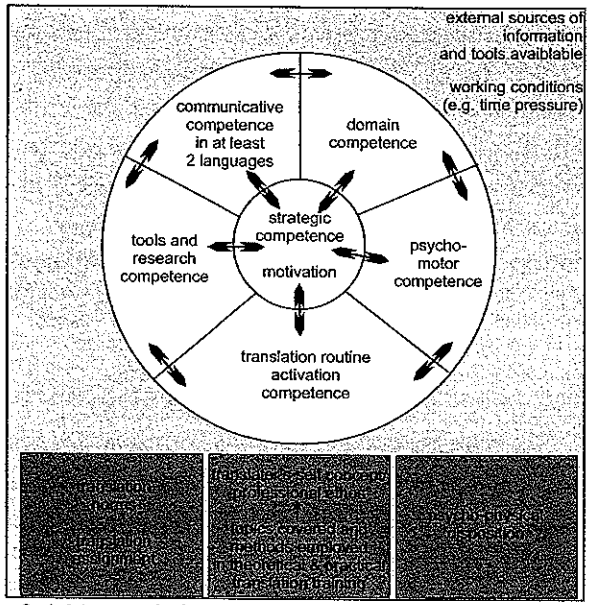

Figure 3. Göpferich's translation competence model

As illustrated in Fig. 3, I differentiate between the following sub-competences.

1. Communicative competence in at least two languages
   This sub-competence corresponds to the PACTE group's "bilingual sub-competence". It comprises lexical, grammatical and pragmatic knowledge in both languages. Pragmatic knowledge also includes knowledge about genre and situation-specific conventions in the respective cultures. Communicative competence in the source language is relevant primarily for source-text reception, whereas target-language competence determines the quality of the target text produced. Target-language receptive competence must not be neglected, however, because it is needed for monitoring processes in which source-language units and target-language units are compared for semantic equivalence, for example.
2. Domain competence
   This corresponds approximately to the PACTE group's "extra-linguistic sub-competence" and comprises the general and domain-specific knowledge that, in addition to the knowledge mentioned above, is necessary to understand the source text and formulate the target text, or at least the sensitivity to recognize what additional knowledge is needed from external sources of information to fill one's knowledge gaps.
3. Tools and research competence
   This corresponds to the PACTE group's "instrumental sub-competence" and comprises the ability to use translation-specific conventional and electronic tools, from reference works such as dictionaries and encyclopaedias (either printed or electronic), term banks and other databases, parallel texts, the use of search engines and corpora to the use of word processors, terminology and translation management systems as well as machine translation systems.
4. Translation routine activation competence
   This competence comprises the knowledge and the abilities to recall and apply certain – mostly language-pair-specific – (standard) transfer operations (or shifts) which frequently lead to acceptable target-language equivalents. In Hönig's terminology, this competence could be described as the ability to activate productive micro-strategies (see also Section 5.2, especially footnote 10).
5. Psychomotor competence
   These are the psychomotor abilities required for reading and writing (with electronic tools). The more developed these competences are, the less cognitive capacity is required, leaving more capacity for other cognitive tasks. Psychomotor skills needed for typing may have an impact on the cognitive capacity that will be available for solving

[4] For a "psycholinguistic model of the translation process", see Kiraly (1995); for a critical review of Kiraly's model, see Göpferich (2008: 137 ff.).

translation problems in a narrower sense, because from this the memory capacity needed for performing psychomotor tasks has to be subtracted. The poorer the psychomotor skills are, the larger the cognitive capacity required by psychomotor activities is assumed to be.

6. Strategic competence

   This corresponds to the PACTE group's "strategic competence" and controls the employment of the sub-competences mentioned above. As a meta-cognitive competence it sets priorities and defines hierarchies between the individual sub-competences, leads to the development of a macro-strategy in the sense of Hönig (1995), and ideally subjects all decisions to this macro-strategy. How strictly translators adhere to employing this macro-strategy depends on their strategic competence and their situation-specific motivation, which may be both intrinsic (enjoying translating) or extrinsic (payment, fear of compensatory damages, etc.).

The employment of the sub-competences mentioned above and their central control are determined by three factors, which form the basis of my model: (1) the translation brief and translation norms; (2) the translator's self-concept/professional ethos, on which the contents conveyed and the methods employed in theoretical and practical translation training courses have an impact and which form the component of my model where aspects of social responsibility and roles come in (cf. Risku 1998: 90; 2004: 76), and (3) the translator's psycho-physical disposition (intelligence, ambition, perseverance, self-confidence, etc.). Translators' psycho-physical disposition may have an influence on how quickly their translation competence develops: a critical spirit and perseverance in solving translation problems may accelerate the development of translation competence.

3. The PACTE group's translation competence acquisition model

Since, as we have seen, the translation competence models developed so far are still rather vague, it is obviously even more complicated to develop a translation competence acquisition model. The only existing model of translation competence acquisition is that of the PACTE group (Fig. 4).

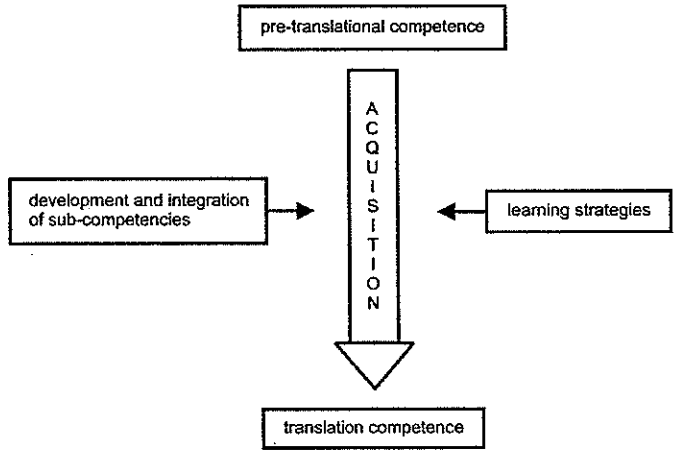

Figure 4. The PACTE group's translation competence acquisition model (PACTE 2000: 104)

The model is based on the PACTE group's revised translation competence model, which I, however, propose to replace by my own model (Fig. 3). According to the PACTE model, the acquisition of translation competence involves the development of the individual sub-competences and, in addition to this, the development of the integrative competence to fall back on the individual competences and to prioritize them depending on the respective assignment and communicative situation ("integration of the sub-competencies"). The development of these competences and their integration do not only involve the accumulation of declarative knowledge, but, above all, the restructuring of existing knowledge (PACTE 2000). The PACTE group describes this as follows:

> Thus, the novice stage in the development of translation competence could be defined as the stage when the sub-competencies have been acquired, at least partially, but they do not interact with each other. Therefore, the development from novice to expert is not only a question of acquiring the missing sub-competencies, but also of re-structuring the existing sub-competencies to put them at the service of the transfer competence [i.e., the strategic competence in my terminology]. (PACTE 2000)

According to the PACTE group, this integration and restructuring is only made possible by a learning competence with specific learning strategies (Fig. 4).

4. Findings in expertise research

The PACTE group's description of the development of translation competence is supported by findings from expertise research. Some of the results from this field of cognitive psychology that are relevant for process research into the development of translation competence are the following:

1. Experts do not only possess a large amount of knowledge in their specialized domain; this knowledge has also been restructured and interconnected to a higher degree in the process of its acquisition; they possess superior analytical and creative as well as practical skills; their mental processes have been automatised to a higher degree (Sternberg 1997).

2. The high degree of interconnection of knowledge in their long-term memories allows experts to retrieve it more quickly and with more precision and to overcome limitations of their working memories (Ericsson/Charness 1997: 15 f.; Neubauer/Stern 2007: 165 f.). They are able to plan taking many factors into account (Ericsson/Smith 1991: 25 f.).

3. Experts have transformed declarative knowledge in their domain of specialization into procedural knowledge ("proceduralisation"); they learn tactically (i.e., they store and automatise sequences of actions and strategies they need for problem solving in their domain) as well as strategically (i.e., they know how problem-solving processes in their domain can be tackled most efficiently). Complex mental problem representations help them in doing so (Anderson [3]1990: 267 ff.).

These specific features of expert performance are also reflected in Risku's "cognition model" of expert translation competence. Comparing this model to her "cognition model" of novice translation competence reveals what must happen on the way from novice to expert (Risku 1998: 241 ff.).

5. TransComp – a longitudinal study into the development of translation competence

As mentioned in Section 1, the above-mentioned assumptions and findings have not yet been verified in longitudinal studies of the development of translation competence if *longitudinal study* is understood in the strictest sense of the term. There are findings from numerous contrastive studies, though, comparing the translation processes of students of a certain translation competence level with those of more advanced translators or even translation professionals, which support the above-mentioned assumptions (for a survey of these findings, see Göpferich 2008: 168 ff.).

To gain insight into the development of translation competence *in its continuity*, to provide stronger empirical evidence of the assumptions above, and to refine the models presented so far, the longitudinal study TransComp was launched at the University of Graz in October 2007 (Göpferich 2007).

5.1 The design of TransComp

In TransComp twelve undergraduate students of translation at the beginning of their first semester and ten professional translators have been selected as subjects. The number of professional translators is smaller because the project focuses on the students' development of translation competence and the data from professional translators are needed for purposes of comparison only.

The most crucial selection criterion for the student subjects was that they had obtained "very good" or "good" grades for their A-level exams in German (their mother tongue) and English (their first foreign language). English also had to be the first foreign language they chose for their Translation Studies program. Furthermore, the potential student subjects had to take a test measuring their abilities for semantic differentiation.[5]

The twelve student subjects have been divided into two groups of six subjects each. If students drop out, they will be replaced by other students with a similar profile.

Each student will have to translate ten English texts (eight extracts from popular-science texts and two extracts from operating instructions for household appliances) into German according to the scheme in Table 1.

[5] By means of this test, we wanted to select the twelve best students from those who had volunteered to take part in TransComp and met the other criteria mentioned above. Since there were very few volunteers who fulfilled these other criteria, all were accepted.

Table 1. Translation scheme[6]

	Group A (6 students)	Group B (6 students)
Beginning of 1st semester	Text A1, Text A2, Text A3	Text B1, Text B2, Text B3
Beginning of 2nd semester	Text A4, Text A5 Text B1 (1 semester's lag)	Text B4, Text B5 Text A1 (1 semester's lag)
Beginning of 3rd semester	Text B2 (2 semesters' lag)	Text A2 (2 semesters' lag)
Beginning of 4th semester	Text B3 (3 semesters' lag)	Text A3 (3 semesters' lag)
Beginning of 5th semester	Text B4 (3 semesters' lag)	Text A4 (3 semesters' lag)
Beginning of 6th semester	Text B5 (4 semesters' lag)[7]	Text A5 (4 semesters' lag)
End of 6th semester	Text A1 (6 semesters' lag)	Text B1 (6 semesters' lag)

The scheme takes into account that competence improvements may not occur to a sufficient extent to be detected after only one, two or three semesters, but may only become detectable after two or three years. It allows us to check for progress over longer periods. It also takes into account that progress may proceed in steps, with varying improvement speeds over the whole period.

All texts will be translated only once by each student except for Text A1 and Text B1, which will be re-translated after three years when the learning effect can be assumed to have become highly attenuated, i.e., when the students can be assumed to have forgotten how they had translated it three years before. Five of the professional translators will translate Texts A1 to A5, the other five, Texts B1 to B5.

The source texts selected offer a repertoire of different translation problems (lexical, syntactic, pragmatic, text-linguistic, culture-specific, creativity-demanding and comprehensibility-related problems). Their comprehension, however, does not require any specialized knowledge. They were primarily chosen because they are relatively easy to understand, but difficult to transfer into the target language. These texts have to be translated in Translog 2006, which registers all keystrokes, mouse clicks, and the time intervals between them. To guarantee ecological validity, the

[6] 'Lag' indications show the time elapsed from the moment the relevant text was translated first to the moment it is re-translated for the purpose of comparison.

[7] Unfortunately, we will not have data for a time lag of five semesters because this would have involved handing out two more texts for translation to the subjects at the beginning of their first semester, which was not feasible due to time and staff constraints.

subjects are allowed to use the Internet as well as any other electronic and conventional resources they wish. Use of electronic resources is registered by the screen-recording software Camtasia Studio (or ClearView respectively[8]); use of conventional resources is documented by observers.

Originally we had planned that 50 % of the student subjects and 50 % of the professional translators would have to think aloud during the experiments (level 1 and 2 verbalizations according to Ericsson/Simon 1999: 79); the remaining 50 % in both groups would be asked to comment on their translation processes in immediate retrospective interviews for which we wanted to use the screen records of their translation processes as prompts. This would have allowed us to compare the data elicited by means of the two methods with regard to their comprehensiveness and to establish the degree to which the method interfered with the actual translation process. If one of the two methods turned out to be superior for answering our research questions, the plan was to proceed with this method only. However, after the first experiment, we asked our subjects how they felt about the think-aloud method, for which they had been trained before the experiments in a trial run, or whether they would prefer the retrospective method instead. All subjects answered unanimously that they strongly preferred the think-aloud method. One of the reasons for this can be assumed to be the fact that cued retrospection is very time-consuming and the subjects did not want to spend even more time on the experiments. The student subjects felt exhausted after each experiment and wanted to rest, whereas the professional translators had their busy schedules in mind. Therefore, we decided to use think-aloud in all

[8] For three of our subjects in the first wave, a Tobii eye-tracker (with the screen-recording software ClearView) was also used. Due to the long duration of our experiments (approx. 1 hour or more), in which we could not prevent the subjects from moving out of the area in which eye-tracking registration is possible, and other reasons, poor eye-tracking results were obtained, which do not allow any detailed analysis. Since the added value we obtained from the eye-tracking results was minimal compared with the effort involved in using this additional method, it was decided to abandon it. Eye-tracking seems to be more useful when focusing on specific aspects of the translation process, such as fixations in certain areas of the screen, than when analysing translation processes as a whole. Cf. Göpferich (in press) for methodological aspects of using eye-tracking.

experiments in order not to risk obtaining incomplete accounts in the retrospective interviews due to the subjects' lack of motivation.

The think-aloud will be transcribed using XML mark-up according to the *Guidelines for Electronic Text Encoding and Interchange* (version P5) of the *Text Encoding Initiative* (TEI 2008). These guidelines have been modified slightly to meet the specific requirements of translation process studies (for a detailed description of the transcription rules used, see Göpferich in press). In addition to the subjects' think-aloud, the transcripts also include other activities such as search processes.

Immediately after each translation, the subjects have to fill in questionnaires on how they felt during the translation process, on the problems they encountered, the strategies they employed to solve them and the extent to which they were satisfied with the results.[9] After this, short retrospective interviews will be conducted with the subjects. The goals pursued in these short retrospective interviews are (1) to collect data on phases in the translation process where the subjects stopped verbalizing while thinking aloud (due to cognitive overload or other reasons), (2) to find out whether the subjects are aware of certain problems they may have encountered during the translation process, and (3) to make sure that the terminology they use in their think-aloud and their retrospective interviews is interpreted in the way they intended.

Although retrospective verbalization, in contrast to think-aloud (concurrent verbalization), has the advantage of not interfering with the translation process, think-aloud is used as a primary source of information, at least for the student subjects, because "[f]or tasks of longer duration, the validity of think-aloud reports appears to be higher than that of retrospective reports" (Ericsson/Simon 1999: xxii). Since we assume, however, that in professional translators more processes will be automatised and that they will take into account more potentially translation-relevant factors in their translation processes leading to higher cognitive load and thus to less concurrent verbalization, more emphasis will be placed on the retrospective interviews when analysing their translation processes (see also Hansen 2006; and Section 5.2). Since our subjects translate into their mother tongue, i.e., the same language in which

[9] For the availability of the materials used in the experiments, see Section 6.

they are thinking aloud, interferences should be smaller than in studies where the language in which the subjects think aloud differs from the target language.

In addition to their translation products and translation processes, the subjects' self-concepts will be analysed by means of questionnaires (see Göpferich 2008: 264 ff.).

The results will be triangulated, set in relation to the quality of the subjects' translation products, and used to correct, optimize and refine our provisional translation competence model (Fig. 3) and the translation competence acquisition model of the PACTE group (2003: 60; Fig. 4).

The quality of the translations, for which precise assignments have been formulated and handed out to the participants, will be assessed according to functional principles by three raters experienced in translation and/or translation didactics in a discursive process.

5.2 The focus of TransComp and the 'measurement' of (the development of) translation competence

TransComp will concentrate on the following components of translation competence: (1) strategic competence, (2) translation routine activation competence, and (3) tools and research competence (see the objectives in PACTE 2005: 611). The reason for this selection is that we assume that these competences are the main translation-specific competences in which translation competence differs from the competence of bilingual persons with no specific training in translation. These competences will form the dependent variables in our study.

By requiring our students to have good or very good grades for their A-levels in German and English and to follow the same curriculum during our longitudinal study, we make sure that their communicative competence in these languages can be considered a more or less controlled variable (more or less because the impact of individual activities, such as stays abroad, and personal factors, such as their intelligence, are beyond our control). The same applies to the subjects' psychomotor competence. By selecting source texts whose comprehension does not require any domain-specific knowledge, we make sure that the subjects' domain competence can also be regarded as a more or less controlled variable.

Since we will work closely together with our subjects for three years, we expect to be able to characterize their psycho-physical disposition, which may also have an impact on their development. During the whole study, the subjects' development will be analysed against the background of the controlled theoretical and practical input of their translation training, which is assumed to shape their translator's self-concepts and professional ethos. Here we start from the assumption that the individual subjects go through stages of mental development which also mark major stages in the development of the discipline of Translation Studies from the equivalence-oriented paradigm to the functionalist paradigm and beyond.

For analysing the development of the three sub-competences mentioned above, numerous criteria, even criteria which we cannot think of yet because they are not covered by the theoretical model used as a starting-point, may be relevant. In such cases, working with think-aloud protocols turns out to have the advantage that it offers the possibility of collecting data in an unstructured way, i.e., in a way that is not biased by our theoretical model. Krings (2001: 218) describes this as follows:

> In this case [i.e., when working with think-aloud data], the researcher's model predetermines data collection far less than in other models with a more rigid structure [...] in which the range of results is considerably restricted by the data collection tools in direct proportion to the extent of their structuredness. Verbal-report data, especially Thinking Aloud, is thus more 'sensitive' to the structure of the object area than methods with a more rigid predetermined structure. The structures can only be developed in a reflexive process following data collection, gradually approaching the object structure. Verbal-report data are thus particularly suited to the investigation of objects whose structure is as yet little known.

We will follow such a reflexive process. As a first step, we will analyse our corpus using the criteria described below, which can be derived from findings from expertise research and/or findings from contrastive studies of translation competence. In the course of our analyses we expect further criteria to emerge which will then be added.

Starting from the assumption that **strategic competence** becomes salient when problems occur and need to be solved, we will first analyse the transcripts for problems that occurred during the translation process. For this analysis we will use the primary and secondary problem indicators suggested by Krings (1986). Having identified problematic items in the

translation process we will then analyse the transcripts for the strategies employed to solve these problems. Special attention will be paid to the mental processes involved in the translation of those items which are thought to represent the repertoire of different potential translation problems (Section 5.1). Both the translation problems and the strategies employed will be classified. We will determine how they develop quantitatively and qualitatively over the three years.

As Krings (2001: 310 f.) discovered, the application of his problem indicators may be problematic for the professional translators for the following reason:

> While nonprofessional translators typically process many translation problems, but usually consider them in isolation, the professional translators' mental activities spread like waves from the translation problem across the entire text. This fact renders it difficult to differentiate problematic elements of the translation process from nonproblematic ones and thus strategic elements from nonstrategic ones.

For this reason, we will use several other criteria which will be applicable to both the students' and the professional translators' TAPs. The TAPs will be analysed for passages where the subjects describe, comment on or employ a macro-strategy in the sense of Hönig (1995). Indicators for such passages are verbalizations about the function of the target text, the expectations of the target-text audience, and other requirements that the target text has to fulfil with respect to the translation assignment. We will also analyse what aspects and how many different aspects the subjects take into account in their problem-solving processes. Furthermore, we will analyse the linearity with which the subjects proceed (for an operationalization of this analysis, see Krings 1988).

Assumptions underlying these analyses are the following. The higher a translator's translation competence, the more advanced the sub-competences are and the better their interaction and coordination by the strategic competence. This interaction and coordination should become obvious from the number of aspects that are taken into account during problem-solving strategies, in the repertoire of strategies employed, the ability to implement a non-linear approach, and the macro-strategies verbalized as well as the consistency with which they are employed. As Tilp's (2007) exploratory study suggests, professional translators develop a macro-strategy and use it as a criterion whenever they have to take

decisions, whereas students only gradually learn to develop a macro-strategy, and even if they have one, they only gradually develop the competence to employ it consistently.

Our analysis of the subjects' **tools and research competence** will be based on the following assumptions. Whereas professional translators are aware of the specific type of problem they encounter while translating (higher meta-cognitive competence), novices have only a vague idea of the type of translation problem they are experiencing. Furthermore, we assume that with increasing communicative competence the translators' problems shift from target-text production problems to comprehension problems or the potential desire to understand the source text in more depth. This desire may become visible in the subjects' think-aloud data on search questions. Therefore, we will analyse the TAPs according to the following criteria. What types of problem cause the subjects to search? What types of information do they search for (lexical items, relationships between units of information, encyclopaedic information on aspects of the source text, etc.)? In addition to this we will ask the following questions: where do the subjects search for solutions (in the source text, in their long-term memories or in external resources)? Do they use reference works to solve comprehension problems or target-text production problems, or both, and are they aware of the type of problem they have? What type of reference works do they consult for the different kinds of problems (monolingual dictionaries, bilingual dictionaries, encyclopaedias, parallel texts, etc.)? Do the subjects only search until they have found an acceptable target-language equivalent or do they go beyond that, for example, to gain more comprehensive understanding?

The subjects' **translation routine activation competence** will be analysed in connection with their translation creativity. Here we start from the assumption that novices have a rather restricted translation routine activation competence, which increases in the course of their training. The more their translation routine activation competence increases, the more cognitive capacity they have available for more creative solutions, which are solutions which take into account more translation-relevant aspects. Indicators of increasing translation activation routine competence could be "spontaneous interlingual associations" for more complex source-text

items (Krings 1986: 311, 317). Therefore we will analyse the TAPs for such associations and their complexity. As one of several measures of the subjects' process creativity, the number of alternative potential translation solutions they produce or verbalize will be determined. In an exploratory study by Krings (1988), a professional translator produced far more alternative solutions (measured by the variant factor VF) in his translation processes than foreign-language learners (1.24 for the professional vs. an average of 0.69 for the language learners). Furthermore, the subjects' translation products will be analysed systematically for creative solutions (on the operationalization of measuring creativity, see Bayer-Hohenwarter in this volume).[10] Special emphasis will also be placed on omissions, corrections of content and additions made by the subjects. These changes will be documented in concept maps. The TAPs will be analysed systematically for reasons for these modifications.

All instances of the phenomena for which the TAPs will be analysed (such as problem indicators, strategies, creativity of solutions, etc.) will be marked with special tags in the XML transcripts.

Furthermore, our analysis will concentrate on verifying the following assumptions.

1. At the beginning of their training, the subjects are more surface-oriented, i.e., they concentrate on small linguistic items (lexical, syntactic, and text-linguistic problems) without realizing that a skopos-adequate target text also requires creative solutions in the more complex problem areas. In the course of their training, their focus of attention shifts from the former category of problems, which will then be solved more

[10] In another study, we also plan to investigate whether translation routine activation competence can be made visible by EEG or fMRT. Such an investigation involves having the subjects read a short source text which offers (1) items which have a standard target-language equivalent and can be expected to be transferred in a routine process, (2) items which may not yet be translatable in a routine process by novices but only by experts, and (3) items which require a unique translation solution and are beyond the use of routine competence even in the case of experts. After reading the entire text, the subjects will be shown the first of these items in the text and asked to think of a target-language equivalent for it. After having found a solution, the subject is expected to press a button. After a fixed interval, the next item will be displayed, etc. Activation patterns in the brain are assumed to vary both in their strength and their distribution depending on the degree of routine which the subjects can fall back on during the translation of each item.

automatically, to the latter category. Increased automaticity in a category is expected to result in fewer verbalizations with regard to problems in this category.

2. At the same time, the translation strategies employed become more global (on the distinction between local and global translation strategies, see Jääskeläinen 1993) and more diversified.

3. The same applies to search strategies: whereas searches for individual lexical items dominate at the beginning of their training, the subjects gradually adopt a more global approach for more complex knowledge clusters. To the same extent, the search in bilingual dictionaries is reduced and the number of searches in monolingual dictionaries and other resources (parallel texts).

4. During their training, the subjects become more self-confident and visualize themselves more as text designers than as text reproducers. This will be manifested as more profound shifts carried out during the translation process and a stronger tendency to take the scenes evoked by the source text as a point of departure for producing the target text instead of the linguistic representation of the source text. This development will also lead to more creative solutions.

5. The development described under 4 may also lead to an increase in the size of the translation units, which will emerge from the log files and TAPs.

6. Reflections on the skopos (function and audience) of the target text and the translation brief will play a more decisive role towards the end of the subjects' training whereas at its beginning the subjects proceed in a more source-text-oriented fashion. Thus their individual development as translators reflects the development in the theory of Translation Studies over the last 60 years.

7. In the course of their training, the subjects' meta-linguistic and meta-communicative competence, as well as their meta-cognitive competence (Risku 1998: 163), increases. On the one hand, this gives them better control over the translation process and may facilitate the verbalization of what goes on in their minds. On the other hand, it may also lead to increased automaticity, which will mean that less will be available for verbalization.

6. Availability of materials and results

All materials used in TransComp, such as the source texts, the translation assignments, the model translations, and the questionnaires, and all data obtained in the experiments, such as the TAPs, the log files, and the screen records, will be made available to the scientific community in an asset management system (AMS), an open-source-based storage, administration and retrieval system for digital resources. This also applies to the XML transcripts. In this way the problems pointed out by Englund Dimitrova (2005: 82 f.) are addressed. She criticizes that so far "no *single*, widely accepted model for coding and analysis" has been developed and that "there does not yet seem to be an established way of reporting protocol data". The AMS will contribute to the solution of this problem and allow future multi-centre studies, in which, for instance, the same source texts and assignments can be downloaded from the system and used with subjects from other translation-oriented programs and with other language combinations, whose data can then also flow into the system and be compared with the ones from our own and other studies.

In October 2008, the third experimental wave of TransComp started. The materials used as well as the data collected in the experiments so far have already been stored in our AMS (Göpferich 2007). At the moment, these materials and data are password-protected because the source texts will also be used in future test waves of TransComp, and we have to make sure that our subjects do not have access to them until the last text wave has been completed. After this, password protection will be removed and the data can be accessed freely.

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