TRANSLATION COMPETENCE DEVELOPMENT AND THE DISTRIBUTION OF COGNITIVE EFFORT: AN EXPLORATIVE STUDY OF STUDENT TRANSLATION BEHAVIOR

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Abstract

Translation competence as a versatile construct of physical and mental abilities (i.e., sub-competencies) involves more than rendering text from one language into another. Translation competence models picture an interwoven system of psychological, physiological, cognitive and linguistic sub-competencies differentiating the bilingual speaker from the translator. In other words, translation competence is the result of a developmental process from being bilingual to being a translator. So far, this developmental process has been investigated extensively in the TransComp project, a longitudinal study conducted at the University of Graz, where 12 students were tested recurrently over a period of 3 years. However, hitherto no study has focused on the translation of metaphor from a developmental perspective.

In this project, the translation of metaphorical expressions by translation students (English-German, English-Norwegian) at different levels of their education (i.e. 1st, 2nd and 3rd year) is investigated. The analysis consists of a product-oriented and a process-oriented part. In the product-oriented part, application of different translation strategies within and across the individual subject groups is studied. In the analysis of the process data, cognitive effort as indicated by production time values and its relation to specific translation strategies is studied for each participant group. The empirical exploration of the translation process is conducted with the help of the keystroke-logging program TRANSLOG II. The methodological part of the study is an adaptation of a study by Sjørup (2013), who investigates cognitive effort in metaphor translation in 17 professional Danish translators. However, Sjørup's study did not focus on (the development of) translation competence.

The investigation aims to answer the following research questions:

1. Which metaphor translation strategies do the different subject groups select, and are there similarities and/or differences between the groups, that is between 1st, 2nd and 3rd year students within one language (Norwegian, German) as well as across languages.

2. What is the relationship between the selection of specific translation strategies and production time (e.g., larger or smaller production time values for different strategies) thus indicating greater or lesser cognitive effort? Do these results differ between the subject groups according to their advancement in the training program thus indicating some form of translation competence development?
3. What do the measurements of production time in relation to specific metaphor translation strategies disclose about cognitive effort invested during the translation process?
4. Does the distribution of cognitive effort change over time indicating some form of translation competence development?

The quantitative data from the keylogging study is statistically analyzed using a regression model, which allows for a controlled investigation of the predicted effect of the different variables like translation strategy type and participant group.

The results of the product-oriented study suggest that all participant groups (both language groups) most often select strategies that are associated with a reduced amount of cognitive effort. Thereafter, however, participants select other strategies which, based on previous research, are associated with elevated cognitive effort and increased translation competence. Other strategies, on the other hand, are applied seldom or are applied by specific participant groups exclusively. This leads to the hypothesis that it is not the allocation of cognitive effort, but a form of linguistic and conceptual formal relationship between source- and target text that governs the translation behavior of the student participants. Differences between the groups vary in both language groups. Consistency implying some form of competence development cannot be established in this part of the analysis.

The analysis of the process data (production time effects) concludes that the strategy applied most often by all groups is associated with low cognitive effort. However, the strategy associated with advanced translation competence is marked by the largest increasing production time effects, and thus the allocation of most cognitive effort. Yet, participants engage with this strategy more often than with other strategies, which require less cognitive effort. Changes between the groups are rather negligible, corroborating the findings of the product-based analysis: the development of translation competence as measured by the (re-) allocation of cognitive resources is close to non-existent over the period of a three-year translator training program.

The study aims at connecting and developing further previous research on metaphor translation in translation process studies, and operationalizing this research for the study of translation competence and competence development. New and extended theoretical as well as methodological approaches are employed in order to advance research on translation competence development from a cognitive perspective. Two specific hypotheses are proposed which present themselves as subjects for further scientific inquiries.

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List of Abbreviations

AOI	areas of interest
AST	applied translation studies
CMT	conceptual metaphor theory
DMC	different mapping conditions
DST	Dynamic System Theory
LGP	language for general purposes
LSP	language for specific purposes
L2	second language
L1	first language
MIP	metaphor identification procedure
ms	millisecond(s)
NT	natural translation
RT	reaction times
s	second(s)
SL	source language
SMC	similar mapping conditions
ST	source text
ST AOI	source text area of interest
TC	translation competence
TL	target language
TT	target text
TT AOI	target text area of interest

1. Introduction

Within the field of translation studies, the investigation of translation competence, that is, translation competence that is the result of purposeful education and targeted training, has played a central role for more than half a century (Albir, 2010, p. 56). Originating in a didactic interest to support and enhance translator education, research into professional translation competence assumes that translation "is a complex activity, involving expertise in a number of areas and skills"(Adab & Schäffner, 2000, p. viii). This complexity renders the task to describe and define the construct of professional translation competence rather difficult (Albir, 2010, p. 56). Starting in the 1990s, substantial scholarly research has set out to fulfill this task. Since 1997, the PACTE group (Procés d'Adquisició de la Competència Traductora i Avaluació) at the University of Barcelona (PACTE, 2000, 2002, 2003, 2005) has produced and constantly refined a componential model describing "the core competences involved in translation competence" (Albir, 2010, p. 57), for example a bilingual competence, a strategic competence and a competence pertaining to knowledge about translation. At present, the group continues to experimentally investigate these competences, enhance the model, as well as operationalize the model by developing and testing educational strategies and tools to implement into translator training. On the basis of the PACTE model, Susanne Göpferich (2009) proposed a model which served as the basis for a longitudinal study of the development of translation competence conducted by her and her colleagues at the University of Graz between 2007 and 2010. Göpferich's model supplements the PACTE model with contextual components like translation norms, the translation assignment, or the psychophysical disposition of the translator. Both the PACTE model and Göpferich's model describe a conglomerate of pre-existing, rather general skills (e.g., knowledge of two or more languages) and topic-specific competences (e.g., knowledge about translation). Moreover, these models picture an interwoven system of psychological, physiological, cognitive, and linguistic sub-competences differentiating the bilingual speaker from the professional translator. Professional translation competence is thus the result of a developmental process from being bi/multilingual with a pre-existing rather general set of skills, to being a translator with a translation-specific skill set. The latter skills need to be specifically implemented and strengthened through target-oriented learning processes, training and not least experience. Both the PACTE model and Göpferich's model describe a form of final stage condition, a state or rather a composition of different competences to reach in order to have acquired professional translation competence. That does not imply that this state is static, but that the necessary competences are acquired, that is, the necessary (or expected, or required) skill set is present in a translator. Any further development is assumed to be dynamic in the sense that there is a constant interaction, possibly qualitative change, between the existing skills (Göpferich, 2013).

However, the question remains how this developmental process unfolds. So far, the components of Göpferich's model have been investigated extensively in the aforementioned TransComp project, where 12 students were tested recurrently over a period of three years. Their translation performance was measured relative to a number of variables and compared to data collected from ten professional translators. The project has generated a number of publications and contributed widely to the methodological development within the field of translation process research (TPR). In 2013, Göpferich approached the topic anew, suggesting that the utilization of different sub-competences requires varying amounts of cognitive resources during the translation process. For example, "[t]he successful application of strategic competence requires a large amount of cognitive resources in working memory because it involves taking into account a larger context with many potential factors that may become relevant for successful decision making" (Göpferich, 2013, p. 66). From the perspective of the distribution of cognitive resources, Göpferich's competence model can be classified as an effort model. Furthermore, Göpferich proposes that the development of translation competence may be closely related to the allocation of cognitive resources. She argues that with advancing translation competence certain routine skills are automatized and thus cognitive resources are released to be invested into more demanding non-automatic skill application operations (p. 62). The approach is, however, largely untested. The current thesis builds on this approach, assuming that the developmental process from being bi/multilingual to being a professional translator may be explored by investigating the allocation of cognitive resources, or more specifically, by investigating the cognitive resources spent on specific translation tasks (i.e., cognitive effort).

In the case of the investigation of human cognitive resources, the English proverb *dear child has many names* appears to be appropriate. The construct of cognitive effort is referred to as, for example, *mental effort*, *mental load*, *cognitive load*, *mental workload*. Terminology appears to be dependent on the scientific discipline dealing with the subject, whether it is "cognitive, educational, and engineering psychology, human factors, human-computer interaction, and design"(Muñoz Martín, 2012, p. 171). Kahneman proposes a model of cognitive capacity which is based on three assumptions: 1) that human cognitive capacity is limited, 2) that the level of capacity demand determines the availability of cognitive capacity, and 3) that therefore the amount of cognitive capacity rises and falls in proportion to the level of cognitive demand, i.e. "a rise in the demands […] causes an increase in the level of arousal, effort, and attention"(1973, p. 13). Furthermore, Kahneman hypothesizes that "the effort invested in a task is mainly determined by the intrinsic demands of the task" (p. 15). However, Kahneman's theory does not imply that the task-demand relation is constant, yielding comparable levels of cognitive effort for every task and every subject. One may therefore assume that task difficulty (demand) and the resulting redistribution of cognitive capacity (the allocation of cognitive effort into the task) are related to task familiarity and experience. This leads back to Göpferich's hypothesis regarding distributional differences in the allocation of cognitive resources between novices and advanced translators. If the task-demand ratio is assumed to differ according to experience, the distribution of cognitive effort can be expected to be different between translation novices and experienced translators.

One relevant translation task which may be the object of an investigation of cognitive effort with regard to competence development is the translation of metaphor. Since the beginning of the 1980s, metaphor has assumed a distinct position within cognitive linguistic research as a feature of not only literary language, but everyday language use (Lakoff & Johnson, 1980/2003). As a specific feature of human cognition, the distinction between conceptual processing and linguistic realization of metaphors has yielded a considerable body of theoretical and empirical research in a number of languages. This research shows that metaphors are culture- and language-overlapping or culture- and language-specific. As such, metaphor constitutes an interesting research object for the study of translation, and professional translation in particular, as a special form of cross-cultural and cross-linguistic language use. Over the last five or six decades, there have been a number of theoretical and empirical considerations of metaphor in translation. Discussions on the translatability of metaphor (Dagut, 1976; Van den Broeck, 1981) were closely related to prescriptive approaches proposing a number of carefully developed translation strategies (Newmark, 1983). With the emergence of the conceptual approach to metaphor within cognitive linguistics (Lakoff & Johnson, 1980/2003), the relationship between cognitive and cultural characteristics of source- and target languages and cultures, that is similarities and/or differences in conceptualizing and expressing reality, came into focus (Mandelblit, 1996). However, although there has been a shift from a purely prescriptive to a theoretical approach to metaphor in translation, translation strategies remained the center of attention. Translator behavior in terms of specific translation strategies became the object of empirical studies. Jensen (2005) studied differences in selection between three groups of translators (novices, young professionals and experts) interpreting the results in relation to the underlying cognitive processes of specific metaphor strategies and the allocation of cognitive resources. In 2013, Anette Sjørup operationalized the construct of cognitive resources by measuring production time of metaphorical expressions in target texts, and relating them to specific translation strategies. Differences in production time duration were interpreted as differences in cognitive effort invested in the translation of these expressions, and related to different types of translation strategies. However, besides speculating that "the translator will choose the path of least resistance" (Sjørup, 2013, p. 208), that is the translation strategy requiring the least cognitive effort, the study falls short of acknowledging the cognitive mechanisms underlying metaphor processing (mono- or bilingual), which may explain the different demands of cognitive effort for different strategies as evidenced by production time differences. Furthermore, Sjørup investigated only translations by professional translators leaving out the question of whether or not her results may differ for divergent groups of translators at different levels of development. Thus, the measurement of cognitive effort in metaphor translation has not yet been operationalized for the investigation of professional translation competence development (Göpferich, 2013).

The present study intends to contribute to the process-oriented investigation of professional translation competence development by exploring the allocation of cognitive effort in the translation of metaphorical expressions related to different types of translation strategies. The participants in this study are students of translation (L1 German – L2 English, L1 Norwegian – L2 English) at different stages of their education (i.e., 1^{st}, 2^{nd}, and 3^{rd} year of a translator training program). The empirical exploration of the translation process is conducted with the help of the keystroke-logging program TRANSLOG. The empirical analysis consists of a product-oriented and a process-oriented part aiming to answer the following research questions:

1. Which metaphor translation strategies do the different subject groups select?

1a. Are there differences or similarities between the groups according to their advancement in the study program (1^{st}, 2^{nd}, 3^{rd} year)?

1b. Are there differences or similarities between the two different L1 groups (Norwegian, German)?

2. What is the relationship between production time and translation strategy?

2a. Do these results vary across the subject groups according to their advancement in the training program?

2b. Do these results vary across the subject groups according to the target language (Norwegian, German)?

In the product-oriented part (1), the implementation of specific translation strategies within (e.g., within a 1^{st} year group) and across the different subject groups (across 1^{st}, 2^{nd}, and 3^{rd} year groups, and across the two L1 groups German and Norwegian) is studied. In the analysis of the process data (2), Sjørup's approach is adopted: cognitive effort as indicated by production time for different metaphorical expressions is investigated and related to different metaphor translation strategies. A statistical model consisting of a number of explanatory variables in addition to the dependent variable *Production Time* is developed. The data is analyzed employing various statistical methods (e.g., descriptive statistics).

Theoretical considerations of the results of the previous two analyses aim at answering the following research questions:

3. What do the measurements of production time in relation to specific metaphor translation strategies disclose about cognitive effort invested during the translation process?

4. Does the distribution of cognitive effort change over time indicating some form of translation competence development?

In addition, the study has two underlying aims:

1. to investigate whether Göpferich's proposition (2013) that professional development may be investigated via the allocation of cognitive resources is feasible
2. to develop further the theoretical and methodological approaches to the empirical study of metaphor translation taken by, for example, Jensen (2005) and Sjørup (2013)

Chapter 2 introduces the different theoretical frameworks from both translation studies and metaphor studies underlying this investigation, as well as clarify the specific use and understanding of particular terminology. Chapter 3 aims at giving an extensive overview of the methodological approaches taken, including a detailed description of the data collection process, the data material and the data analysis processes. The results of the various analyses are presented in Chapter 4. The chapter is divided into the analysis of the data for the Norwegian participant group and the German participant group, before the two language groups are compared. In Chapter 5, the results are discussed in relation to the research questions outlined above and the different theoretical considerations put forward in Chapter 2. The closing chapter will assess the merits of the study as well as address problematic issues and outline future research avenues.

2. Theory

Metaphor has been an object of translation theory for a number of decades. For a long time however, it was approached from a purely didactic perspective, and researchers discussed the fundamental question of whether or not metaphor was translatable (Dagut, 1976; Newmark, 1977). This discussion was accompanied by attempts to develop rules (i.e., normative translation procedures) for different types of metaphors (Newmark, 1983). However, while research and theory within translation studies (e.g., a turn from product to process studies aided by new research methodologies) as well as metaphor studies (e.g., conceptual view of metaphor as a cognitive and linguistic device encompassing all thinking and speaking) progressed, it took some time before metaphor was picked up by theoretical and empirical translation studies, in particular translation process studies, as a tool to investigate translation. The view of metaphor as a phenomenon with far-reaching consequences for human conceptualization and articulation has a particular impact on intercultural communication in general and translation in particular. Schäffner and Shuttleworth (2013) point out that "[b]ecause of its emphasis on the psychological rather than textual aspects of metaphor and the insights that it offers into the brain's cognitive processes the conceptual metaphor approach's applicability within process research should be clear"(p. 94). Shuttleworth (2013) identifies seven parameters of metaphor that constitute a point of interest for translation studies: 1) mapping, 2) typological class, 3) purpose, 4) level of categorization, 5) metaphor type, 6) metaphor provenance and 7) conventionality (pp. 40-62). These parameters have potential for translation research because of "the significance that each of these parameters may possess in terms of its possible influence on translators' decisions"(Schäffner & Shuttleworth, 2013, p. 95). Since metaphor constitutes an interesting object of study for translation process research, it is also worth looking at in relation to translation competence and competence development, which constitutes a large part of process research and vice versa.

This chapter aims to place the present study into the larger field of translation studies, outline its relation and placement with respect to previous research, and delimit and define particular theoretical and empirical concepts that are of importance. Theoretical constructs and frameworks underlying the study in general, and the research questions in particular are introduced and discussed.

The first section addresses the concept and construct of the focal point of the study: translation competence. Section 2 gives an overview of the study of translation as a process (as opposed to a product-oriented approach) and its implementation into research on translation competence. The last section reviews the cognitive linguistic approach to metaphor and its implementation into research on translation processes and the development of translation competence.

2.1 The Concept and Construct of Translation Competence

The concept of translation competence as it is used in the present study refers to professional translation competence, which, to start with, shall be described in terms of any other professional competence. In order to develop a working definition for the purpose of this study, the term professional competence is split up into its two components *professional* and *competence*, which is in no way meant to be exhaustive or generalizable, but rather serves the immediate need for a definition.

Starting with the second component of the term, the Oxford English Dictionary defines competence as "the ability to do something successfully or efficiently"[1]. In a business context, the Oxford Dictionary of Business and Management defines competence (or in this case the parallel term competency) as "[a]ny of the skills, talents and traits required to be able to perform a particular task to a given standard"(*A Dictionary of business and management*, 2006, p. 115). Both definitions are still quite general and perhaps fuzzy in terms of distinguishing general competence from professional competence. The Business Dictionary specifies competence as "[a] cluster of related abilities, commitments, knowledge, and skills that enable a person (or an organization) to act effectively in a job or situation"[2]. The relation between competence and a work-related context as presented by the Business Dictionary implicitly refers to

[1] http://www.oxforddictionaries.com/definition/english/competence [4. Sept. 2015]
[2] http://www.businessdictionary.com/definition/competence.html [4. Sept. 2015]

professionalism. Drawing once more on the Oxford English Dictionary, professional is defined as "[r]elating to or belonging to a profession"[3] and subsequently profession as "[a] paid occupation, especially one that involves prolonged training and a formal qualification"[4]. Consequently, professional competence is, for the purpose of this study, a conglomerate of abilities, knowledge, attitudes, and skills in a professional/work-related context which is typically based on some form of training and formal qualification and involves monetary compensation. To further develop the notion of a professional competence to translate, it is necessary to take a closer look at some elementary concepts that underlie such a competence. Firstly, it is important to distinguish between bilingualism, on the one hand, and the notion of natural translation, that is an inherent capability to translate, on the other hand. Secondly, a distinction has to be made between a general competence to translate and a professional competence to translate.

2.1.1 Bilingualism and translation

The literature provides a number of (sometimes) quite different definitions and descriptions of the phenomenon of bilingualism. Lörscher (2012, p. 4) identifies three concepts of bilingualism, which are, for the sake of completeness, briefly described here. The first, and most restrictive of the three, is the view of bilingualism as the ability to speak two languages to a degree where the speaker is recognized as native speaker in either of the two language communities. The second, broader view, comprises a communicative competence in a second language in either "speaking, listening, writing or reading" (p. 4) at any level of competence. Finally, a third approach assumes a position in-between the two aforementioned views stating that a person is bilingual if s/he uses two languages on a daily basis without necessarily assuming the status of a native speaker in both languages, that is being recognized as a non-native speaker or second language speaker. Irrespective of these three definitions of bilingualism, Lörscher argues that "translation – together with *code switching* and *code mixing* – occurs frequently among bilinguals"(p. 5, emphasis in original) at any level of

[3] http://www.oxforddictionaries.com/definition/english/professional [4. Sept. 2015]
[4] http://www.oxforddictionaries.com/definition/english/profession [4. Sept. 2015]

competence. It is therefore necessary to shed some more light on the concept of translation and its relation to bilingualism.

The term natural translation (NT) was introduced by Harris in the early 1970s. In his 1976 paper on *The Importance of Natural Translation*, he defines NT as "the translation done by bilinguals in everyday circumstances and without special training for it"(1976, p. 99). Harris does not give a clear explanation of his understanding of bilingualism and bilinguals, but seems to distinguish between the latter from professional translators, because he criticizes the research field of translatology to be too narrow-minded by exclusively investigating texts produced by professional translators. He goes on pointing to the field of linguistics, which "has now reached out to include all speech acts, even the humblest and youngest babblings" and requests that "the proper study of translatology is <u>all</u> translation"(p. 97, emphasis in original). Harris calls for the inclusion of bilinguals into research on translation, because, as he states in his first postulate, "[a]ll bilinguals can translate. In addition to some competence in two languages Li and Lj, they all possess a third competence, that of translating from Li to Lj and vice versa" (p. 99). Furthermore, Harris claims that bilinguals should not only be included into the study of translation, but that the investigation of NT should precede all other research on translation. Pointing towards his own background as a teacher of translation, he argues that, in reality, translation schools do not teach students to translate, but "[w]e do try to teach them to translate better"(p. 100). It has to be pointed out that Harris considers NT to be predominantly oral arguing that "*[t]ranslation* is used in general language as a cover term that includes both the written and the oral variants"(Harris, 2013, no pagination, emphasis in original).

Toury agrees with Harris on the existence of some kind of pre-existing ability to translate, but does not consider it to be inherent to bilingualism. Introducing his own concept of the "native translator", Toury distinguishes between translation as an innate predisposition and translation as a skill and argues that the former may indeed be inherent to mere bilingualism. However, translation as a skill "should be taken as coextensive with 'interlingualism' (which is the ability to establish similarities and differences – that is, interlingual relationships – on various levels, between items, structures and rules that pertain to those languages that the bilingual actually has at his disposal)" (1986, pp. 19-20). Thus, this skill is activated and developed through practice by translating one's own or other people's verbal output, that is through some kind of social motivation. Furthermore, Toury argues that, in addition to a certain amount of command of two languages, a particular interlingual transfer competence is necessary for a bilingual individual to be able to translate. This transfer competence consists of linguistic (e.g., semantics, syntax) as well as non-linguistic skills (e.g., communicative functions of texts, text types). Lörscher (2012) presents three hypotheses for why Harris' postulate that *all bilinguals can translate* is not applicable: (a) a difference in competence in the two languages of a bilingual person; (b) an absence of meta-lingual and meta-cultural awareness; and (c) an absence of the transfer competence as described by Toury (p. 5). Lörscher himself proposes that bilinguals possess a rudimentary ability to mediate assuming that "every individual who has a command of two or more languages (even with various degrees of proficiency) is also endowed with a rudimentary ability to mediate information between languages"(p. 6). According to Lörscher, this ability relies mainly on two characteristic human traits: (a) to perceive and structure reality in categories; and (b) to compare knowledge and experiences in order to understand and make sense of the unknown. Lörscher introduces a non-verbal dimension to his rudimentary mediation ability stating that "mediations of sense and/or signs can occur within the verbal sphere, between the verbal and the nonverbal spheres and between different nonverbal spheres"(p. 6). Thus, translation in the sense of mediation is not restricted to written or oral communication (*cf.* Harris 2013), but involves also other, non-verbal modes. In his earlier work, Lörscher (1991) points out that such a view of translation is incompatible with the definition of translation as a text-based activity in translation theory, but that a cognitive analysis of translation processes inevitably enters the non-verbal level and thus makes it relevant for translation theory.

Summing up, Harris, Toury, and Lörscher acknowledge the existence of a bilingual ability to transfer meaning from one language to another at different levels of competence and in different modes. While Harris refers to it as translation competence, Toury and Lörscher refrain from the use of the word *translation*, talking about *transfer* and *mediation* instead. Lörscher highlights that NT in the sense of Harris "must not be confused with translation competence as possessed by professional translators"(2012, p. 5), because this entails, amongst other things, the cognitive restructuring of existing knowledge.

In the confines of this research project, the main point of interest is translation as a profession, the translator as a professional participant in a (global) workplace. Thus, Lörscher and Toury's argumentation is followed and a general bilingual competence to transfer meaning, on the one hand, is distinguished from a professional competence to translate, on the other hand. The latter entails acts of language transfer at an advanced level of linguistic and non-linguistic competence and is acquired through theoretical and practical training and/or (extensive) experience. Collapsing the definition of a general professional competence with the rudimentary description of professional competence based on a distinction from natural translation and bilingualism, the following definition arises:

Professional translation competence is a conglomerate of abilities, knowledge, attitudes and skills related to acts of written language transfer at an advanced level of linguistic and non-linguistic competence in a professional/work-related context. It is typically acquired through theoretical and practical training and/or (extensive) experience, and its practice often involves compensation of some form or another (e.g., monetary).

The following section will present in detail the theoretical concept, composition and structure of such a professional competence to translate.

2.1.2 Professional Translation Competence

In general, "[c]ompetence, in any sphere of work, can be a difficult concept to pin down. It is particularly difficult when it relates to professional occupations where roles can be complex and the knowledge and skills involved many and varied"(Cheetham, 1996, p. 20). The translator profession can very well be considered such a complex and diverse occupation. For example, Halverson takes a pragmatic approach to the context that conditions translation and focuses on the translator as facilitator of translations. She utilizes the term *translation situation*, which is the "actual, real world situation in which a translation is created" (unpublished manuscript, p. 3). The translator is situated at the center of the translation situation. By means of his/her translation-related activities, the translator becomes a mediator between the source text and the target text, and in a wider sense between the source language and the target language, and thus, more importantly, between the source culture and the target culture. In a translation situation, source culture and target culture meet (and overlap) through, and in, the translator. On both sides, multiple actors (participants) as well as other influential factors are, at any given moment, involved in the translation situation, which, consciously or subconsciously, put the translator in a constant push-and-pull situation not only between the two sides, but also between different forces within one side (p. 4). Amongst these different forces are, for example, the source text and the target text and their specific cultural implications (e.g., general characteristics related to text type, genre, language use etc.). On the side of the source culture, Halverson includes the source text author, the source text audience, but also the commissioner of the translation assignment and the translation brief, that is the commissioner's specific translation instructions and other information relevant to the task. On the other side, the side of the target culture, there are stakeholders like the readership, but also potential future employers of the translator, because, in a professional translation setting, this particular translation situation might lead to other translation assignments. All these different groups and factors (consciously or subconsciously) influence the translator, who is at the pivot point of the translation situation, and thus the translation process, and eventually the finished product, the translated text. Halverson's translator-driven description of the translation situation reveals various factors that actively and passively influence the translator and the translation process, with or without the translator noticing it. The translator has to handle a complex network of linguistic (e.g., semantic, syntactic, pragmatic) as well as extra-linguistic demands (e.g., commissioner, readership, translation equipment etc.) from two sides: the source text/language/culture and the target text/language/culture. Therefore, it is reasonable to assume that professional translation competence is affected by these varied relations, and the role of the translator is a complex one, with a diverse spectrum of knowledge and skills involved.

Although, as Cheetham and Chivers (1996) indicate, it is difficult to describe or define professional competence when the particular profession (in this case translator) is multifaceted and complex, professional translation competence has been widely discussed and modelled in the literature. However, Albir and Alves (2009) point out that few of these models have been submitted to comprehensive empirical testing. This is mainly due to the complexity of the models. A research project testing such a model in its entirety is likely to be extensive in terms of duration, manpower (scientific personnel as well as experimental subjects) and financing. Two examples are the TransComp project, a longitudinal study conducted at the University of Graz headed by Susanne Göpferich, and the research by the PACTE group (Procés d'Adquisició de la Competència Traductora i Avaluació) at the University of Barcelona, which both take a comprehensive approach to the testing of their respective models. The following paragraphs will give a broad overview of research into translation competence, concentrating on two different points of view, a theoretical point of view, and a didactic point of view.

A number of researchers have approached the topic from different perspectives. There are didactically founded approaches (e.g., Kelly, 2005; Wilss, 1976) on the one hand, and models that approach translation competence from the theoretical perspective of expertise and expert knowledge on the other hand (e.g., PACTE, 2000; Risku, 1998). Susanne Göpferich indicates that researchers, regardless of the approach, seem to agree "that translation competence is composed of several sub-competences" (S. Göpferich, 2009, p. 12). According to Göpferich, there are only three sub-components the different models seem to agree on: *communicative competence in source and target language*, *domain competence* and *tools and research competence* (2009, p. 13). PACTE for example refers to these three as bilingual sub-competence, extra linguistic sub-competence and instrumental sub-competence (2000, p. 101). This combination of linguistic and non-linguistic specialized knowledge indicates, on a superficial level, the broadness of knowledge and skills involved in translation competence, as argued earlier in this chapter. In the following, rather than recapitulating research into translation competence in a chronological manner, important contributions to the field according to the approach they have taken, that is didactic or theoretical will be introduced.

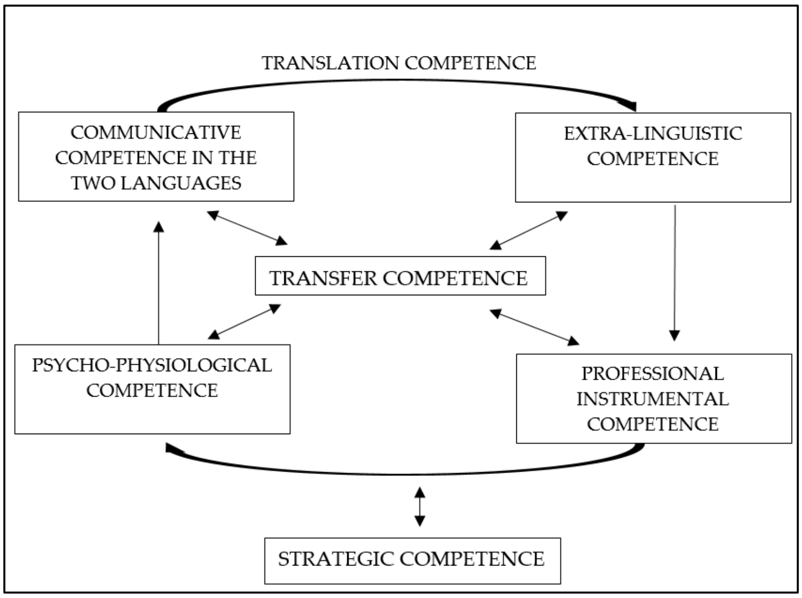
From a didactic point of view, Wilss (1976) points out that due to the late emergence of translation studies as an independent field of research, also research within applied translation studies (AST), in this case specifically translation competence, is considerably delayed. He argues that "AST cannot provide a satisfactory answer to the question of the professional minimum qualifications of a translator, above all, because *the* translational competence is, to all intents and purposes, nonexistent and probably also non-definable", and that "it is, therefore, extremely difficult for AST to describe learning targets in detail" (p. 120, emphasis in original). As one of the first to approach the topic, he gives a rudimentary description of what he perceives as the two basic competences of a translator: 1) source language competence in terms of reading and understanding, and 2) target language competence characterized by a linguistically determined production ability. Translation competence, as "an interlingual competence" is in Wilss' eyes a supercompetence that facilitates the transfer process between source- and target language and presupposes source language competence and target language competence. Furthermore, he claims that an adequate way to solve the imminent lack of theoretical and empirical knowledge of translation competence is the investigation of the translation process "not as a linguistic operation but a psycholinguistic activity that brings two language levels, lexis and syntax, functionally together"(p. 121).

Kiraly (1995) distinguishes between translation competence and translator competence, arguing that the latter puts "emphasis [...] on the complex nature of the professional translator's task and the non-linguistic skills that are required" (p. 16). Kiraly claims further that by choosing the term translator competence over translation competence, the controversial distinction between natural and professional translation is overcome, because it highlights the professional aspect of translation as opposed to the didactic use of translation as a tool for second-language learning. Thus, Kiraly asks for translator trainers to identify those translation skills that differentiate the professional translator from the bilingual speaker. Simultaneously, he is careful to point out that those professional translation skills are not specific skills in terms of translation domains (e.g., legal translation, technical translation etc.), but, what he calls, "more generalized specializations such as research skills, terminology management, and familiarity with electronic information sources" (p. 17). Thus, Kiraly seems to wish for translator training to focus on extra-linguistic skills as distinctive features of professional translator behavior, as opposed to linguistic knowledge (e.g., source- and target language knowledge). This in turn implies that language and language learning are not a prominent part of translation competence development and, therefore training.

Dorothy Kelly (2005) takes a comprehensive pedagogical approach to translation competence and suggests a "list of areas of competence desirable in graduates from translation courses for the purpose we are interested in here, that of curricular design" (p. 32). The list consists of the following seven competences: 1) communicative and textual competence in at least two languages and cultures, 2) cultural and intercultural competence, 3) subject area competence, 4) professional and instrumental competence, 5) attitudinal or psycho-physiological competence, 6) interpersonal competence and 7) strategic competence (pp. 32-33). The list contains the three sub-competences which according to Göpferich (2009) are recurrent in translation competence research: *communicative competence in at least two languages*, *domain competence,* and *tools and research competence*. Interestingly, and this is probably due to her didactic approach to the topic, Kelly adds cultural knowledge to the communicative competence in source- and target language. Moreover, cultural and intercultural competence is a separate sub-competence on her list, which highlights the importance of cultural influence on translation and the translation process in Kelly's eyes. Finally, Kelly adds an interpersonal sub-competence, which she refers to as the "[a]bility to work with other professionals involved in translation process (translators, revisers, documentary researchers, terminologists, project managers, layout specialists), and other actors (clients, initiators, authors, users, subject area experts)(2005, p. 33). Such a view on translation competence extended into the translation context and situation is different from earlier pedagogical approaches, and illustrates the general development and progress within research in translation studies, which has had an impact on pedagogical considerations of translation as well. While Wilss (1976) complains about the infancy of translation studies and the respective implications on the teaching of translation, general research on competence and process research on competence in particular has led to new insights which have left their imprint on translation pedagogy (e.g., Kelly's comprehensive pedagogical model of translation competence).

After describing didactic approaches to translation competence, selected theoretical models are presented. In 2000, the PACTE group described translation competence as "the underlying system of knowledge and skills needed to be able to translate"(p. 100). PACTE's research aim was (and is until today) a description of translation competence not as a static, locked phenomenon, but as a flexible model affected by professional development and advancement. The PACTE model is the first comprehensive theoretical attempt to model professional translation competence. It includes linguistic (e.g., communicative competences) as well as non-linguistic (or extra-linguistic) sub-competences like an instrumental sub-competence or a psycho-physiological sub-competence. It is therefore the first model to illustrate the complexity of professional translation competence as argued earlier. The model is able to account for the different relations and requirements expressed by Halverson's model of the translation situation (e.g., source text and target text and their specific cultural implications are included in the communicative sub-competence) introduced earlier.

Figure 1: PACTE's first translation competence model

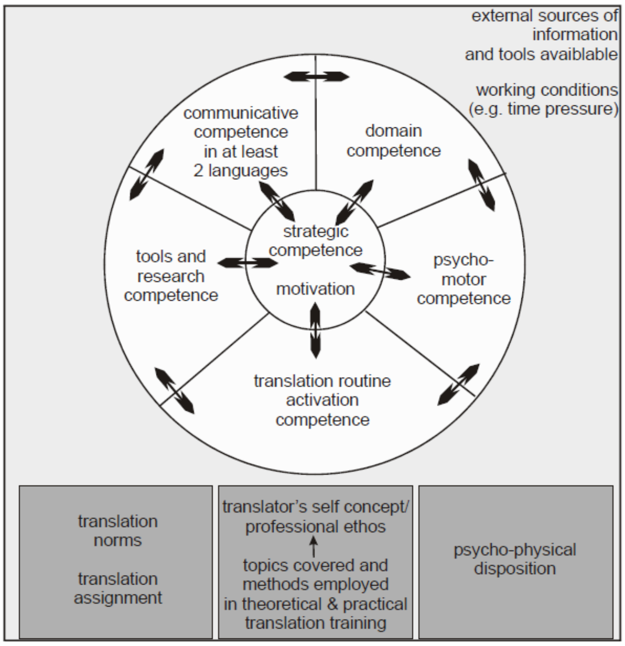


(Albir, 2017, p. 37)[5]

[5] Permisson to reprint this figure has kindly been granted by *John Benjamins Publishing Company*.

Considering the PACTE model, Göpferich (2008/2009) proposes a refined model of translation competence. The model is closely related to PACTE's componential model. However, Göpferich's proposal situates the model into a translational context as well as a translation situation. She places a strategic competence at the center of the model steering and regulating all other sub-competences. This, even more so than the PACTE model, stresses the cognitive and process-related character of the model. The change has since been implemented into the PACTE model as well (*cf.* Albir, 2017). More importantly, and this represents a major difference to PACTE's model, Göpferich highlights the developmental character of the single sub-competences and their respective interplay to form a whole, but dynamic, construct of professional translation competence. While earlier, pedagogical models of translation competence emphasized either linguistic skills (e.g., Wilss) or extra-linguistic knowledge (e.g., Kiraly), both the PACTE model and Göpferich's model take a holistic approach including linguistic as well as non-linguistic skills and the various relations a translator engages in while translating. This underlines the cognitive approach to translation competence and its focus on cognitive processes.

Figure 2. Göpferich's translation competence model



Göpferich (2009, p. 20)[6]

[6] Permisson to reprint this figure has kindly been granted by *Samfundslitteratur* (samfundslitteratur.dk).

In a recent publication, Shreve, Angelone and Lacruz argue that "most competence 'models' are descriptive formal models, whose psychological reality is questionable"(Shreve, Angelone, & Lacruz, 2018, p. 37). They accept the models as originating in and serving translator training, but deny their usefulness for cognitive translation studies. Instead, they advocate the concept of expertise (as embraced by, for example, interpreting studies) as performance-based concept, which, in their opinion, "offers a much more robust theoretical framework and, most importantly, is an important connection point of cognitive translation studies with the cognitive sciences in general" (p. 52). The authors claim that componential competence models like the ones proposed by PACTE and Göpferich focus too much on descriptions of an ideal final stage of professional translation competence and lack thus a specific developmental reference, while "[e]xpertise theory has always included the notion of progressive development"(p. 46). Furthermore, they argue that the concept of expertise "provides a comprehensive framework that allows for including a wide variety of task-related cognitive resources, detailing how they interact, and then describing how those resources and their interactions change during the acquisition of expertise"(p. 47). Therefore, from the compelling arguments provided by the authors, it appears as if expertise is the better concept to employ in the present study.

There are, however, two reasons why it has been decided to employ the concept of competence rather than expertise. Firstly, expertise and its implementation into translation studies appears to be based on performance, more explicitly on successful performance of translation tasks (e.g., problem-solving). The measurement or assessment of successful translation, on the other hand, remains rather unclear. Secondly, although the developmental character of expertise is highlighted (novice, advanced beginners, competent, proficient, expert; p. 47), the approach does not consider dynamic development. In other words, expert appears to be the final stage of development, which implies that, although not all translators are expected to reach an expert stage, there is a concluding stage which does finalize the development of translation expertise. Thus, (working) life-long development appears to end at this expert stage, however this may be defined. Since the study at hand does not include qualitative assessment of translation products, and a dynamic character of competence is assumed, it was decided to continue to use competence, even at the risk of "some kind of conceptual inertia, […], that keeps us clinging to the notion"(Shreve, Angelone & Lacruz, 2018, p. 49). It is, however, important to note that, as put forward by the authors, there are a number of valid similarities between the two concepts.

2.2 Translation Process Studies

The study of translation as a process can be roughly divided into two categories: the study of translation-related processes regarding the workplace and its organization on the one hand, and the study of translation-related conscious and subconscious mental processes on the other hand (Göpferich, 2008, p. 1). The former is, for example, represented in studies on the influence of workplace ergonomics on the translation process (Ehrensberger-Dow, 2014). The latter, and thus the one that is object of the current study, includes studies on, for example, problem-solving and decision-making strategies by professional translators on the one hand, and language learners on the other hand (Gerloff, 1988). Research into translation processes (as opposed to product-oriented research) started to gain momentum in the mid-1980s with the adaption of thinking-aloud (both concurrent to the translation process as well as retrospective) as a research method in psychology to the scientific investigation of translation. For example, Krings (1986) investigated the translations of eight university students of French concentrating on translation strategies and translation problems. All eight students were asked to verbalize their thoughts during the translation task (four students translated a text from French into German and four students translated a text from German into French). Krings' investigation resulted in the first detailed descriptions and models of the translation process for both translation directions, that is translation from a foreign language into the mother tongue and translation from the mother tongue into a foreign language, to be found in the literature (1986, pp. 480-482).

Pamela Gerloff (1988) employed thinking-aloud to investigate the translation processes of three different subject groups: four language learners, four natural bilinguals (i.e., raised bilingually) without translation experience, and four professional translators who did not grow up with a second language. All subjects translated a French newspaper text into English while simultaneously verbalizing their thinking. Gerloff was interested in whether or not there were procedural differences in the three subject groups executing the translation task. While Krings looked at possible differences regarding translation directionality (i.e., into the mother tongue or into a foreign language), Gerloff looked at three different categories of translators performing the same task. In her analysis of the data, she found that

> translation gets neither 'easier' nor faster as one becomes more knowledgeable in the language and more practiced in translation. Certain aspects of the process do appear to become more automatic and more routinized. These aspects of the translation process may be said to grow 'easier' and quicker as one becomes a more proficient language user. Other aspects, however, become concomitantly more complex.
>
> (1988, p. 145)

Context seemed to play a more decisive role for advanced translators than for inexperienced ones, which, in Gerloff's opinion, led to the identification of more problem areas by professional translators than by novices. In turn, and most importantly for the purpose of the present study, more time was invested in solving translation problems.

Newer research methodologies have enabled translation studies to investigate translation processes on a different level of analysis. From a methodological point of view, translation process studies have come a long way since those early days in the 1980s. Along with the technological development at the workplace (from typewriters to computer aided work processes), new research methods have been developed that allow for a different and more fine grained research approach to translation processing. The implementation of keystroke-logging and eye-tracking has enabled researchers to investigate translation-related cognitive processes on a micro level (e.g., production time in milliseconds, number of eye fixations on source and target text items), which allows for an analysis of both conscious as well as subconscious cognitive processes. While it is now known from empirical studies that thinking-aloud actually has a disturbing effect on the object of study, namely the translation process (A. L. Jakobsen, 2003) , these new technologies are far less invasive and contribute therefore to an increased ecological validity of the results of studies employing these kinds of research methodologies (Saldanha & O'Brien, 2014, pp. 132-145). For translation studies in particular, the design of the software TRANSLOG2000 (and its successors TRANSLOG2006, TRANSLOG I and TRANSLOG II) (A. L. Jakobsen & Schou, 1999), which implements both keylogging and eye-tracking, has contributed to an increased number of empirical studies and the compilation of large databases like the *CRITT Translation Process Research Database* at the *Center for Research and Innovation in Translation and Translation Technology* (*Copenhagen Business School*). Due to this technological and methodological advancement, it is now possible to investigate the translation process more thoroughly, in more detail and from different angles than before. To mention just a few, revision, segmentation and production time are popular objects of study involving both keystroke-logging data and eye-tracking data. This methodological development ultimately influences process research into (the development of) translation competence.

2.3 Translation Process Studies and Translation Competence (Development)

As mentioned previously, the theoretical construct of translation competence (e.g., PACTE 2000, Göpferich 2009) can be investigated in products (i.e., the translations) and in the processes that lead to these products. The delineation of workplace-related (external) translation processes on the one hand, and conscious and subconscious cognitive translation processes on the other hand (Göpferich, 2008, p. 1) applies to competence research as well. This section, however, will, in line with the study at hand, focus on the investigation of competence development related to cognitive translation processes.

The investigation of translators at different stages of their professional development is characteristic of the majority of studies within competence development. Some studies oppose bilinguals with students of translation (e.g., Gerloff, 1988), while others compare students of translation to professional translators with different numbers of years of professional experience (e.g., Jensen, 2005). These kinds of research settings, however, are potentially problematic due to an inherent disagreement between research object and research subjects. Although the object is to investigate a developmental process, which is inherently temporal, these studies are designed in a cross-sectional manner, that is, different subjects are investigated at one specific point in time. Therefore, studies following the same subjects in a longitudinal research design comparing their test results at different points in time (e.g., S. Göpferich, 2009, TransComp) are ecologically more valid than cross-sectional studies. Göpferich (2008) emphasizes that "[u]m eine Art Skala unterschiedlicher Kompetenzgrade für prozessorientierte Einstufungen von Personen entwickeln zu können, sind jedoch Longitudinalstudien erforderlich, in denen die translatorische Kompetenz derselben Versuchspersonen über einen längeren Zeitraum … in regelmäßigen Abständen … ermittelt werden"(p. 146)[7]. Such studies are, however, difficult to conduct both from a research administrative point of view (e.g., subject recruitment, length of project period, amount of data etc.) and from an economic point of view (e.g., costs related to the project). Therefore, studies comparing different subjects from different subject groups (e.g., bilinguals, students, professionals) in a cross-sectional research design are more common in process studies on translation competence development. Without such studies, it would not be possible to make any statements or assumptions about the development of translation competence.

Göpferich and Jääskeläinen (2009) summarize some general findings regarding translation competence development within process research: (1) a general tendency to work on larger text segments with an increasing level of competence; (2) a general tendency to work on text segments of higher complexity with an increasing level of competence (cf. Gerloff, 1988); (3) a general tendency to work on a macro level (e.g. text function, context, intended readership/audience etc.); (4) a general tendency to work rather detached from the source text inferring meaning instead of translating on a word-to-word basis; (5) a generally increased awareness of translation problems including the

[7] *To develop some form of spectrum of different degrees of competence which contributes to a process-based classification of translators, longitudinal studies are necessary which focus on the investigation of translation competence of the same research subjects over a longer period of time in regular intervals* (my translation)

generation of a larger number of tentative translation options, which results in increased editing and revision procedures due to an increased sensitivity to the best fit of a translated segment; (6) a general tendency to use reference works differently than translator with less competence (e.g. more frequently or on a comprehension level rather than a production level); (7) a general tendency to automatize elementary processes (e.g. typing, researching), which leads to freed cognitive capacity to be used for more complex translation activities (2009, pp.174-175). The latter marker of advanced translation behavior, freed cognitive capacity, shall be of further interest here.

Göpferich (2013) attributes the change in translation behavior from a novice stage to an advanced stage to two factors: 1) (cognitive) restructuring and the adaptation of existing knowledge to the specific task of translation and 2) a change or reallocation of cognitive capacity. With her own competence model in mind, which she describes as "an effort model that assumes limited working memory capacity" (2013, p. 62; *cf.* Section *2.1.2*), Göpferich proposes that the allocation of cognitive capacity to different tasks changes over time with increasing training and experience, and is determined by a distinction between "a routine mode of translation, assumed to involve low cognitive effort, and a creative and cognitively more demanding mode of translation" (p. 67). The acquisition of professional translation competence is therefore a matter of re-distributing the same (limited) amount of cognitive capacity to different, translation-specific skills and tasks. At the same time, other skills and tasks are marked by automatization. The process of automatization turns these tasks into less cognitively demanding tasks. As a result, this freed capacity can be used for other tasks, "such as the capacity to make more creative non-obligatory shifts" (p. 62).

Göpferich relates (changes in) the distribution of cognitive resources and associated competence development to her competence model, and specifically to its different sub-competences. Such an approach is relatively new and therefore largely untested, that is, it is based on theoretical considerations alone. She exemplifies the measurement of strategic behavior (awareness of formal target text criteria as correspondent to source text, switch between routine and demanding/creative mode of translation, and decision making) in a few studies related to the TransComp project (e.g., Bayer-Hohenwarter, 2011) (p. 67).

Strategic behavior is a marker of the strategic sub-competence in Göpferich's model. However, these measurements of strategic behavior are very much confined to translators' meta awareness of the translation process, which is not surprising given the definition of the strategic competence as a meta-cognitive competence (2009, p. 22). The presence of strategic behavior, as measured in these studies, is treated as a marker of re-distribution of cognitive resources, and thus as a marker of advanced translation competence. Besides the reference to automatization and routine behavior, it remains rather unclear what is cognitively effortful, or effortless, and why. It is therefore of interest for the present study to consider Göpferich's proposition from a different point of view, focusing on the question outlined (What is effortful, or effortless, and why?), and how does such an exploration relate to the development of translation competence. It has therefore been decided to investigate underlying linguistic and conceptual features of the translation process from the point of view of (an empirically measureable amount of) cognitive effort.

Summing up, translation competence and its acquisition and development have been modelled and explained based on largely cross-sectional empirical process studies opposing non-experts (novices) and experts. Translation-general competences (i.e., competences that are necessary for and applicable to other professions and vocations) and translation-specific competences have been proposed, and differences regarding these competences between less and more experienced translators have been identified. Introducing a general framework for explaining development from the perspective of the allocation of cognitive resources, Susanne Göpferich attempts to move on from investigating, describing and modelling translation competence at specific stages, and differences between these stages based on the exploration of the translation process from a product point of view (e.g., text segment size, formal relationship between source- and target text, translation problems) (*cf.* Göpferich & Jääskeläinen, 2009, pp. 174-175). The framework may be employed to explain the underlying motivation and trajectory of translation competence development based on the distribution of cognitive resources. However, an operationalization of the concept of cognitive effort and its empirical exploration in the translation process is necessary, before a relation to the distribution of cognitive resources, a competence model and its individual components (sub-competences) can be established. The current thesis intends to be one such stepping-stone on the way to testing Göpferich's effort-based competence theory. Cognitive effort is operationalized and measured, and its distribution, and potential change in distribution, is investigated from a developmental perspective. A tie to specific sub-competences or the complete model and its dynamic nature as proposed by Göpferich, however, is not the focus of this study.

To operationalize the measurement of cognitive effort, the cognitive-linguistic feature *metaphor* has been chosen. The next sections introduce metaphor theory from a conceptual point of view, as proposed by Lakoff and Johnson in the early 1980s, and its implications for and applications in translation studies.

2.4 A cognitive linguistic theory of metaphor: Conceptual Metaphor Theory

As a figure of speech, metaphor has been considered a solely literary device for centuries. Just as long, its specific figurative power in literature (i.e., poetry, prose and drama) has occupied scholars. As early as 335 BCE, Aristotle writes about metaphor that it "is the application of a strange term either transferred from the genus and applied to the species or from the species and applied to the genus, or from one species to another or else by analogy" (Poetics, 1457b.7, Loeb trans., as cited in Levin, 1982, p. 24). Oversimplified, metaphor can be defined as the understanding and description of one thing in terms of another.

With the publication of *Metaphors We Live By*, George Lakoff and Mark Johnson (1980/2003) profoundly changed the view on metaphor as a solely literary figure of speech. From a cognitive linguistic point of view, they propose that metaphor structures human conception and thinking and is thus a major component of everyday language. Therefore, metaphor is considered to be a general cognitive linguistic tool which exists in the language use of each individual irrespective of type of speech (spoken, written, sign), genre (e.g., poetry, religion, politics), or even language (e.g., English, Chinese). Metaphor is thus no longer merely a stylistic device for poetic imagination and rhetoric, but a conceptual mechanism underlying people's perception, understanding and structuring of reality. With this new approach to metaphor, Lakoff and Johnson not only turn metaphor from a literary into an everyday linguistic tool, but lift it from a linguistic level (figure of speech) to a cognitive conceptual level (conceptual structuring mechanism). Accordingly, conceptual metaphor theory (CMT) distinguishes between metaphor in language and metaphor in thought. While the latter operates on the conceptual level in the human mind, the former is traceable in linguistic realizations, that is human speech (written and oral)[8]. Lakoff (1993) further specifies that "the locus of metaphor is not in language at all, but in the way we conceptualize one mental domain in terms of another" (p. 203). Like Aristotle 2000 years earlier, Lakoff emphasizes the basic principle of metaphor to be understanding one thing in terms of another. From a conceptual point of view, this means that parts of one conceptual domain, that is the target domain, are understood in terms of another distinct domain, the source domain. This basic principle is referred to as cross-domain mapping. The conceptual content of a source domain is used to understand and denote specific parts of a target domain. A domain like TIME, for example, comprises conceptual items and their linguistic equivalents (e.g., *day*, *month*, *age* etc.). The conceptual items of a domain, the conceptual inventory, is based on individual as well as socially and culturally collective experience. In a mapping scenario, a source domain, for example MOTION, (or parts of its conceptual inventory) can be mapped onto (parts of) a target domain, for example TIME. Hence, time is objectified and perceived as moveable through hypothetical space. Often, the source domain is the more concrete, experiential domain, while the target domain is rather abstract. Members of the experiential domain, for example MOTION, are mapped onto the abstract domain, for example TIME. The known (source domain) is used to make sense of the unknown (target domain). We are physically able to experience and thus describe and understand any kind of motion. Time, however, is an abstract and socially and culturally arbitrary construct, which is difficult, if not impossible, to experience in a clearly physical way.

Making the leap back to the basic distinction between metaphor in thought and metaphor in language, Lakoff and Johnson (1980/2003) argue that cross-domain mappings on the conceptual level are traceable in language through linguistic

[8] Metaphorical realizations in other modes of production (e.g., visual metaphor, *cf.* Forceville 2008) are not addressed here.

expressions (linguistic realizations). Examples of the cross-domain mapping TIME IS MOTION are the linguistic expressions *Time is flying by*, *Christmas was approaching fast* or *The day came when I had to visit my aunt*. In all three expressions, one item of the domain TIME (*time*, *Christmas*, *day*) has been (conceptually) objectified and placed in an imaginary space relative to the speaker. Thus, while *Christmas* and *the day* are (conceptually) approaching the speaker head on, *time* is approaching and passing by the speaker.

These examples of linguistic realizations of the conceptual mapping TIME IS MOTION (general representation of cross-domain mappings is TARGET DOMAIN IS SOURCE DOMAIN or TARGET DOMAIN AS SOURCE DOMAIN) illustrate the general character of metaphor in everyday language, and thus the penetration of everyday language with metaphor. However, it is necessary to point out that "[t]here is now a huge body of empirical work from many academic disciplines that demonstrates the ubiquity in metaphor in both everyday language and specialized language" (Gibbs, 2008, p. 3). Numerous discourse studies have investigated the use of metaphor in politics, science and education, advertising and health care (Semino, 2008) as well as metaphor in gestures (Cienki & Müller, 2008) and multimodal metaphors (Forceville & Urios-Aparisi, 2009). Innumerable cross-domain mappings have been uncovered, and an attempt to gather these mappings in a so-called master metaphor list[9] in the early 1990s has since been abandoned. During the three decades since the publication of Lakoff and Johnson's book, extensive research within a number of different scientific fields has put focus on how context influences conceptual mappings and their linguistic realizations, how metaphor and metaphor research is a part of the general study of human communication and understanding, how mappings and linguistic expressions are motivated and facilitated, how metaphor is a part of a larger interactive network of mind, body, language and culture, and finally, how metaphor is considered to be a general trait of human cognition across borders of individualism, culture and society, but, at the same time, is marked by individuality, newness and cultural influence (Gibbs, 2008, pp. 3-5). Gibbs refers to the latter as the "paradox of metaphor" (p. 5). These different approaches to the investigation of metaphor show that it is no longer a matter

[9] http://araw.mede.uic.edu/~alansz/metaphor/METAPHORLIST.pdf [13 Nov 2015]

of demonstrating whether or not metaphor is linguistically prevalent (as it was in the early days), but that its focal point lies in cognition and not language. Thus, from an empirical point of view, language is the physical realization of conceptualization and the means through which metaphor is approached in research.

Johnson (1990) dedicates an entire chapter to the relationship between conceptualization and linguistic output. He claims that "non-propositional structures such as images, schematic patterns, and metaphorical projections (all of which are considered components of understanding, but not essential to meaning in the 'proper' sense)" are "intimately tied to propositional contents of sentences and utterances" (1990, p. 18). Furthermore, Johnson argues that these non-propositional structures "play a crucial role in our ability to comprehend anything (an object, person, event)" (1990, p. 18). These structures exist independently of any propositional structures, that is linguistic output. However, only in linguistic manifestations these structures become tangible. More specifically, Johnson focuses on image-schematic structures of meaning, which, according to Johnson, originate in physical movement and physical experience, and facilitate understanding of and reasoning about reality. In contrast to other cognitive approaches to schemata, which refer to the concept as a collection of general knowledge facilitated by (repeated) encounter and recognition, Johnson stresses the importance of physical and bodily experience on the nature and composition of conceptual schemata. Such a focus on bodily experience introduces a notion of individuality to schemata, as bodily experience is highly dependent on individual as well as collective experience. Thus, image-schematic structures are not rigid structures of collective human experience, but flexible patterns of comprehension that can be adapted to different situations and varying experiences. Johnson exemplifies his argumentation with the image-schematic structure of physical containment: human bodies as containers which are filled with things (e.g., food, drinks, medicine, organs etc.). This understanding of confinement is extended into the environment in that

> we experience constant physical containment in our surroundings (those things that envelop us). We move in and out of rooms, clothes, vehicles, and numerous kinds of bounded spaces. We manipulate objects, placing them in containers (cups, boxes, cans, bags, etc.). In each of these cases there are repeatable spatial and temporal organizations. In other words, there are typical schemata for physical containment" (1990, p. 21).

Furthermore, image-schematic structures like physical containment "are constantly operating in our perception, bodily movement through space, and physical manipulation of objects" (p. 23) and entail a variety of different conceptual, and ultimately linguistic, consequences. For example, our bodily placement as a container in time and space sets us relative to other objects, persons, or abstract things. Thus, for example, the in- and out orientation entailed by the container schemata implies that other objects, persons or things might be in the contained space with us or outside of it. In terms of movement through space, these objects, persons, or things might be moving away from us or towards us. *Time flies by*, for example, places us in a confined space as immovable object being approached, passed, and left behind by the abstract thing that is time. In other words, time is coming into and getting out of sight. There is an underlying image-schematic structure of containment (in/out) to this metaphorical understanding of the abstract thing of time as a moving object, which is facilitated by bodily experience.

As described previously, there is a collective cultural as well as an individual notion (which is influenced by the collective cultural) to such image-schematic structures. As such, they might differ to varying extent not only between individuals of the same culture and cultural understanding, but also between individuals from different cultural backgrounds, and thus different conceptual backgrounds. Therefore, in turn, image-schematic structures as facilitators of understanding may affect intercultural and cross-cultural communication and thus translation. The broad variety of research within CMT, as described previously, created the necessity of some kind of metaphor classification system. Due to a lack of time and space, only two of these approaches will be presented in the following section.

2.4.1 Metaphor typology

Since metaphor research within the CMT framework has produced (and still produces) an enormous number of cross-domain mappings, and accordingly an even higher number of respective linguistic expressions, and an attempt to gather them all in one place has been terminated, theoretical effort has been directed towards developing a classification system for mappings. Different researchers have proposed different systems. Two of these will be briefly introduced here. If applicable, their importance for translation will be commented on.

2.4.1.1 Lakoff and Johnson's metaphor classification

One of the first attempts to categorize and classify conceptual metaphors is Lakoff and Johnson's systematization of metaphorical conceptualizations (1980/2003). While the concepts and expressions used to describe the basic principles of CMT in the previous section are what Lakoff and Johnson term *structural metaphors*, that is, the structure of one domain is transferred to another (2003, p. 14), they also propose *orientational metaphors*, *ontological metaphors* and *personification*. *Orientational metaphors* are, as the term indicates, characterized by spatial orientation. Linguistically, most of the metaphorical phrases in this category contain prepositions indicating some kind of spatial positioning like "up-down, in-out, front-back, on-off, deep-shallow, central-peripheral"(p. 14). Examples for orientational metaphorical mappings are HAPPY IS UP and SAD IS DOWN, which is linguistically realized in phrases like *I'm feeling **up*** and *I'm feeling **down*** (p. 15). According to Lakoff and Johnson, orientation metaphors are motivated by "the fact that we have bodies of the sort we have and that they function as they do in our physical environment" (p. 14).

Ontological metaphors are based on the human capability and effort to categorize. Our bodily experiences allow us to compare and extract main features of concrete physical substances and entities, which in turn leads to categorization of similar items based on similar experiences. In ontological metaphors, this ability to categorize concrete items on the basis of physical experiences is transferred to abstract concepts, that is "events, activities, emotions, ideas, etc." (p. 25). Lakoff and Johnson exemplify this metaphor class with the cross-domain mapping INFLATION IS AN ENTITY as expressed in sentences like *If there's much more inflation, we'll never survive* (p. 26). Finally, there are metaphorical mappings centered on the notion of personification. In this category, which in a wider sense belongs to the category of ontological metaphors, non-human entities are viewed as either being persons or carrying human traits. Again, individual experiences with our physical self or others allow us to conceptualize and understand abstract concepts and ideas. Thus, when *Inflation has given birth to a money-minded generation*, the human characteristic of reproduction via parturition and some of the knowledge and understanding of it is transferred to the abstract economic concept of inflation (p. 33).

Although this classification of metaphors appears feasible at first sight, it quickly becomes clear that its application in a context of translation is challenging. For example, the argument that the interaction between our bodies and the physical environment alone provides us with conceptualizations that are clearly traceable in language might be true on a general basis. It does, however, not automatically imply that every human being in the world conceptualizes reality similarly, and thus expresses it similarly linguistically, just because humans interact with space. Cultural and social influences might cause conceptual variations in other cultures, and thus in other languages. This presents a challenge for the translator, because he or she not only has to negotiate between two languages, but between two cultures, between two societies, and ultimately between two, potentially different, systems of conceptualization.

2.4.1.2 Metaphor classification along the lines of conventionality

Charteris-Black (2004) remarks that speakers are able to choose between constructing their own metaphors adjusted individually to the respective communication situation (e.g., aim, context, addresses etc.), or resorting to commonly known, conceptually and linguistically accessible and accepted metaphors within their linguistic community. Accordingly, he refers to the latter as conventional metaphors and the former as creative metaphors.

Referring back to Lakoff and Turner's definition of conventionalized metaphors as "automatic, effortless and generally established" (Lakoff & Turner, 1989, p. 55), Charteris-Black defines these metaphors as "phrases that exist at some point between literal and metaphorical uses" and "they reflect a diachronic process whereby use that was originally 'metaphorical' becomes established as 'literal' within a language"(2004, p. 17). He points out that conventional instances of metaphor cannot be declared literal per se, because, due to individual experiences and subjective encounters with language, some metaphors might be more conventionalized to some speakers than to other speakers. Furthermore, referring to metaphorical mappings and their respective linguistic expressions as conventionalized or creative is not a matter of either/or, but a distinction along a continuum of various degrees of conventionality according to a number of different factors. One factor, the influence of individual speaker experience, has already been mentioned. There is also a distinction between conventionalization of mappings and conventionalization of their respective linguistic expressions. While, for example, a mapping might be regarded conventionalized, its different linguistic realizations might (or might not be) to varying degrees. Some expressions might be conventionalized while others are not. Although cross-domain mappings carry a rather general over-arching character, it has to be borne in mind that not the complete conceptual content of a source domain is mapped onto (the complete conceptual content) of a target domain. In a study on the conceptual metaphor TIME IS MOTION for example, it was found that, in English, the conceptual source domain items *rise*, *enter, leave, travel* and *jump* (verbs of motion) are not used to express figurative motion of any commodity of time (e.g., *day, night, time, life*) (normalized frequency of zero instances per ten million words in a corpus of 525 million words)(Hegrenæs, 2011). This does not mean that it is not possible (or even done by individual speakers) to conceptualize and linguistically realize such metaphors. In fact, between 5 and 22 instances of use of these verbs of motion were observed in the whole corpus (observed frequencies, p. 46). Thus, although the conceptual metaphor TIME IS MOTION can be described as conventionalized in present day English (at least BrE and AmE), some of its linguistic realizations are more conventionalized than others, and yet others are not used at all. Due to social and cultural influence, the latter is a sign of a conceptual incapability, or lack of motivation, for speakers to imagine, and thus articulate, these expressions. For example, why is it possible for English speakers to imagine time flying by, but not the night jumping? On the other hand, those expressions which exist, but are creative, have the opportunity to go through the diachronic process of conventionalization and may or may not become conventionalized at some point in time. The classification of metaphor described in this section is referred to by a number of different terms in the literature. In addition to conventional/creative (*cf.* Charteris-Black, 2004), there are conventional/unconventional, dead/novel, linguisticized/novel and non-innovative/innovative.

In relation to translation, it needs to be pointed out that this type of classification is developed with native speakers of a language in mind. Two problematic issues mentioned previously come into play here. Firstly, conceptual metaphors are not, as originally suggested by Lakoff and Johnson, general to human conception, but are influenced by social and cultural structures. A number of cultures might share some metaphors, while others only exist in a single culture and language. Secondly, and as a result of the former, since metaphor may be either culture-dependent or culture-overlapping, the degree of knowledge about the target culture (one might say the degree of target culture integration) and proficiency in the language is decisive for a classification of metaphor along the lines of conventionality and creativity applied to a translation context.

2.5 Metaphor in/and translation

Metaphor, and non-literal language in the form of figurative speech in general, assumes a special position in translation. Both in monolingual and multilingual settings, all instances of language use that involve non-literality and indirectness, which metaphor is generally associated with, require linguistic as well as cultural knowledge.

Since metaphor was regarded a solely rhetorical feature in poetic literature for a long time, it did not receive much attention from theoretical translation studies either. Most contributions on metaphor in translation were normative prescriptive in the sense that they discussed ways to handle metaphors (in the traditional sense) in the translation process. Readers, most often students of translation, were provided with lists of specific translation strategies or translation options for metaphorical expressions. Metaphor was regarded a linguistic feature that might potentially pose translation problems (Schäffner, 1998, p. 281). Dagut (1976) initiated a discussion asking whether or not metaphor is translatable at all, thus declaring all normative approaches redundant. Van den Broeck (1981) argues for a theoretical approach to metaphor translation, but disregards contemporary developments in metaphor theory, that is CMT. The following section will take a closer look at theoretical approaches to metaphor translation as well as the implications of CMT on the subject.

2.5.1 The translatability of metaphor – a prescriptive approach

Before Lakoff and Johnson (1980/2003), Dagut (translation theory) claimed that metaphor "is a phenomenon which is … central to all forms of language use" (1976, p. 21). He criticizes translation theorists for neglecting metaphor as a linguistically prevalent feature in all text. Since, however, Dagut treats metaphor as a purely linguistic element, he does not acknowledge any generalizing or grouping constituent to metaphor (see Lakoff and Johnson's cross-domain mappings and culture-overlapping metaphors), but approaches metaphor as a unique linguistic feature referring to numerous individual, unique verbalizations. Thus, he assumes that "every metaphor is an entirely new and unique creation" which "is unpredictable and irreducible to 'rules'" (1976, p. 23). However, Dagut does not doubt the translatability of metaphor in general. He rather argues that there is no universal rule or strategy for translating metaphors in any given language. He is the first to introduce the importance of context to translating metaphors by highlighting cultural and semantic notions to the concept of metaphor. He stresses the translator's awareness of cultural and social implications in source as well as target language during the translation process and states that "the translatability of metaphor fluctuates according to the complex of cultural and linguistic factors involved in each particular case" (p. 33).

Newmark, well aware of Dagut's contribution the year before, disagrees. He credits Dagut for his advance to put metaphor in the focus of translation theory, but introduces a series of five translation procedures to be applied by translators when encountering what he calls "standard, i.e. more or less common, metaphors" (1977, p. 172): 1) translating by a metaphor using the same or a similar image; 2) to translate with a different image that has the same sense; 3) to convert the metaphor in a simile; 4) to extend the simile with some meaningful information about the metaphorical image and 5) to translate and paraphrase as much of the metaphorical image as possible (p. 173). The choice of translation strategy is, however, dependent on the type of metaphor. Newmark distinguishes between standard metaphors, dead (fossilized) and original (creative) metaphors (see previous sections on metaphor classifications). The translation of the latter depends on whether a similar image exists in the target language, and whether the translator decides to translate semantically (close to the source text) or communicatively (close to the readership). However, he points out that a semantic translation (keeping the image) is viable in most cases, since the creative image is just as new in the source language as it will be in the target language. This way, the intended effect on the readership is kept. In 1983, he extends his classification adding two metaphor types, namely cliché and recent metaphors, and extending the list of suggested translation procedures for standard metaphors (now called stock metaphors) to eight: 6) modification of metaphor; 7) deletion and 8) same metaphor combined with sense (Newmark, 1983, pp. 11-18). Thus, although Newmark agrees with Dagut that metaphor is prevalent in every type of language use and not only prosaic literature, and that it is translatable, he suggests a series of translation rules to be applied when translating standard metaphorical images. In this sense, he contradicts Dagut, who claims that there are no universally applicable rules for the translation of metaphors, since every metaphor is a unique linguistic item.

Disregarding CMT, Van den Broeck (1981) discusses restrictions to translatability in general, using metaphor as an example. Just as Dagut, Van den Broeck does not intend to develop a prescriptive list of translation rules for metaphor translation, but rather to show that generalizations in terms of metaphor classifications are possible (in contrast to Dagut), but should not be used to enforce strict rules on how to handle certain types of metaphor when translating (p. 86). Van den Broeck proposes for translation theory to consider metaphor from an "effectiveness in communication" point of view. This relates to the question of "whether or not metaphors are *functionally* relevant, i.e. whether they are relevant to the communicative function of the text in its situation, or not" (p. 76). Van den Broeck calls for a theory that models the phenomenon of metaphor translation in order to be able to firstly predict transfer strategies in a specific context, and secondly to provide prescriptive translation rules for metaphors to satisfy an "optimal correspondence" (p. 77) between source text and target text in a given context. Thus, he introduces prescriptive norms after all, but reduces them to suggestions based on empirical description and modelling. In terms of translatability, Van den Broeck does not distinguish metaphor from any other language use: "It goes without saying that translatability of metaphors does not stand apart from translatability in general, but is only a special case or significant aspect of it" (p. 84). He refers back to Even Zohar's basic law of translatability (1971) as applicable to metaphor translation as well:

(1) Translatability is high when a pair of languages are of close basic 'type', provided that the conditions under (2) and (3) are fulfilled.
(2) Translatability is high when there is contact between SL and TL.
(3) Translatability is high when the general cultural evolution in SL and TL proceeded on parallel lines.
(4) Translatability is high when translation involves no more than a single kind of information. In other words, a text is more translatable if it displays information of a single type than if it is 'complex' in that various types, and hence a greater quantity of information , are involved.

(Van den Broeck, 1981, p. 84, adapted from Even-Zohar)

Van den Broeck does not clearly acknowledge the cultural relations between source- and target language established by Even-Zohar, but reduces cultural and social influence on translatability to a text's functional setting (text type, metaphor function etc.). Thus, he misses the importance of conceptual similarities and differences between source- and target language and between source culture and target culture, as introduced by CMT. Furthermore, because of this disregard of CMT, Van den Broeck errs when he claims that metaphors are only functionally relevant when they are of the creative type in literary language use as opposed to non-creative types as used in, for example, the language of science (p. 78). Research has shown that scientific language use is entrenched with all types of metaphors (Semino, 2008, Chapter 4). In an area of discourse which is marked by new discoveries, new developments and abstract phenomena, the use of metaphors, and specifically what Van den Broeck calls "bold metaphors", is vital and unavoidable (Semino, 2008, p. 131). Therefore, and probably due to his definition of metaphor, Van den Broeck's argumentation is inaccurate when he claims that "[i]n scientific discourse bold metaphors are very unlikely to occur" and "it goes without saying that for a translator there is no problem in rendering them (metaphorically or non-metaphorically)"(Van den Broeck, 1981, p. 78). However, the discussions on metaphor translatability initiated by Dagut, Newmark, and Van den Broeck succeeded in pushing metaphor into the focus of translation theory.

2.5.2 Metaphor translation and CMT

Since conceptual metaphors as described in Section *2.4* are assumed to be dependent on society and culture, knowledge not only about the target language but also the target culture is important for the translation of metaphor. For example, a culture that does use money as a payment system but some other (arbitrary) system, will not be able to understand linguistic realizations of the conceptual mapping TIME IS MONEY (e.g., *You better make this worth my time*). This example illustrates that there are, or might be, conceptual differences as well as similarities, between cultures. Such similarities and differences are assumed to affect translation, because

> [i]f the two languages use different metaphorical mappings to express the same idea, and the mappings are indeed conceptual rather than linguistic

> (as suggested by Lakoff), then the translation would involve not only a transfer process from one *language* to another but also a transfer process from *one way of conceptualizing the world* into another". (Mandelblit, 1996, p. 483, emphasis in original)

Thus, the translation process is not merely a process of linguistically rendering text from one language into another, but of rendering similar or different conceptualizations of the world.

In a cultural context, Stienstra (1993) distinguishes between three types of metaphorical correspondences between languages: (1) universal metaphors, (2) culture-overlapping metaphors, and (3) culture-specific metaphors. This classification of metaphors is reminiscent of Van den Broeck's discussion of the translatability of metaphor and his reference to Even-Zohar's basic laws of translatability (Van den Broeck, 1981, p. 84), which refer to a high degree of translatability when there is language contact, and when some form of common cultural genesis exists between two cultures. While Van den Broeck's discussion is mainly confined to the linguistic level, only partly admitting to cultural influence, Stienstra acknowledges the conceptual impact of cultural differences and similarities. She argues that most universal metaphors are based on bodily, physical experiences, which are of a universal nature to all humans. Culture-overlapping are those metaphors which might concur between two or more cultures, and culture-specific metaphors are those which are restricted to conceptualization in a single culture. Stienstra's classification does, however, not distinguish the conceptual from the linguistic level. Her metaphor classification is based exclusively on the former, whereas, in a translation context, the latter plays an important role as well.

Mandelblit (1996) differentiates two types of metaphors based on conceptual similarities and differences between languages: metaphors of Similar Mapping Conditions (SMC) and metaphors of Different Mapping Conditions (DMC). She acknowledges a differentiation between a conceptual and a linguistic level and argues that

> [i]n the Similar Mapping Condition (SMC), the source idiomatic expression and the expected translation are based on the same general metaphorical mapping. In the Different Mapping Condition (DMC), the expected idiomatic translation is based on a different ontological mapping than that of the source expression. The Similar Mapping Condition (SMC) is further divided into cases, where the target expression precisely (or almost precisely) matches the source one (i.e., same wording), and cases where some aspect of the metaphorical mapping alternates between the source and target expressions. (Mandelblit, 1996, p. 491)

Thus, Mandelblit recognizes that conceptual similarities (e.g., similar mappings as expressed in universal metaphors and culture-overlapping metaphors) are not necessarily linked to linguistic congruency (morphological, syntactic, semantic similarities between source- and target text expressions). The linguistic choices made by target language speakers might differ from source language speakers, although the same conceptual mapping is expressed. This refinement is important for translation.

Based on Mandelblit's distinction of mapping conditions, Al-Ali and Al-Hasnawi (2006) specify three metaphor types (conceptual mapping conditions and linguistic realizations) in a corpus of English and Arabic metaphors and their respective translations:

> (1) metaphors of similar mapping conditions, where shared ideas are expressed by *identical* expressions in both languages,
> (2) metaphors likewise of similar mapping conditions, only realized by *different* expressions in the two languages, and
> (3) metaphors of different mapping conditions with *no* equivalents in the TL
>
> (2006, p. 234, emphasis in original)

Al-Hasnawi (2007) claims that conceptual differences between cultures hamper translation, especially "when translating between two distant cultures" (Chapter 2, no pagination). The farther apart two cultures are, the more different these two cultures may conceptualize reality. An investigation of metaphor types based on linguistic and conceptual similarities or differences between languages and cultures requires out of necessity a qualitative analysis of translation products. Such a qualitative investigation is not the aim of the present study. However, a classification as suggested here by Mandelblit and Al-Ali and Al-Hasnawi is closely related to a classification and denotation of different translation strategies, as it has been employed in the current study (presented in Chapter 3).

The influence of cultural-conceptual similarities and differences on translation has been investigated within translation process studies from several points of view. The next section will give an overview of this type of research.

2.5.3 Translation process studies, metaphor translation and CMT

Schäffner and Shuttleworth (2013) point out that most research on metaphor in translation is based on the translated text which only "shows us the results of very complex cognitive process" (p. 97), but does not tell us anything about the nature and structure of these processes. Only a few studies have hitherto addressed and investigated metaphor translation from a processing point of view employing methodologies like thinking-aloud (Mandelblit, 1996; Tirkkonen-Condit, 2001, 2002), keystroke-logging (A. L. Jakobsen, Jensen, Kristian T.H.&Mees, Inger M., 2007) and eye-tracking (Sjørup, 2011). Some of these studies are relevant for the study at hand, and will be introduced in the following.

Mandelblit (1996) claims that, in a monolingual setting, access to the conceptual level might not be necessary for highly linguisticized metaphors. However, when the task is translation and the target culture does not provide a suitable conceptual mapping or uses different linguistic expressions for the same mapping (*cf.* Al-Hasnawi, 2007), a shift from the linguistic to the conceptual level becomes necessary. Mandelblit refers to this view as *cognitive translation hypothesis* (1996, p. 486). However, such a shift from the linguistic to the conceptual level is not necessarily an automatized process. Mandelblit refers to the *Gestalt School* and their concept of *functional fixedness*, which, she assumes, entraps the translator, at least momentarily, in the linguistic (and conceptual) form of the source language, resulting in word-to-word translations that may not correspond to any linguistic and/or conceptual equivalent in the target language. Referring to Scheerer (1963), Mandelblit claims that "the problem solver is 'fixated' on the given (original) formation of the problem, being unable to restructure the problem in a way which will lead to the solution" (Mandelblit, 1996, p. 488). Translation is treated as a problem-solving process with the translator as the problem solver, the original problem being the source text metaphor and the (adequate solution) being a conceptually and linguistically adapted target language phrase, which is not necessarily metaphorical.

In order to investigate the *cognitive translation hypothesis* empirically, Mandelblit compared translation times for metaphorical phrases under Similar Mapping Conditions and metaphorical phrases under Different Mapping Conditions (1996, p. 491). Under the aforementioned assumption that conceptual differences between source- and target language require a shift from the linguistic to the conceptual level, she hypothesizes that these phrases require longer time to translate than metaphorical phrases which operate under the same mapping conditions in both languages; that is, these phrases do not require access to the conceptual level. Based on an English-French data set, Mandelblit was indeed able to report that "translation time is significantly longer in cases where the source and target languages make use of different conventional correspondences to express the same topic of communication" (p. 493). She suggests that this delay in reaction time is due to a shift not only from a linguistic to a conceptual level, but a shift between source language conceptualization and target language conceptualization.

Tirkkonen-Condit (2001, 2002) points to similar tendencies in two think-aloud studies on metaphor translation by professional translators and advanced translation students. She argues that a "literal rendition may be the first that comes to mind and therefore also surfaces in the thinking aloud. The effort it takes to get rid of the literal rendering may be exactly the thing that causes delay in instances of domain conflict" (2002, p. 115). Thus, Tirkkonen-Condit confirms Mandelblit's findings that metaphorical expressions that exploit different domains in source- and target language cause a delay in the translation process. However, the data used by Mandelblit and in the two studies reported on by Tirkkonen-Condit are elicited by using the think-aloud method. The shortcomings of this particular method for process-related investigations have been discussed in Section *2.2*. Tirkkonen-Condit indirectly acknowledges this set of problems when she refers to the literal translation as the one that surfaces in the TAPs, while the subsequent process of finding an alternative translation is difficult to retrace in the protocols.

As discussed earlier, keylogging and eye-tracking compensate for a number of shortcomings of the think-aloud method and have been employed for the exploration of metaphor-related translation processes. Using keylogging, Jakobsen et al. (2007) investigate the translation process of idiomatic expressions in general and find that compared to non-idiomatic expressions, the translation of idiomatic expressions, which includes metaphor, takes longer. Although this investigation does not consider metaphor in particular, nor does it problematize conceptual shifts between source- and target language, the results of TAP studies like Mandelblit's and Tirkkonen-Condit's can be said to have been corroborated by employing keylogging.

Jensen (2005) is the first to combine process studies and the investigation of translation competence with metaphor. Like Mandelblit (1996) and Tirkkonen-Condit (2001, 2002), Jensen distinguishes between a conceptual and a linguistic level of metaphor and assumes that "translating metaphor requires translator competence, which among other things entails an awareness of the duality of the metaphor as both a mental concept and linguistic expressions" (2005, p. 183). Jensen continues to argue that a cognitive approach to metaphor allows for a more comprehensive approach to the translatability of metaphor than taken by a normative approach as suggested by, for example, Newmark (1983). She points to Schäffner (2004), who, in line with Mandelblit (1996), argues that metaphor might be present in both source- and target language on a conceptual level (macro level), but only partly and/or differently, or even not at all, on a linguistic level (micro level) (p. 1267). Thus, a normative approach that does not consider a conceptual representation of metaphor (i.e., distinguish between conceptual and linguistic level) and its implications on the translation process (and product) is deemed unfit for metaphor translation and consequently for translator education.

In order to investigate metaphor from a cognitive point of view related to translation competence, Jensen investigates translation strategies (coping strategies). Based on her earlier work, which was not related to metaphor, Jensen reportes that "non-professional translators favoured coping strategies that required less cognitive effort than those selected by professional translators" (2005, p. 191). The allocation of cognitive capacity (i.e., cognitive effort; *cf.* Göpferich 2013) is here closely linked to problem solving behavior (*cf.* Krings, 1986). A small amount of cognitive effort is associated with unproblematic routine processes that "make use of existing cognitive structures" (2005, p. 190), while large cognitive effort is seen in connection with complex problem-solving behavior (p. 190). Using TAPs and keystroke-logging, Jensen investigates the translations of six participants (two non-professional translators, two young professional translators with two years experience and two expert translators with at least 10 years experience). Based on a pre-made typology, she identifies four different metaphor translation strategies:

> 1: Use an equivalent of the original metaphor, which would express a similar conceptual mapping (M → M)
> 2: Replace a metaphor of the original with a metaphor based on a different conceptual metaphor (M → D)
> 3: Replace a metaphor with a paraphrase (M → P)
> 4: Deletion – a complete deletion of the metaphorical expression (Del)
> (2005, p. 193)

This classification of metaphor translation strategies is related to Mandelblit's distinction between similar and different mapping conditions (1996) and the metaphor types identified by Al-Ali and Al-Hasnawi (2006). Strategies identified in a qualitative product-based analysis are taken as indicators of translators' cognitive processing as reaction to and operationalizations of conceptual similarities or differences between cultures.

Assuming that metaphor translation is dependent on the development of a specific translation competence, which includes the understanding of metaphor as a conceptual as well as linguistic phenomenon, and cross-cultural knowledge (2005, pp. 183-184), Jensen hypothesizes that, in general, professional translators opt for metaphorical translation strategies (M → M, M → D) and non-professional translators for non-metaphorical coping strategies (M → P, Del). According to her earlier argumentation that professional translators select translation strategies that are associated with a larger amount of cognitive effort, while non-professional translators seek for cognitive relief by selecting less straining coping strategies, M → M and M → D are treated as indicators of increased cognitive demand, while M → P and Del represent reduced cognitive demand. Jensen's results show that the group of professional translators (experts and young professionals) selects metaphorical strategies more often than the group of non-professionals. In addition, there is a slight difference within the group of professionals. The group of experts uses metaphorical strategies more often than the young professionals. A more fine-grained analysis reveals that

> non-professional translators mainly applied two solutions. They either translated the source text metaphor by the same metaphor (M → M, 43%), or they simply deleted the metaphor (Deletion, 41%). They rarely attempted to find a different metaphor (M → D, 7%), or paraphrase (M → P, 9%) the metaphor. (Jensen, 2005, p. 203)

It is interesting to notice that, while the young professionals selected deletion as a strategy, the data for the expert group did not exhibit a single case of deletion. However, the young professionals resorted to paraphrasing in more instances than any of the other two groups of informants. Jensen concludes that the non-professional translators did not exceed the linguistic surface level of the metaphor indicated by either word-to-word translations (M → M) or deletion of the expression when no instant equivalent in the target language could be found (Del). Only in a few cases, they implemented a different metaphorical image in the target language or rephrased into non-metaphorical language. The professional group, on the other hand, seems to access the conceptual level by trying to find metaphorical equivalents in the target language or by paraphrasing. Jensen interprets the prevalence of paraphrasing in the group of young professionals as a sign of conscious struggle with conceptual re-thinking, which in turn is a sign of ongoing professional development, but not expertise. The professional group (young professionals and experts) seem to be able to cope better with the demand a conceptual mismatch between source- and target language imposed on them, which Jensen sees as a sign of (advanced) professional experience, that is as a sign of the development of a specific translation competence. In other words, the professional group exhibits signs of a cross-cultural understanding of conceptual as well as linguistic differences and similarities between the English and the Danish culture and language.

Summing up, Jensen's data shows that the development of professional translation competence seems to be intertwined with changes in the allocation of cognitive resources. Non-professional translators resort to cognitively less demanding transfer operations, while professional translators seem to be able to deploy more cognitive effort by engaging in conceptually more challenging translation tasks. However, it becomes clear that Jensen's assumption that paraphrasing as a non-metaphorical translation strategy is a marker of non-professional translation behavior, and therefore indicates less cognitive effort, cannot be corroborated. Quite the opposite, Jensen concludes that paraphrasing clearly indicates access to the conceptual level which entails larger cognitive effort, and is thus a marker of professional development rather than non-professionalism. Jensen does not seem to acknowledge this discrepancy between her initial categorization and her final interpretation of the data.

Sjørup (2013) picks up the topic of cognitive effort in metaphor translation. She operationalizes the concept of cognitive effort by measuring production time for metaphorical expressions in the target text. Firstly however, Sjørup takes a step back and sets out to determine whether or not metaphor indeed presents a translation problem as argued by for example Newmark (1983). In an eye-tracking analysis involving 17 professional Danish translators (English-Danish), Sjørup discovers that when told to read a text for the purpose of verbal reproduction, metaphor does not seem to pose a problem. Reading times and fixation times for metaphorical expressions are not significantly different from reading- and fixation times for non-metaphorical expressions. However, when told to read the text for the purpose of subsequent translation, reading- and fixation times differ between the two types of expressions. Metaphorical expressions exhibit significantly longer times than non-metaphorical expressions. This seems to empirically corroborate the assumption that metaphor is indeed a problem of translation rather than monolingual language processing. Furthermore, for the task of reading for translation, Sjørup investigates reading- and fixation times related to different translation strategies. However, she employs a different classification than Jensen, which is based on Dobrzyńska (1995). This classification does not distinguish between a conceptual and a linguistic level: 1) *an exact equivalent of the original metaphor* (M – M), 2) *another metaphorical phrase that expresses a similar sense* (M1 – M2), and 3) *replacement of an untranslatable metaphor of the original with its approximate literal paraphrase* (M – P)(1995, p. 599). Dobrzyńska's classification relies on linguistic text analysis and does not account for conceptual differences. Sjørup does not find any significant effects of type of translation strategy on reading- and fixation times. It needs to be pointed out, however, that the empirical measurements (i.e., reading- and fixation times) are only part of the complete translation process. Types of translation strategies were identified in the target text after the translation event. Thus, there is no immediate relation between those measurements and the type of translation strategy.

In a second investigation employing keylogging, Sjørup (2013) examines production time for metaphorical and non-metaphorical expressions and finds that production time for the latter is shorter than for the former, that is, metaphorical expressions take longer to produce than non-metaphorical expressions. This corroborates the findings of the previous analysis: metaphor appears to be a translation problem, not necessarily a comprehension problem. Regarding specific translation strategies, Sjørup reports that there is a clear quantitative preference for the word-to-word strategy (M-M) among the participants of her study, followed by paraphrasing (M-P) and the replacement with a different metaphor (M1-M2). Concerning production time, the M-M strategy is marked by the shortest production time, followed by paraphrasing with insignificantly longer time values. Finally, the least used strategy M1-M2 exhibits the longest production time. If then, production time is taken to be a direct indicator of cognitive effort, with low effort indicated by short production time and large(r) effort indicated by longer production time, Sjørup's results suggest that her participants selected strategies which involve less cognitive effort (M-M, M-P) as opposed to a strategy which demands a larger amount of attention, and therefore cognitive resources (M1-M2).

Since Sjørup only investigates a group of informants she classifies as professional translators (with at least 12 months of professional experience)(2013, p. 104), a comparison between her findings and those in Jensen's study has to be confined to this group (young professionals and experts in Jensen's study). In terms of choice of translation strategy, Sjørup's results corroborate what Jensen hypothesizes and discovers in her data set, namely that professional translators prefer the word-to-word translation strategy M→M/M-M. However, while Sjørup's translators select the paraphrasing strategy (M→P, M-P) before the change of metaphor (M→D, M1→M2)(p. 182), Jensen's informants (both the experts and the young professionals) exhibit the opposite behavior (M→D, M1→M2 before M→P, M-P). Sjørup's empirical measurements show that both the word-to-word strategy M-M and paraphrasing demand less cognitive effort than the conceptual and linguistic adaptation of a target language metaphor (change in metaphor). She presumes that

> the increased cognitive effort could be due to the duality of the M1 – M2 translation strategy in which the participant must not only interpret and discard the ST metaphor as suitable in the TT, but she must find a target language metaphor which expresses the same meaning but which has a higher language-specific saliency than the ST metaphor, i.e. is more suitable to the target language. (2013, p. 207)

Furthermore, she continues to argue that "[t]he results could be interpreted as [sic] indication that the translator will choose the path of least resistance, i.e. a direct transfer translation strategy" (p. 208). Since her subjects were all deemed professional translators, this argumentation suggests that the choice of the less cognitively demanding strategy is not dependent on the degree of professionalism, but on the very fact that it requires fewer cognitive resources. Although Jensen assumes that an indicator of professionalism in translation is the usage of cognitively demanding strategies like the metaphorical translation strategy M→D, Sjørup's interpretation seems to be supported by her own data: The experts (10 years of experience) chose the word-to-word strategy more often than any other group of informants (59 times, as opposed to 37 times for the young professionals and 43 times for the non-professionals).

Jensen's study provides two separate, but related answers to this difference between the expert group and the two other groups. Firstly, professionals resort to cognitively less demanding strategies which are associated with routine processes that exploit available cognitive structures (2005, p. 190), because it is "a way of reducing the general cognitive load allowing resources to be allocated to problem-solving when needed" (p. 191). Secondly, in her examples, Jensen points out that a number of translations executed by selecting the word-to-word strategy are marked by conceptual and linguistic similarity in the target language Danish. Thus, one can assume that word-to-word translations based on similarities between English and Danish are routine translation processes that are characterized by low cognitive effort.

However, this raises the question why the other two informant groups do not exhibit the same, or approximately the same behavior. The explanation might be found in Göpferich's translation competence model (2009, p. 20). The translation routine activation competence is Göpferich's addition to PACTE's model and describes "the abilities to recall and apply certain – mostly language-pair-specific-(standard) transfer operations (or shifts) which frequently lead to acceptable target-language equivalents"(p. 21; see also Section 2.1.2). Similar conceptual and linguistic mapping conditions causing the implementation of the word-to-word translation strategy can be perceived as such standard operations, in this case specific to the language pair English and Danish. The ability to recall and apply them during a translation task is a feature of professional translation behavior, and the fact that the groups of young professionals and non-professionals exhibit fewer instances of the M→M strategy can be treated as a marker of professional inexperience and professional development, that is, the translation routine activation competence is not yet fully developed. Thus, although similar concepts and linguistic expressions exist in a target language (in this case Danish), a lack of experience (i.e., translation routine activation) might prevent less experienced translators from selecting the word-to-word translation strategy, as professional translators do. As a feature of their ongoing development, they might need to select other strategies like paraphrasing, which Jensen's sees "as a way of actively coping with metaphors while developing expert metaphorical competence" (2005, p. 205), that is developing a routine activation competence. Thus, Sjørup's interpretation of professionals choosing "the path of least resistance, i.e. a direct transfer translation strategy" because "she will prioritise her cognitive resources and not spend more cognitive effort on a translation strategy than necessary" is not a conscious decision by the translators, as Sjørup seems to imply, but can be interpreted as a marker of professional competence.

Since the investigation of metaphor in connection with translation competence is not object of Sjørup's study, this interpretation of the results is not part of her work. Jensen, who investigates three different subject groups in a developmental setting on the other hand, includes both routine processing and cognitive effort in her analysis, but lacks the empirical underpinning to measure cognitive effort that Sjørup introduces. Paraphrasing as the second most used translation strategy in Sjørup's study (longer production time and therefore more cognitive effort) demonstrates that production time (as indicator of cognitive effort) is better suited to investigate competence development, than type of translation strategy. Furthermore, regarding the replacement strategy M→D/M1-M2, these instances might be novel to the translator and therefore not part of the automatic shift operations suggested by Göpferich for routine translation. Jensen's example 4 displays a source text segment from a prose text (*The prose trips off the tongue like peanut butter*) (2005, p. 197), which might even be novel and difficult to grasp for a source language speaker, let alone for a translator. Increased cognitive effort indicated by increased production time values is due to the necessary exploitation of both the conceptual and the linguistic level in the comprehension phase as well as the transfer into a target language metaphor (Sjørup, 2013, p. 207). The difference in selection between Jensen's and Sjørup's informants (M→D over M→P and vice versa) might simply be due to the difference between Jensen's experts (at least 10 years of experience) and Sjørup's professionals (more than 12 months of experience).

Advanced experience, a developed translation competence like Jensen's expert presumably possess, is assumed to free cognitive capacity to direct to other, more problematic tasks "such as the capacity to make more creative non-obligatory shifts" (Göpferich, 2013, p. 62), which metaphorical shifts between the source- and target language might be an example of.

2.6 Summary

This chapter aimed at placing the study at hand into the larger framework of translation process studies and research on translation competence (development). It provides the necessary clarification and delineation of important theoretical concepts (e.g., translation competence, conceptual metaphor theory, metaphor translation), as well as an in-depth presentation of previous research that forms the basis for the present investigation.

Translation competence as "the underlying system of knowledge and skills needed to be able to translate" (PACTE, 2000, p. 100), is described as a dynamic construct consisting of an interwoven system of psychological, physiological, cognitive and linguistic sub-competences that develop over time with training and experience. Proposed models of professional translation competence (e.g., Göpferich, 2009; PACTE 2000) provide a necessary theoretical point of origin for further research. Process research on translation behavior of translators with different degrees of professional experience has revealed a number of parameters in which less and more experienced translators differ in terms of how they process through a translation task. Metaphor with "its emphasis on the psychological rather than textual aspects […] and the insights that it offers into the brain's cognitive processes"(Schäffner & Shuttleworth, 2013, p. 94) constitutes a useful tool to investigate translation competence development from the view point of cognitive resources and their distribution in a process research setting. The study at hand does not claim to be the first of its kind, but intends to fill gaps in and cross bridges between earlier studies with the aim to provide new insights into the subject matter.

Jensen (2005) and Sjørup (2013) investigated metaphor in translation from a processing point of view. Both treat metaphor as a translation problem, and Sjørup empirically tests this hypothesis in an eye-tracking analysis of reading-and fixation times for metaphorical and non-metaphorical expressions. Based on differences between measurements, she concludes that metaphor constitutes a translation problem. Jensen explores the use of four different types of metaphor translation strategies across three different subject groups (non-professionals, young professionals, experts) and concludes that non-professional translation behavior is marked by surface-level processing and a preference for the cognitively least demanding options. The data for the young professionals and experts, on the other hand, reveal active coping mechanisms, which Jensen associates with elevated cognitive effort. However, Jensen's assumptions about cognitive effort, and thus competence-related translation behavior, are theoretical, since she did not employ any form of empirical measurement of cognitive effort. Sjørup operationalizes cognitive effort using production time for different translation strategy types as measurements in a keylogging analysis. She finds that certain translation strategies are preferred over others, and hypothesizes that this is due to decreased cognitive effort as indicated by shorter production time. However, Sjørup investigates only professional translators as opposed to Jensen, who examines the translations of three different subject groups. While Jensen suggests that experienced translators invest more cognitive effort by selecting more demanding translation strategies, Sjørup argues that professional translators seems to choose "the path of least resistance, i.e. a direct transfer translation strategy" (2013, p. 208), which is marked by a small amount of cognitive effort.

This study aims to explore Göpferich's proposition to investigate translation competence development from the point of view of the distribution of cognitive effort (2013). It does not intend, as outlined by Göpferich, to investigate the allocation and distribution of cognitive resources in relation to (specific sub-competencies of) holistic competence models, but to explore in more detail the extent of cognitive effort (What is effortful and effortless, and why?). It merges parts of Jensen's (2005) and Sjørup's (2013) studies and explores metaphor translation behavior from a processing point of view and a developmental perspective. In a keylogging analysis, cognitive effort as indicated by production time (Sjørup) for different translation strategies (Jensen, Sjørup) is investigated in three different subject groups at three different levels of translator training, that is 1st, 2nd and 3rd year students (Jensen: non-professionals, young professional, experts; Sjørup: professionals). Keylogging and the measurement of production time facilitate the empirical investigation of cognitive effort, while metaphor (and the theory of conceptual metaphor) in translation provides a framework for interpretation (What is more effortful and why). Finally, a cross-sectional comparison between the different participant groups (competence levels) explores the distribution of cognitive effort from the perspective of competence development.

3. Methodology

The present chapter introduces the methodological framework of the study and gives a detailed account of the data collection, the experimental setup, the statistical model, and the methods applied to analyze the data.

The study is designed in a cross-sectional manner. It reports on observations (the translation of metaphorical expressions) collected from representative subsets of specific populations (1st, 2nd, and 3rd year students of translation) at a given point in time (end of the respective year of study, i.e., 1st, 2nd, and 3rd year). Furthermore, the research design can be described as what Saldanha (2014) terms a quasi-longitudinal research setting, which refers to a design "where, instead of following the same participants over a number of years, different participants are selected from different stages of development and their data are compared"(p. 119). Ideally, in a longitudinal study data is collected at several points in time over a longer period (years or even decades). For practical reasons, this approach was not feasible over the period of this study. Collecting data for three out of the four years granted for this project would have exceeded the four-year time frame. It was, however, of interest to record what is assumed uneducated behavior or bilingual translation behavior (before any impact of translator education changes their translation-related behavior). In other words, the aim was to make observations of some kind of base line translation behavior. Thus, the group of 1st year students was tested twice: once at the beginning of their first semester (i.e., the beginning of their studies, no translator training input), and once at the end of their first year (two semesters of theoretical and practical input on translation).

The methodological framework of the study consists of approaches from both translation studies and cognitive linguistics, which will be described in detail in this chapter. The experimental setup for the data collection is exclusively based on a method widely employed in translation process studies, namely keystroke-logging.

3.1 Data collection – equipment and tools

The data for the study was collected using the software tool TRANSLOG II, a keylogging and eye-tracking software to investigate text production processes, and as such "an instrument to acquire […] digital data of human translation processes"(Carl, 2012, p. 4108). The program consists of a user module and a supervisor module. The latter allows the researcher to create the text file and adjust for a number of desired settings (e.g., presentation mode of source and target text window horizontal or vertical), as well as to replay and analyze the data file subsequent to the data collection process. The user interface presents participants (i.e., users) with a window frame, where the source text is presented in one part of the window and the target text (the translation) is to be typed into the other part of the window. In the background, TRANSLOG records each keystroke and mouse movement with an exact time stamp (measured in milliseconds), which enables the researcher to retrace the text production process meticulously in a systematic manner.

As evidenced by the CRITT Translation Process Research Database[10], TRANSLOG has been used in a variety of studies on translation processes involving a large variety of language pairs. At the time of writing, the CRITT database consists of close to 30 translation (and text production) studies which account for approximately 500 hours of text production gathered in more than 1400 sessions. Since the release of TRANSLOG 2006, the predecessor of TRANSLOG II, an eye-tracking component has been included into the software. Therefore, many of the studies in the database produced both keylogging and eye-tracking data. In many aspects, eye-tracking has become a vital part of translation process research and appears to be an almost obligatory addition to the collection of keylogging data. However, for the study at hand the use of an eye-tracker was discarded for practical reasons. As will be discussed in more detail in a subsequent section of this chapter, the logistics in terms of data collection (e.g., travelling within and outside Norway) was deemed problematic regarding the use of an eye-tracker. Carrying and setting up eye-tracking equipment at different locations up to several times was simply not feasible.

[10] https://sites.google.com/site/centretranslationinnovation/tpr-db (23 May 2016)

Thus, keylogging (i.e., the use of TRANSLOG II without an eye-tracker) was in many aspects considered the only option.

TRANSLOG II was installed on a Lenovo ThinkPad Mini with Windows 7 as operating system at the time of the data collection (October 2014 until September 2015). All students, both in Norway and in Germany, carried out the experiment on this particular laptop. Since the computer is equipped with a Norwegian keyboard, the German students were required to adjust their typing to this specific keyboard. This includes the spelling of the German umlauts *ä*, *ö* and *ü* as *ae*, *oe* and *ue*, as well as the reversed placement of the letters *y* and *z*. Regarding the typing of the umlauts as two separate letters, it is acknowledged that Windows offers another keyboard shortcut option, which would have resulted in the correct spelling of the letters (i.e., *ä*, *ö*, *ü*). However, participants were not expected to be familiar with this option, and instead of spending time teaching each German participant this option, they were asked to spell the sounds as two separate letters instead. This was necessary in order to ensure comparability between each translation and between each participant, since typing (in this case the number of letters typed to represent the umlaut) is assumed to account for some form of effect in analysis 2, the analysis of production time.

Regarding the visual setup of the user interface, that is the placement of the source text window (English), TRANSLOG II offers different options. Since the English source text in this study is relatively short, and did therefore not require any kind of scrolling during the reading and production process, the source text was displayed to the left of the target text window. Figure 3 below shows the TRANSLOG II user display as presented to the participants of the experiment:

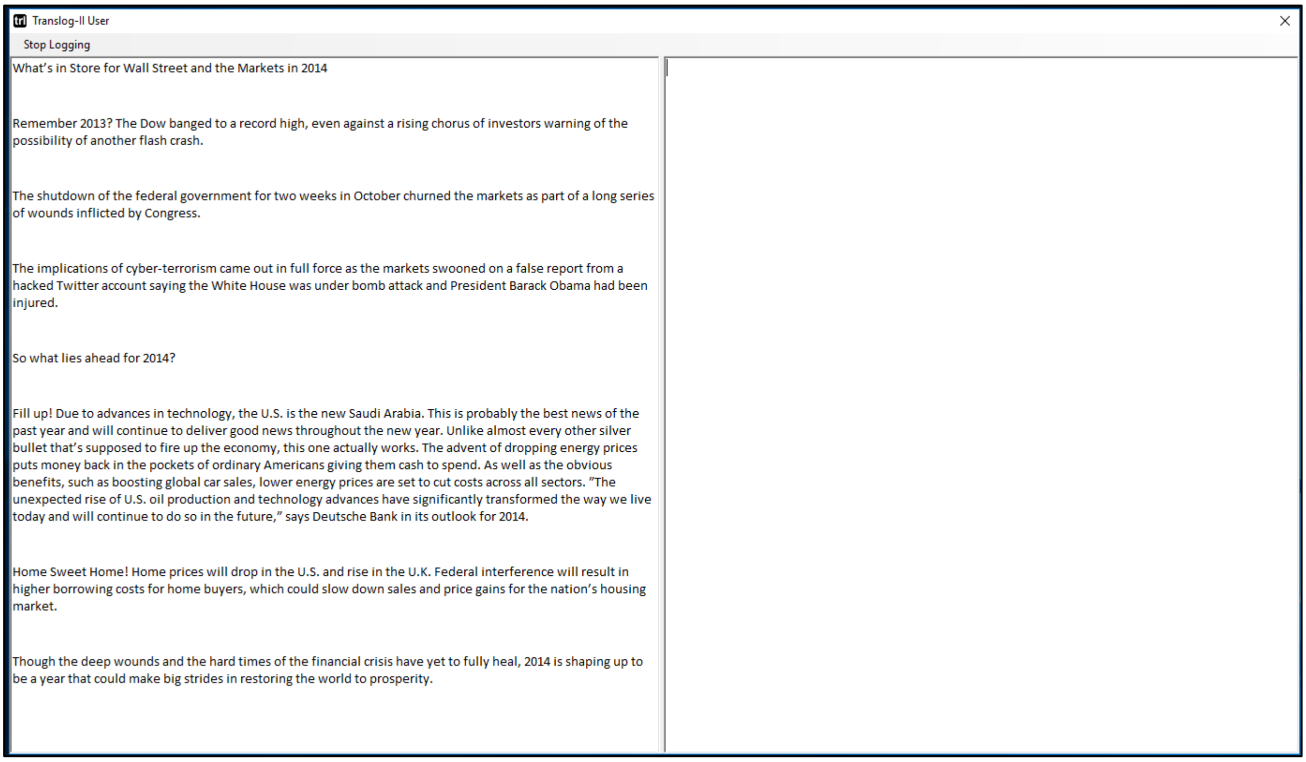


Figure 3: TRANSLOG II user interface with source text display

The source text appears in its entirety in the left hand window. Starting with the heading, the text is divided into seven sections (paragraphs) for reasons of improved readability. The participants typed their respective translations in the right-hand window. Both source- and target text were displayed in font size 11. Due to the screen size of the laptop, a larger font would not have been possible. The source text and its features will be described in more detail in a subsequent section of this chapter.

Besides TRANSLOG II, several other data collection methods were employed to enhance the data validity and to control for a number of variables. These methods will be introduced in the following subsections.

3.1.1 Questionnaire

Before starting the actual keylogging experiment, the participants were given a questionnaire in English containing seven questions regarding their language background and proficiency (i.e., English as a second language), and their experience with translating apart from their studies. Information regarding language background and proficiency (e.g., grade for subject English on high school diploma) was considered important for two reasons. Firstly, production time for translations is assumed to be influenced by language proficiency. Furthermore, in terms of metaphorical knowledge or metaphor understanding, advanced language proficiency might comprise a better or different understanding of, or knowledge about figurative language use, which in turn might lead to faster production time. Secondly, translation experience exceeding the occasional translation exercises in second language classes is also considered to have an impact on the measurement of production time. Thus, for reasons explained above, potential professional or non-professional translation experience needed to be surveyed. The questionnaires for both language groups are included in appendices A and B.

3.1.2 Scratch paper

Since, as described in an earlier chapter, translation processes are considered complex conscious and subconscious processes, the workflows supporting these processes are no less interesting. How translators go about their translation tasks is highly individual, and habits regarding, for example, the use of reference works or note taking are assumed to develop with experience over time. Since it was impossible to foresee or anticipate specific work habits, and certain aspects of a more natural translation workflow were prevented by the nature of the experimental setup, it was decided to offer a blank sheet of paper to the participants, which they could use to take notes in case they needed to. This is interesting from a point of view of translation problems. Notetaking is considered to be closely related to problem solving. The scratch paper provides a more concise picture of the translation process, as it cannot be captured by the TRANSLOG II software alone.

3.1.3 Course portfolio

As demonstrated in Chapter 2, within translator training, metaphor has been treated from a purely didactic and normative perspective. Depending on different types of metaphors, Newmark (1983) proposes a number of metaphor translation procedures to be taught to students. Therefore, the question of whether or not the participants of the study had been exposed to theoretical discussions or practical exercises regarding the translation of metaphor prior to the experiments became a point of interest. If the topic had been part of the programs' curriculums, an influence on the performance data of the participants cannot be precluded. Thus, it was necessary to collect information regarding the course portfolio of the participants and the respective teaching content of those courses.

For the Norwegian participants, this task was manageable. The students follow the same predetermined course plan during their time at their Norwegian home institution. The course plan and reading list for the Norwegian students does not cover metaphor in any specific detail. For the German students on the other hand, the situation was different. Students have to complete compulsory courses as well as electives. They can choose between a number of courses from the compulsory portfolio to fulfill the course requirements. Thus, students do not necessarily follow the same curriculum, although they are at the same stage of their academic training (1st, 2nd, 3rd semester etc.). Therefore, they received a form to list the individual courses they have taken since the beginning of their studies. However, many of them (especially the students in the higher semesters) could not recall all courses or the correct subject names on the spot. They were asked to take the form home and return it by email later. Unfortunately, only a fraction of the students (eight out of eighteen) did so. A gentle email reminder did not yield any additional forms, thus the data set for this category is incomplete.

3.1.4 Translation brief

To ensure ecological validity of the data collection, a hypothetical translation brief was prepared. A translation brief contains "[i]nstructions or specifications accompanying a translation assignment that indicate the target audience and purpose of a translation assignment"(Koby, 2014, p. 247). Christiane Nord (1997) observes that "from a functionalist point of view (cf. Reiss/Vermeer 1984, Nord 1991), the translator's decisions in the translation process should be governed by the function or communicative purpose the target text (TT) is intended to fulfil in a particular target-culture situation" (p. 41). Writing from the perspective of a translator trainer highlighting the communicative function of translation, Nord states that the translation brief contains "as much knowledge as possible about the communicative purposes the target text is supposed to achieve for the addressees in their communicative situation" (p. 46). She points out that professional translators often infer those details from specific source texts and clients. Students, on the other hand, do not yet possess this specific insight into the workings of specific source texts and translation commissioners, and need therefore particular instructions which define "the conditions under which the target text should carry out its particular function" (p. 47). In order to relieve the participants of the potential additional cognitive burden a translation without a brief may put on them, it was decided to present them with a translation brief. Both versions, the Norwegian and the German brief, are included as appendices E and F.

3.2 Participants

As described earlier, the study is twofold in the sense that data was collected from two separate participant groups in terms of the target language (Norwegian and German), yielding two data sets. According to the Norwegian *Personal Data Act* of 2001, a research project is required to be reported to and approved by the *Norwegian Centre for Research Data* (NSD)[11], if personal data is collected, stored and analyzed with the help of computers and software, and the personal data (at least for the duration of the project) can be used to identify specific individuals as participants in the study. Since this is the case for the present study, the study is registered and approved by NSD under the project registration number 37485. The following sections describe in detail the participant recruitment procedures for the study as well as the composition of both participant groups.

[11] http://www.nsd.uib.no/ (26 May 2016)

3.2.1 Norwegian participant group

The Norwegian educational system provides a limited choice of study programs for students interested in becoming professional translators. At the *University of Oslo*, students of the bachelor's and master's program in languages are able to choose a one-semester course on translation in their respective languages (e.g., French, Arabic, Turkish). A general training course in translation theory on the master's level has recently been discontinued. Also at the *University of Bergen*, a similar one-semester course on translation theory and practice has been cancelled in 2017.

The OPTIMALE network (*Optimizing professional translator training in a multilingual Europe*), an ERASMUS network for professional translator training, consists of 70 partner institutions in 32 European countries offering translation programs in higher education. In a project funded by the European Commission, the network mapped out existing programs all over Europe, a map which is now available on the OPTIMALE web page.[12] The project concentrated on master's degree programs. Thus, for Norway, the map only displays the *National Accreditation Exam* at the *Norwegian School of Economics* in Bergen. As of now, the school does not offer a complete master's program, but interactive online training courses specializing in legal translation and terminology management. The *National Accreditation Exam* offered on behalf of the *Ministry of Education and Research* by the *Department of Professional and Intercultural Communication* at the school is "a prerequisite for obtaining authorization to practice as a state authorized translator".[13] To be able to take the exam, candidates have to account for at least 180 credits (the equivalent of three years of studies) from an institution of higher education.[14] However, the type of studies they have completed is irrelevant. Thus, the exam is open to candidates without any prior translation education.

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[12] http://www.ressources.univ-rennes2.fr/service-relations-internationales/optimale/2013-01-24-16-55-06 (accessed 4 July 2016)

[13] https://www.nhh.no/en/departments/professional-and-intercultural-communication/national-translator-accreditation-exam/ (accessed 4 July 2016)

[14] Credits obtained at international institutions of higher education need to be officially recognized by the Norwegian Agency for Quality Assurance in Education (NOKUT).

The only available training program in translation in Norway can be found at the *University of Agder*. The program is a bachelor's program in *Translation and Intercultural Communication*. It is limited to the language combination English-Norwegian, and offers training in translation theory, linguistics, intercultural communication, text and genre analysis, genre-related text production as well as an introduction to political, social, and economic topics in Norway, Great Britain, and the United States. Students spend the first and third year of their studies at the *University of Agder*. During the second year, they are required to spend at least one semester at one of the many Anglophone institutions the university holds an exchange agreement with (in the U.S., Great Britain, Ireland, Australia, New Zealand, Canada). The second semester of the second year, they may choose between either extending their exchange, or completing an internship in a translation-related company (e.g., a translation agency).

Since, as mentioned above, this is the only complete training program in Norway, it presented the only option to recruit participants for the study. Prior to the experimental waves (October 2014, April 2015, September 2015), an information sheet containing information about me and the project was circulated among potential participants (see Appendix C). Students were asked to sign up for specific time slots in a sign-up sheet or contact me by email, if they were interested in participating. Unfortunately, this procedure was not successful. Thus, upon arrival at the university for the respective experimental waves, I visited lectures, introduced the project and myself, and answered questions by the students regarding the experiments. This way, it was possible to recruit 10 students to the Norwegian participant group: four 1st year students, three 2nd year students, and three 3rd year students. The students volunteered for the experiments and did not receive any form of compensation for their efforts.

3.2.2 German participant group

The German higher education system offers a wide variety of possibilities to be trained as a professional translator at a number of different institutions. The OPTIMALE network identifies seven programs at institutions of higher education (university colleges, universities), which offer translator training.

Through an ERASMUS+ exchange contract[15], I received the opportunity to conduct the experiments with students of the bachelor's program in translation at the *Department of Applied Linguistics and Translatology (IALT)* at the *University of Leipzig* (Universität Leipzig). The program provides students with translation specific theoretical and practical training, for example methodological knowledge to handle typical translation problems, relevant cultural and intercultural knowledge, experience with translation software and tools, as well as the necessary basic knowledge to conduct field-specific research. The latter is a prerequisite for the subsequent master's program in translatology or interpreting. The students are encouraged to spend their fifth semester abroad (exchange in earlier semesters is also possible, but difficult with regard to the general course scheme).

Similar to the Norwegian group, prior to my arrival in Leipzig (November 2014, June/July 2015), a simplified description of the project, the experiments, an introduction of myself (see Appendix D) and a preliminary sign-up sheet was distributed amongst potential candidates from the different target groups (i.e., 1st, 2nd, and 3rd year students). Except for the 3rd year student group, which needed to be actively recruited during a lecture, this procedure yielded a number of participants. Ultimately, the German participant group consisted of eighteen students: eight 1st year students, four 2nd year students, and six 3rd year students. Unfortunately, upon analyzing the TRANSLOG files, it became apparent that one of the files by a 3rd year student was corrupt. It was not possible to open the file in the software. Thus, the student and the respective data needed to be removed from the study, which reduced the German participant group to 17 students (five 3rd year students). The students volunteered and did not receive any compensation for their participation.

3.3 Experiment text

Considering that the subjects of this study are students at various stages of their bachelor's degree programs and thus (presumably) possess varying degrees of

[15] ERASMUS+ is the European Union's program for education, training, youth and sport and facilitates student and staff exchange between European educational institutions.

theoretical and practical knowledge and expertise in translation, the text needed to cater to the level of training of participants of all three subject groups similarly. On the one hand, for reasons of comparability due to the inherent nature of the project (i.e., the investigation of translation competence development), the text needed to be the same for all groups. On the other hand, the text could not be overly difficult for 1st year students, but at the same time not too easy to translate for 3rd year students. Admittedly, the threshold between "too difficult" and "too easy" is a rather subjective notion, especially since the text was chosen prior to the recruitment of the participants, and thus not designed for specific participants and their particular level of competence. There were, however, a few criteria that were applied when searching for an experimental source text, which will be briefly explained here. The selection criteria were *genre*, *intended readership,* and *authenticity*. Firstly, for *genre*, the decision fell on a newspaper article with an economic topic. Such translation assignments are assumed to present likely assignments for professional translators and are used frequently in translator training. The second criteria, *readership*, concerns the degree of specificity of the text, that is, whether the text concerns a general economic topic written for a general public with little or rudimentary knowledge of economic issues, or whether the text is written for a specific readership which is assumed to possess a high degree of insight into and knowledge of the topic. Such a distinction can be made on the basis of a linguistic distinction between language for general purposes (LGP) and language for specific purposes (LSP) (Picht & Draskau, 1985). Picht and Draskau operationalize such a distinction based on three factors: a syntactic factor (e.g., specific insertion of post-modifiers in legal English sentence structure to emphasize semantic unambiguousness), a linguistic factor (linguistic inventory) and an epistemological factor (special knowledge of the receptor) (1985, p. 3). Thus

> LSP is a formalized and codified variety of language, used for special purposes and in a legitimate context- that is to say, with the function of communicating information of a specialist nature […] with the aim of

> informing or initiating other interested parties, in the most economic, precise and unambiguous terms possible. (p. 3)

LGP, on the other hand, is perceived as the entirety of linguistic means that all members of a language community share and that enable them to (successfully) communicate with each other (Hoffmann, 1985, p. 48). There is a clear relation between LGP and LSP in that LGP forms the "general reservoir on which the LSPs of the various special areas draw"(Picht & Draskau, 1985, p. 3).

With regard to the assumed level of professional advancement and experience of the potential participants (students), an article written in the general language variety addressing a general public presented itself as the better option. Finally, in terms of ecological validity, an authentic text, that is a text that was written and published, was preferred over a text that was artificially constructed for the sole purpose of the experiments. Thus, it was ensured that the metaphorical expressions in the text represent actual language use and are not deduced from hypothetical language use, or fitted to or created for the purpose of the study.

The selected article was first published in *Newsweek* on December 27, 2013. *Newsweek* is a traditional American general newspaper. It publishes weekly print editions in Japanese, Korean, Polish, Spanish, Arabic and Turkish as well as an English international edition. Therefore, it is reasonable to assume that articles published in the English edition are subject to translation. Struggling economically caused by the general decline in sales numbers in the magazine industry, *Newsweek* is chiefly published as a digital medium (updated daily). Recent numbers indicate a circulation of about 200 000 printed copies in the U.S, Europe and Asia, as well as around three million unique online visitors per month.[16] *Newsweek* covers a wide range of topics from the U.S. and other parts of the world, reporting on technology and science, business, culture and sports, and is therefore not genre specific (as opposed to, for example, *Sports Illustrated*, which covers only sports). The magazine's readership is assumed to be a general audience.

[16] http://www.wsj.com/articles/newsweek-on-the-mend-to-relaunch-in-asia-1427948634 (30 May 2016)

The selected article refers to an economic outlook for and development of the American stock market in 2014. Originally, the text consisted of 1093 words, which was considered too long and comprehensive for the experiments (see Appendix G). Each participant was given a maximum of two hours to complete the experiment. Therefore, primarily due to task duration, a length of approximately 300 words was considered appropriate. The text was shortened according to two criteria: coherence and level of linguistic difficulty (see Appendix H). The first relates to text coherence, that is, the text and the different paragraphs still had to form a comprehensible unit even though parts of it had been removed. The second criterion, level of difficulty, concerns the amount and degree of terminology. As mentioned above, the text needed to be suitable for students at three different levels of training, and could therefore not contain a large amount of terminology or difficult vocabulary which participants at the lowest level could not have been expected to be familiar with. This may have resulted in extensive use of digital reference works, and would thus have prolonged the task duration. The original text was subdivided into several paragraphs dealing with different topics related to the economy. From these six topics (energy, capital, housing, consumer behavior, employment, trading), two were retained: energy and the housing market. Both the introduction and the closing section were shortened to a degree that still made it possible to comprehend both subsequent and previous text. Finally, specific terminology and vocabulary that was not considered essential to text comprehension was eliminated (e.g., *drilling* in *drilling technology, bifurcated* in *bifurcated Congress*). Thus, the text was shortened to a length of 308 words. To ensure applicability, the text was test-translated by two Norwegian students of the elective course in Business English at the *Department of Professional and Intercultural Communication* at the *Norwegian School of Economics* (no translator training or experience), and an experienced colleague (mother tongue American English, translator, translation scholar). All three, at opposite ends of an assumed competence spectrum, deemed the text to be a good fit for the experiments both in terms of length and difficulty as well as from a technological and visual perspective, that is the setup in the TRANSLOG II software (Section *3.1*). In a next step, potential areas of interest (AOI), that is metaphorical expressions, were identified in the abridged experimental text.

3.3.1 Metaphor Identification Procedure

In 2007, the Pragglejaz Group proposed "an explicit method that can be reliably employed to identify metaphorically used words in discourse"(2007, p. 1). The aim was to develop a general procedure, a metaphor identification procedure (MIP), which could be employed by researchers from different research disciplines to identify figurative discourse without solely relying on intuition. The procedure consists of a series of four steps to be applied to any kind of discourse. The fundamental idea behind this method is to distinguish non-metaphorical meaning of textual units (i.e., linguistic items like nouns, compound nouns, verbs, phrasal verbs, proper names etc.) from contextual, figurative meaning. This is achieved with the help of contemporary reference works like dictionaries. If a more literal meaning, that is a more concrete, precise or historically older meaning, can be established for a unit, then the unit is characterized as metaphorical in the specific context of the text. To further limit the influence of intuition and subjectivity on the task, the Pragglejaz Group suggests a rater panel consisting of several participants who execute the same procedure on the same text individually. The procedure was refined by Tina Krennmayr (2011), who analyzed and defined textual units to be operationalized in an identification procedure (e.g., compound nouns, phrasal verbs), and addressed a number of problems related to the distinction between basic meanings and contextual metaphorical meanings (pp. 25-80).

For the purpose of the present study, a description of the MIP, guidelines regarding the delineation of textual units (e.g., how to treat compound nouns that are hyphenated as opposed to compound nouns that are written as two separate words), and the experiment text for this study were sent to three researchers (raters), who work with metaphor from a number of different angles (e.g., metaphor in psychiatric textbooks, metaphor in the business press). It needs to be pointed out here that none of the three volunteers are English native speaker. Two have Norwegian as their mother tongue, and the third person is a native German. It was not within the scope of this project to accumulate a group of native English speakers locally, who were willing to perform the analysis without compensation.

According to the procedure prescribed by the Pragglejaz group, the raters also received background information regarding the text, that is name, source, mode, genre, date of publication and readership (Pragglejaz, 2007, p. 15). To ensure comparability, they were asked to use the MacMillan Dictionary,[17] the Longman Dictionary of Contemporary English,[18] and the Oxford English Dictionary,[19] all monolingual English dictionaries. In addition, they were provided with a form to fill in every linguistic unit they identified as metaphorical and its meaning, both basic literal and contextual metaphorical. To save their invaluable time, the raters were not asked to record textual units they identified as non-metaphorical. For a concise overview of the rating document, see Appendix I. With me as a fourth rater (mother tongue German), the members of the group met once to discuss their findings. However, at the start of the meeting, they were asked not to alter any original identifications during or after the meeting, since the goal was not to reach agreement, but to identify a general understanding. As Shuttleworth (2011) points out, even when following MIP as suggested by the Pragglejaz group, when judging a textual unit to be metaphorical or non-metaphorical, "a certain element of subjectivity is inevitably involved"(p. 306). The identification data of all four raters was stored electronically in the following manner: Firstly, each linguistic unit (single words, compound nouns, phrasal verbs) that was identified as metaphorical by at least one rater was recorded. Secondly, every rater's decision (*metaphorical, non-metaphorical, undecided*) for the specific linguistic unit was recorded. For example, if a linguistic unit appeared in a rater's document, it was recorded as either *metaphorical* or *undecided*. If it did not appear in the specific document, it was recorded as non-metaphorical (although it had been identified as metaphorical by one or several other raters). The data set contained 294 linguistic units (out of 308 words). Of these 294 linguistic units, 95 were deemed metaphorical by at least one member of the rater panel. The remaining 199 linguistic units (all considered non-metaphorical) were excluded from the data set, since these were of no interest to the study.

[17] http://www.macmillandictionary.com/
[18] http://www.ldoceonline.com/
[19] http://www.oed.com/

In a second step, for reasons of reliability, the data set was cleared of all instances where the unit was identified as metaphorical by only one rater. The data set was thus reduced to 74 linguistic units. Those 74 units contained six linguistic units where two out of four raters (half of the panel) had identified the unit as metaphorical, and 68 units were three or even all four (more than 50 percent) of the raters had identified the unit as metaphorical. This ratio (50 percent or more of the rater panel) was considered sufficient to identify the unit as metaphorical.

At this point, it is necessary to comment on the meaning of the individual linguistic units in the larger context of the text, and to elaborate on metaphoricity of discourse. MIP is based on the identification and analysis of smaller syntactic units, although "it seems counterintuitive to look separately at linguistic units that are clearly connected"(Krennmayr, 2011, p. 32). However, Krennmayr argues that purpose and object of a study determine whether or not the linguistic unit approach is more suitable than, for example, an approach involving the identification of vehicle terms (Cameron, 2003), or a top-down approach identifying conceptual mappings (Pylyshyn, 1993). Furthermore, MIP considers linguistic units in the light of the context they appear in. The decision whether a unit is metaphorical is taken based on whether the contextual meaning differs from the basic, more concrete meaning. Thus, context plays a role for the identification of the linguistic unit in MIP after all. In conclusion, linguistic units are not inherently metaphorical on their own, but receive metaphoricity from their usage in the specific context and discourse. For the purpose of this study, which is not the investigation of metaphor as such, but the development of professional translation competence, MIP was deemed suitable to identify individual metaphorical linguistic units (e.g., single or multiple word units).

In a next step, if necessary and possible, individual linguistic units identified by the raters were transformed (or merged) into meaningful expressions, that is merged with their closest context to form areas of interest for the data analysis answering the research questions. For example, a number of times, metaphorical linguistic units occurred in multiword units in the source text, that is, several metaphorical units formed a meaningful phrase in the source text. The linguistic units *against*, *rising* and *chorus* were identified separately as metaphorical by three or all four raters. The metaphorical meaning of the units is not clear when taken individually (out of context). However, since these units receive metaphoricity from the context, the closest meaningful context in the form of the phrase *against a rising chorus* was chosen. In other cases, meaningful expressions were formed by inclusion of the (non-metaphorical) context in close proximity. In the phrase *in the future* for example, only the preposition *in* was identified as metaphorical. However, the preposition was only identified because of the figurative meaning of the subsequent noun phrase *the future*. Therefore, both expressions (*against a rising chorus*, *in the future)* were classified as metaphorical expressions consisting of metaphorical and non-metaphorical linguistic units in the text. In a few instances (predominantly nouns), the inclusion of context to create meaningful expressions would have resulted in large expressions, which was deemed problematic regarding the measurement of production time (e.g., *shutdown*). In those cases, it was decided to keep the individual linguistic units as metaphorical expression, although metaphoricity is not self-evident without the respective context. Applying this procedure to the 74 linguistic units, 47 expressions were distinguished (see Table 1).

Table 1: Identified metaphorical expressions in the text

Metaphorical expression			
1.	in store	24.	**fire up** the economy
2.	**Markets**	25.	this one actually **works**
3.	**in** 2014	26.	the **advent** of
4.	**banged to** a record **high**	27.	**dropping** energy prices
5.	**against** a **rising chorus**	28.	**puts** money **back** in the **pockets**
6.	**flash crash**	29.	**giving** them cash to spend
7.	**shutdown**	30.	**boosting** global car sales
8.	**in** October	31.	**lower** energy prices
9.	**churned** the **markets**	32.	**set** to **cut** costs
10.	**long** series	33.	**across** all **sectors**
11.	**wounds inflicted by** Congress	34.	**rise** of U.S. oil production
12.	**cyber-terrorism**	35.	technology **advances**
13.	**came out**	36.	the **way** we live
14.	**in full force**	37.	**in** the future
15.	**markets swooned on**	38.	**outlook** for 2014
16.	**hacked** twitter **account**	39.	Home **Sweet** Home!
17.	**under** bomb attack	40.	prices will **drop**
18.	**lies ahead**	41.	(prices will) **rise** [same subject as *drop*, but left out; ellipsis]
19.	**Fill up!**	42.	**higher** borrowing costs
20.	**advances in** technology	43.	housing **market**
21.	**deliver** good news	44.	**deep wounds**
22.	**throughout** the new year	45.	**hard** times
23.	**silver bullet**	46.	**shaping up**
		47.	**make big strides**

Table 1 lists all meaningful linguistic expressions classified as metaphorical. The words in bold indicate those linguistic units within the expressions that were initially identified by the raters applying the MIP. Those 47 expressions form the basis of analysis 1, answering research question 1. The subsequent section describes the methodological procedure for analysis 1.

3.4 Analysis 1 – Translation Strategies

For reasons of clarity, the research questions pertaining to analysis 1 are repeated here:

1. Which metaphor translation strategies do the different subject groups select?

1a. Are there differences or similarities between the groups according to their advancement in the study program (1st, 2nd, 3rd year)?

1b. Are there differences or similarities between the two different L1 groups (Norwegian, German)?

Putting aside the specific reference to metaphor, the understanding of the term *translation strategy* is diverse and the literature discusses different definitions depending on a range of scientific and methodological approaches. In the following, different definitions, classifications, and applications are introduced briefly, and the definition and operationalization of the construct translation strategy in the current research project is established.

3.4.1 The construct translation strategy

In an attempt to shed light on the apparent imbroglio of definitions and classifications, Jääskeläinen (2010) acknowledges that

> '[t]ranslation strategy' is admittedly one of the elusive concepts in translation studies; sometimes strategies refer to different phenomena, while at other times the same phenomenon is referred to by different names, such as procedures, methods, or tactics – even 'norms' are virtually identical to some uses of 'strategy'. (2010, p. 376)

In general, Jääskeläinen distinguishes between definitions from the viewpoint of the translation product (i.e., the target text) and from the viewpoint of the translation process. The former includes constructs like foreignization and domestication (Venuti, 1998) and syntactic, semantic and pragmatic strategies (Chesterman, 1997). The latter, on the other hand, regards translation as a decision making process and comprises a differentiation between strategies as manifestations of problem-solving behavior (e.g., Krings, 1986; Lörscher, 1991) and strategies related to unproblematic translation processes (Jääskeläinen, 1999). Both, product- (foreignization, domestication) and process strategies (problem, non-problem) are further divided into global and local strategies, that is strategies on a macro- and a micro level. Jääskeläinen elaborates that "global strategies contain general guidelines, plans and principles which are used to govern local strategies relating to problem solving and decision making of individual ST items"(2010, p. 380).

Chesterman (1997) adopts a product-oriented approach and refers to strategies as memes which "are widely used by translators and recognized to be standard conceptual tools of the trade" (p. 87). Also Chesterman acknowledges the many diverse definitions and demarcations to similar concepts like "tactics, plans, methods, rules, processes, procedures and principles etc."(p. 87). However, the fact that the term strategy presents an appropriate tool for discussing translation in general, and translational behavior in particular provides sufficient reason for Chesterman to employ the term (p. 93). He defines strategies as

> types of *linguistic* behaviour: specifically, text-linguistic behaviour. That is, they refer to operations which a translator may carry out during the formulation of the target text (the 'texting' process), operations that may have to do with the desired relation between this text and the source text, or with the desired relation between this text and other target texts of the same type. (Chesterman, 1997, p. 89, emphasis in original).

Chesterman proposes a framework comprising three categories along the lines of language form, meaning, and context: syntactic strategies, semantic strategies and pragmatic strategies. All three categories consist of a number of different strategies. The framework is based on the assumption "that strategies are ways in which translators seek to conform to norms. Note: not to achieve equivalence, but simply to arrive at the best version they can think of"(p. 88). Furthermore, Chesterman differentiates between comprehension and production strategies and bases his taxonomy on the latter. His behavioral classification of strategies and its norm-driven focus emphasize therefore sociocultural motivations (external) of translation behavior (norm conformance to, for example, the target language, communication norms etc.)(1997, p. 113), and neglect cognitive factors (internal) like cognitive capacity and cognitive effort. However, there is no clear demarcation between comprehension and production processes, or between internal and external motivations of translation behavior. Production is inherently dependent on comprehension (Shreve, Schäffner, Danks, & Griffin, 1993, p. 24), and sociocultural motivations influence the translation process alongside cognitive preconditions, for example the structure of knowledge or the availability, distribution and extraction of cognitive resources.

Lörscher (1991) discusses the issues of translation strategy at length positioning his definition around the matter of problem-solving. He concludes that "a translation strategy is a potentially conscious procedure for the solution of a problem which an individual is faced with when translating a text segment from one language into another" (p. 76). However, Lörscher's problem-centered definition is based on his methodological approach to the investigation of translation processes, that is thinking-aloud. The think-aloud method and the resulting think-aloud protocols (TAPs) collect and present oral data by translators about translation processes, which are conscious (otherwise they would not appear in the TAPs) and processed (they might have undergone evaluation processes by the translators before they were uttered. Data elicited by the think-aloud method is assumed to be a direct indicator of translation problems and problem-solving strategies. Furthermore, it is assumed that subconscious processes elicit few or hardly any verbal data during the translation process, because they are inherently subconscious, hidden cognitive processes. Therefore, Lörscher acknowledges that "it seems sensible to limit the empirical investigation of the translation process to those aspects which are connected with the solution of translational problems and which can be documented in and interpreted from the data" (1991, p. 67). Hence, this methodological limitation is reflected in his definition of the construct of translation strategy. This simultaneously implies that subconscious translation processes are non-strategic. Furthermore, since strategic translation behavior, according to Lörscher, is closely linked to problem-solving and conscious processing, it is the language user himself/herself, the translator, who identifies problems and defines strategies, not the researcher (p. 77). Jääskeläinen (1993) criticizes the limitation of strategies to problem-solving and conscious processing. She points to verbalizations of unproblematic translation processes on a global strategic level, which are consciously verbalized by the translator, but not considered problematic. Newer methodological tools, like keylogging and eye-tracking, provide further insights into subconscious and conscious cognitive processes which might be both, problem-related or non-problem-related.

Since the construct of strategy is no longer regarded as attached to problem-solving and conscious processing, the question arises whether another term should be chosen to denote the concept for the purpose of this study. Lörscher (1991) provides a detailed overview of alternative terms like *method*, *plan*, *rule* and *tactics* (p. 68-69) and their specific distinctions from the term *strategy*. None of those would fit the aim of the current thesis. Furthermore, this study is designed in comparison to and based on previous studies (e.g., Jensen 2005, Sjørup 2013), which all employ the term *strategy*, although undiscussed. Jensen employs a pre-defined classification of metaphor translation strategies without discussing the theoretical implications of the construct. The same applies to Sjørup's study. However, introducing a new term at this stage would likely cause confusion for the reader, and therefore be detrimental to the purpose, aim and argumentation of this thesis. For the purpose of this study, Lörscher's definition of translation strategy will be employed, but with three crucial alterations:

> *A translation strategy is a conscious or subconscious local procedure for the translation of linguistic items, which an individual is faced with when translating a text segment from one language into another.*

Firstly, the centering of the construct strategy around a translation problem has been removed. All translation behavior is thus, in some way or another, assumed to be strategic (*cf.* the distinction between global and local translation strategies by Jääskeläinen, 2010). Secondly, a translation strategy is no longer assumed to be tied to conscious processing, but is also be applied subconsciously, that is without the translator noticing it or being aware of it. Thus, the think-aloud method as employed by, for example, Lörscher (1991) does not present itself as an adequate data collection tool for this study, since it does not capture such subconscious translation processes. On the contrary, the changes to Lörscher's definition of translation strategy incorporated here contribute to the inclusion and acknowledgment of newer methodological data collection tools like keylogging and eye-tracking. Finally, the word *local* was added to highlight that the analysis focuses on individual source- and target text items, in this case the 47 identified metaphorical expressions in the source text and their respective translations in the Norwegian and German target texts.

3.4.2 Identification of metaphor translation strategies

As indicated by the reference to *local procedures* in the definition of the construct translation strategy, the identification of translation strategies in this study is based on a comparative product analysis of source- and target texts. Target text linguistic items (ST AOI equivalents) are considered directly observable linguistic outputs and manifestations of indirectly accessible cognitive procedures, which allow for and enable a process-oriented analysis. Therefore, although translation strategies are defined related to the translation process (see Section *3.4.1*; *conscious and subconscious procedures*) and the object of study in this thesis is the translation process, analysis 1 is performed based on the products involved in the translation process, that is source- and target texts.

Furthermore, based on the analysis of target text output, the distinction between metaphorical expressions and their respective conceptual mappings as introduced by CMT (Lakoff & Johnson, 1980) is employed in this study. Translation processes on the product level (translation strategies referring to similarities or differences on the linguistic level between source- and target texts) are used to infer translation processes on the conceptual level (translation strategies referring to similarities or differences on the conceptual level). In other words, on the product level, metaphorical expressions in the source text are compared to their respective translations in the target text. Based on this comparison, similarities and or differences on the conceptual level are established. Translation strategies on the linguistic level are considered the empirically observable access point to the indirectly observable conceptual level, since it is assumed that translators do not translate linguistic units (e.g., words) distinct from their meaning. Thus, the directly observable linguistic realizations (ST AOI equivalent expressions in the target text) representing specific translation strategies comprise the conceptual level and are the basis for translation strategies identified on that level.

As described in Chapter 2, previous studies on metaphor in translation propose a number of different translation strategies. However, these studies do not clearly distinguish between the linguistic and the conceptual level of metaphor in particular, and of the translation process in general. Jensen employs four different strategies:

> 1: Use an equivalent of the original metaphor, which would express a similar conceptual mapping (M → M)
> 2: Replace a metaphor of the original with a metaphor based on a different conceptual metaphor (M → D)
> 3: Replace a metaphor with a paraphrase (M → P)
> 4: Deletion – a complete deletion of the metaphorical expression (Del)
>
> (2005, p. 193)

This classification appears to be based on conceptual mappings. There is no further specification or distinction of realizations on the product level. Sjørup (2013), based on Dobrzyńska (1995), distinguishes between three strategies:

- an exact equivalent of the original metaphor (M – M)
- another metaphorical phrase that expresses a similar sense (M1 – M2)
- replacement of an untranslatable metaphor of the original with its approximate literal paraphrase (M – P)

(Dobrzyńska, 1995, p. 599; Sjørup, 2013, p. 75)

Special attention should be drawn to the third translation strategy in this classification framework, the paraphrasing strategy. According to this description, the paraphrasing strategy is employed when there is "an untranslatable metaphor" in the source text. This formulation is quite vague, since the meaning of *untranslatable* is unclear. However, since the classification is based on a linguistic comparison, *untranslatable* seems to refer to a purely linguistic mismatch between source- and target language, that is, the sense of the metaphor cannot be translated into the target language with either similar or differing lexis. If, however, one views translation as a communicative situation which utilizes language to convey meaning, the concept of untranslatability is obsolete (Ping, 1999), since also a paraphrase can be considered a form of communicating the meaning of the source text. In contrast to Jensen, Sjørup's classification seems to refer exclusively to the linguistic level, overlooking the conceptual dimension of metaphor and thus of the translation process. Thus, it appears as if Jensen and Sjørup employ two different types of strategy taxonomies, one based on the linguistic aspect of metaphor and one on the conceptual. In addition, both taxonomies employ a rather restricted number of strategies. There are, however, two disadvantages to such categorizations. Firstly, a rather small number of categories blurs fine grained nuances and feigns data uniformity, that is similar or even uniform translation behavior for all participants (even if the aim of a research project is to unveil general tendencies, that is similarities in a data set). Secondly, and this goes hand in hand with the former argument, such a top-down approach sets rather strict boundaries and might force the researcher to press observations into one strategy category where they also might fit into another. Certainly, one may argue that well-defined classification criteria for the different categories will counteract this problem. However, in translation process studies, even though looking for generalizable translation behavior, researchers face data collected from individual translators exhibiting subjective and individual execution of the translation assignment. It is therefore argued that a classification which acknowledges, at least partly, these individualities is more suitable to this kind of research than a classification which overlooks individual translator behavior in favor of the quest for generalizability.

A closer look at Chesterman's discussion of translation strategies(1997) appears to offer a solution to the classification problem. Developed based on text analysis, Chesterman's three categories (syntactic, semantic, and pragmatic strategies) and their respective subcategorized strategies (e.g., literal translation, loan, transposition etc. as textual realization of syntactic strategies) offer a more comprehensive picture of translations. Due to the disadvantages of few strategy categories mentioned above, such a bottom-up approach was desired for the data analysis in the present study. A taxonomy of strategy categories was aimed at which would enable a clearer and more concise picture of the data set, and would prevent rigid or forced category attribution of single observations. Thus, it was decided to refrain from employing the same (limited) number of strategies to the analysis as employed by, for example, Jensen and Sjørup. These strategy classifications were rather used as a basic guideline. New strategies were formed as they emerged from the comparative analysis of source- and target text items, because similarities and/or differences of all kinds (minor, major) between the source- and the corresponding target text expression are assumed to influence translation processing, and thus eventually cognitive effort and the distribution of cognitive resources, which is the object of this study. For example, during the analysis of the Norwegian translations, it became evident that a number of students resorted to strategies incorporating image-schematic changes (*cf.* Section *2.4*). Therefore, several new strategies arose from the analysis reflecting these changes, which are observable in the linguistic choices.

Finally, since the distinction between the linguistic and the conceptual level of metaphor is employed in this study in order to investigate the cognitive aspects of translation processing through its linguistic output, a similar distinction was aimed at when establishing metaphor translation strategies. Both Jensen's and Sjørup's classification approaches were incorporated in the sense that strategies both on the linguistic level (Sjørup) and the conceptual level (Jensen) were established. Due to this distinction and to facilitate the reader's comprehension, strategies are from now on called strategy types. Strategy types for the translation of metaphorical expressions on the linguistic level were identified (linguistic translation strategy category) and corresponding strategy types on the conceptual level were induced (conceptual translation strategy category). For example, on the linguistic level (in the linguistic translation strategy category), a word-to-word translation of a metaphorical expression is representative for the linguistic strategy type M-M and represents the conceptual strategy type M-M (similar conceptual mappings in source- and target text) in the conceptual translation strategy category. In this case, the strategy type denotations in the linguistic and the conceptual category are identical. This does not apply to all linguistic and conceptual strategy types, as will become evident shortly.

Before moving on to the specific strategy identification procedure, some remarks are necessary on the actual comparability of the translated texts to the general language norms of the target language. The results of analysis 1 are not necessarily representative for the respective general language communities (Norwegian, German). The object of the study is the actual translation behavior of the students. Translations containing specific linguistic expressions representing conceptual metaphorical mappings which do, in fact, not naturally occur in those target languages were found in the data set. Such results may, for example, be due to translation mistakes or specific translation strategies on a macro level (*cf.* Jääskeläinen, 2010) like foreignization, which the participants may have pursued with their specific translations of the source text. Qualitative evaluation of the translated texts has not been implemented. A categorization of translation strategies on a macro level as introduced by Jääskeläinen has not been employed either. A pure investigation of the authentic translation behavior of the student participants at the micro level has been prioritized.

After analyzing the data for both language groups (ST AOI equivalents of all 47 expressions listed in Table 1 were identified in all Norwegian and German target texts), 12 different linguistic translation strategy types were established representing five conceptual strategy types.

Table 2: Overview linguistic and conceptual translation strategy types

Conceptual Strategy Type	Linguistic Strategy Type	Definition/Explanation	Example
M-M	**M-M**	The phrase was translated directly, i.e. word-to-word or with different morphological and syntactic forms of similar linguistic item/items (semantic). Due to its grammatical system, in German this may also include different word order, i.e. parts of the predicate do not necessarily follow the subject immediately, but might be placed at the end of the sentence.	in 2014-i 2014 (NO) prices will rise-das Steigen der Preise (GER) wounds inflicted by Congress-Wunden, die der Kongress den Aktienmärkten zugefügt hatte (GER)
M-M	**MX-MY**	The phrase was translated using similar conceptual mappings and similar linguistic item/items (semantic). However, the translation is marked by an image-schematic change from the source text to the target text.	higher borrowing costs – werden die Kreditkosten … erhöhen (GER) lower energy prices – å senke energiprisene (NO)
M-M	**M1-M2**	The phrase was translated using similar conceptual mappings, but (fully or partly) different linguistic item/items (semantic).	flash crash – rapider Absturz (GER) flash crash – raskt fall (NO)
M-M	**M1X-M2Y**	The phrase was translated using similar conceptual mappings, but different linguistic item/items (semantic). The translation is also marked by an image-schematic change from the source text to the target text.	dropping energy prices – das Senken von Energiepreisen (GER) dropping energy prices-å senke energiprisene (NO)

M-M	**M-M/NT**	Similar conceptual mappings and similar linguistic item/items (semantic) in an expression consisting of several metaphorical items. However, one or more of the items were translated whereas one or more of the remaining items were kept in the source language (English) in the target text either as specific source language item or as corresponding target language item, i.e. an item that has been borrowed from English (anglicism) and is used as such in the target language.	hacked Twitter account – gehackter Twitter account (GER)
M-M	**M-M/DEL**	A partial deletion of one or more metaphorical items in the translation of a source text phrase which consists of several metaphorical items. The difference to the translation strategy DEL is that the remaining linguistic item is metaphorical, whereas for the strategy DEL a potentially remaining item is non-metaphorical.	make big strides – grosse Fortschritte (GER) deep wounds – sår (NO)
M-D	**M-D**	The phrase was translated using different conceptual mappings and linguistic item/items (semantic).	in Store – bereithalten (GER) in Store – i vente (NO)
M-D	**M1-D1**	The phrase was translated using different conceptual mappings, but partly similar linguistic item/items (semantic) in expressions consisting of several metaphorical items.	churned the markets – erschütterte die Märkte (GER) banged to a record high – økte til rekordhøyde (NO)

M-D	**MX-DY**	The phrase was translated using different conceptual mappings, different linguistic item/items (semantic) and an additional image-schematic change from the source text to the target text.	So what lies ahead for 2014? – Was erwartet uns also 2014? (GER) dropping energy prices – å droppe energipriser (NO)
M-PP	**M-PP**	The expression was paraphrased into non-metaphorical language.	under bomb attack – dass das Haus bombardiert worden sei (GER) hard times – vanskelige tider (NO)
DEL	**DEL**	The metaphorical part of an expression or the complete expression, which includes the metaphorical item, was omitted from the translated text.	in 2014 – das Jahr 2014 (GER) a long series – ei rekke (NO)
NT	**NT**	The phrase was not translated. The English expression was kept in the target text.	flash crash – flash crash (GER) the markets – The Markets (NO)

Table 2 summarizes both types of strategy categories (linguistic, conceptual) in the complete data set (i.e., Norwegian and German translations), before a detailed description of the analysis process is given. For clarity, Norwegian and/or German examples from the data set are added to each individual linguistic strategy type in the table. Some strategy types on the linguistic level are specific to either the one or the other language. The strategy type NT (non-translation) is an addition of this study and does not have a comparable counterpart in previous studies. In the following, the procedural steps that led to the identification of the strategies in the table above are described.

In comparison to the source text expressions, linguistic translation strategy types for each individual metaphorical target text expression were identified based on my own advanced knowledge of the two target languages, and with the help of respective Norwegian[20] and German[21] dictionaries. In general, the basic principle of identification is comparable to the previous analysis of the English source text, that is Metaphor Identification Procedure (MIP, Section *3.3.1*). If there was a more basic meaning in the dictionary than the one used in the target text expression, the translation was deemed metaphorical and a further classification based on linguistic similarities and/or differences (morphological, syntactic, semantic) could be carried out. For example, for the Norwegian translation of *So what lies ahead for 2014?* to *Hva venter så i 2014?*, the verb *vente* displays three entries in the *Bokmålsordboka*, whereof one refers to the physical state of rest, whereas the two other entries roughly translate to *being ready for something* and *expecting something*. Since the translation does not convey the first, the physical entry, it was classified as a metaphorical translation. Furthermore, the meaning has changed from *something lying on a path ahead* to *waiting for something* or *expecting something*. The expression was therefore classified as a different metaphor in the target text as opposed to the source text, that is the linguistic translation strategy type M-D. In cases, where no metaphorical meaning could be established in target text expressions, a categorization into non-metaphorical strategies was executed (e.g., paraphrasing, deletion). The delineation between the two linguistic strategy

[20]Bokmålsordboka:
http://www.nobordbok.uio.no/perl/ordbok.cgi?OPP=&bokmaal=+&ordbok=bokmaal
[21] Duden: duden.de

types paraphrasing (M-PP) and deletion (DEL) presented difficulties in a number of cases. The translation was categorized as a deletion when the metaphorical item in the phrase was left out. For example, the Norwegian translation of *a long series* to *ei rekke* is missing the specific adjective (*long*), which originally was identified by the rater panel as the metaphorical item in the phrase. Thus, the respective linguistic translation strategy type is deletion (DEL). This last example also illustrates the general rule applied during the analysis: the metaphorical item or items in the source text expression were decisive for the identification and classification of strategy types. If a source text expression consisted of several linguistic items, some metaphorical and some non-metaphorical, the non-metaphorical items were insignificant to the identification of the translation strategy type. As described earlier (*cf.* Section *3.3.1*), the latter were added as a means of comprehension and contextualization. They are not inherently metaphorical by themselves, but receive metaphoricity from the metaphorical items in the phrase. Admittedly, they are part of the entire translation event (both comprehension and production), but since the main focus of analysis 1 lies on the production side of the process (translation strategies as identified from the target text items) and comprehension processes are not measured, the translation of metaphorical items in a phrase was given priority. As described in the example above, the deletion of the adjective *long* in the Norwegian translation of the phrase *long series* removed metaphoricity from the second linguistic unit of the expression *series*, and was therefore categorized as a deletion strategy (DEL) as opposed to the word-to-word strategy (M-M; *series-rekke*). The target text expression did therefore not contain a metaphor.

After concluding analysis 1, it became clear that within the scope of this project not all source text equivalent expressions (47 source text expressions) in all 27 translated texts (Norwegian and German) could be included into the analysis of production time (analysis 2). If all expressions were to undergo an analysis of production time, it would be difficult to apply a demarcation criterion for the measurement of production time. Since the 47 source text expressions very nearly amount to the whole text, starting and finishing points for the different target expressions can be expected to overlap, which will make a respective analysis difficult. The following section describes the process of identifying and selecting areas of interest (AOI), that is source text metaphorical expressions, from the list in Table 1 to utilize in analysis 2.

3.5 Analysis 2 – Production Time

Analysis 2 is designed to answer research question 2, which are repeated here:

2. What is the relationship between production time and translation strategy?
2a. Do these results vary across subject groups according to their advancement in the training program (i.e. 1st, 2nd, and 3rd year)?
2b. Do these results vary across subject groups according to the target language (Norwegian, German)?

Since it was deemed problematic to subject all 47 expressions identified in the source text to an in-depth analysis of production time in the various target texts, an adequate and feasible selective framework needed to be applied. A selection along the lines of a metaphor classification which caters to the purpose of this study (investigating cognitive effort in metaphor translation) was deemed appropriate. Therefore, a metaphor classification that emphasizes conceptualization and cognitive processing (as an influential factor on the variables investigated in this study, that is, translation strategies and production time) was desired.

Shuttleworth (2013) points out that "[t]he dimensions along which metaphor can be classified are almost unlimited"(p. 40) and lists seven different parameters for the identification and classification of metaphors: mapping, typological class, purpose, level of categorization, richness, provenance and conventionality. Some of these dimensions have already been introduced in more detail in Section *2.4.1*. As Shuttleworth remarks, identification and classification markers might be unlimited and determined by the research field and aim. For example, Cameron (1999), an applied linguist, lists nine parameters for identifying metaphor in spoken discourse (Shuttleworth, 2013, p. 41). However, a classification like Cameron's was considered unsuitable since it was developed for spoken discourse, and the object of study in the present analyses is translation as a form of written discourse.

Dickins (2005), a translation scholar, discussing metaphor in translation, establishes six dimensions (three figurative-specific, three non-figurative-specific) along which metaphor can be identified and described. Yet, Dickins' classification focuses on a product-oriented description of metaphors in translation and not on cognitive translation processes, and was therefore excluded as a selective framework for this study.

In an empirical study on monolingual metaphor processing, Eriksson (2013) finds "a distinct difference in processing speed, as represented by mean RT's, between conventional and non-conventional metaphors"(p. 18). Response times (RT) are measured based on comprehension tests. Regardless of participant proficiency level (language accuracy and fluency), Eriksson's results show that conventional metaphors are processed faster than non-conventional metaphors (p. 18). Thus, it is reasonable to assume that the degree of metaphor conventionality influences cognitive processing in terms of processing speed. In other words, the more conventionalized (entrenched in the language) a metaphor is, the faster it is processed. Regarding translation processes, it is therefore reasonable to assume that a more conventionalized metaphor is translated faster. Since the study at hand focuses on the investigation of cognitive translation processes as evidenced by production time, it was decided to adapt conventionality as a selection criterion for AOIs. The subsequent sections will describe in detail the methodological implementation of conventionality as a selection criterion.

3.5.1 Conventionality as a selection criterion

As described previously, Charteris-Black (2004) states that speakers are able to choose between constructing their own metaphors individually adjusted to the respective communication situation (aim, context, addresses etc.), or resorting to commonly known, conceptually and linguistically accessible and accepted metaphors within their linguistic community. A number of different classifications have been proposed for the continuum between the one (highly individual metaphors) and the other (commonly known and accepted metaphors). For example, Goatly (1997) differentiates between *dead*, *buried*, *sleeping*, *tired* and *active* (pp. 32-33, order according to Goatly). Newmark (1983) classifies *dead*, *cliché*, *stock*, *adapted*, *recent* and *original* and bases his prescriptive metaphor translation procedures on this taxonomy. Both Goatly's and Newmark's classifications move from highly conventionalized metaphors (dead) to highly individual metaphor use (active, original).

Regarding monolingual metaphor processing, Noveck et al. (2001) establish that, although accompanied by certain beneficial effects on comprehension, metaphors require longer reading times than non-figurative linguistic items. Goatly (2007) refers to the "relative ease with which conventional metaphors and literal language are processed"(p. 22). However, Gentner and Bowdle (2001) propose divergent processing models for conventional metaphors and non-figurative language use. In their view, both the metaphorical and the non-metaphorical meaning are activated when encountering a metaphorical expression, because, due to the processes of conventionalization (linguisticization), the former has been stored as a secondary linguistic meaning in the conceptual store. However, the non-figurative meaning quickly becomes discarded, leaving the metaphorical meaning as the relevant meaning in the context. In an fMRI study, Ahrens et al. (2007) did not find any significant differences in reading times for conventional metaphorical expressions and non-figurative expressions. They found, however, different brain activation patterns, which indicate similar processing times but different processing pattern for conventionalized figurative language and non-figurative language. Sjørup (2013) finds similar effects using eye-tracking. However, the effects are dependent on the task type, in this case reading for comprehension and reading for translation. While translators did not exhibit significant effects when asked to read for comprehension (non-significant differences between metaphorical and non-metaphorical items), they did so when asked to read for translation (pp. 137-138). Thus, different studies establish that monolingual as well as bilingual metaphor processing appear to be different from monolingual and bilingual processing of non-figurative language, in terms of either reading times or brain activation patterns. Although those studies examine conventionalized metaphors only, it can be assumed that a decreasing degree of conventionality has an influence on processing time as measurable by production time.

However, a few elaborative comments are necessary on the comparability of monolingual and bi/multilingual language (and thus metaphor) processing.

Neurolinguistic research shows that second language (L2) speakers of any L2 proficiency level can exhibit native speaker like linguistic and semantic language processing. Kotz and Elston-Güttler (2004), for example, find that "L2 semantic processing appears to be qualitatively the same as L1 semantic processing, but slowed down slightly" (p. 218). Furthermore, in an experiment designed to measure reaction times (RT) in bilingual word recognition as an indicator of second language proficiency, they observe that "[t]he RT data for the high proficiency group was comparable both to native speaker data … and also to early learner data" (p. 228). On average, the Norwegian participants in the present study have undergone 12 years of English language learning and have an average grade of a B (grade five in the Norwegian educational system) on their high school diplomas. The German student group exhibits an average of 9 years of English education and a B average grade on their high school diplomas. Therefore, both student groups are considered proficient L2 speakers of English, who may be expected to exhibit native speaker like linguistic knowledge and behavior.

Shuttleworth (2013) notes that the notion of conventionality "includes such concepts as strength, frequency of use, pervasiveness, embeddedness and vitality"(p. 60). To operationalize a measurement of conventionality for the purpose of this study, the concept of *frequency of use* was employed. The basic assumption behind this concept is that the more often the metaphor, or more precisely, since this measurement operates on the level of actual language use (as opposed to conceptualization and metaphor mappings), the metaphorical expression, is used in natural language production, the closer it is to the conventionalized end of the continuum proposed by Goatly and Charteris-Black (*dead*). In other words, the more often it occurs in speech, the more it is entrenched in the linguistic and conceptual inventory of a single speaker and in the larger community of speakers (language community). The metaphor's original meaning, that is, the original conceptual transfer, "has passed out of our experience" (Goatly, 1997, p. 32). Such conventionalizing processes are assumed to originate in collective language use, that is repetitive use by an ever-developing speech community.

3.5.1.1 Frequency measurements as indicators of metaphor conventionality

Frequency measurements (a usage-based approach) are usually obtained from corpora, whether specifically compiled for the purpose of the measurement or freely available via online platforms. Through "machine-readability, authenticity and representativeness"(McEnery & Wilson, 2001, p. 5), corpora facilitate the scientific investigation of language use on a big scale. Furthermore, corpora contain language "in its most natural form […] in the shape of spontaneous, non-elicited language data"(Tummers, Heylen, & Geeraerts, 2005, p. 226) in different modes (i.e., written, spoken) and from different genres (e.g., newspaper texts, fiction).

For English, the freely accessible *British National Corpus* (BNC)[22] and the *Corpus of Contemporary American English* (COCA)[23] are two examples of large-scale corpora. While the former has been discontinued after 1994, the latter is still maintained and constantly growing. At the moment, "[t]he corpus contains more than 520 million words of text (20 million words each year 1990-2015) and it is equally divided among spoken, fiction, popular magazines, newspapers, and academic texts"(COCA, 2016). Thus, the corpus is considered representative for contemporary monolingual American English language use. Since the experimental text in the present study is taken from an American news magazine written in American English, the COCA corpus was deemed an adequate tool to measure frequencies of the metaphorical expressions given in Table 1. Furthermore, as explained above, the participants of this study are assumed to exhibit native speaker like language user patterns. Accordingly, the use of a monolingual corpus to measure frequency as an indicator of conventionality was deemed justifiable also regarding highly proficient speakers of English as a second language. In other words, the participants of the study are assumed to exhibit native like effects of frequency as a measurement of conventionality, that is, in the course of their acquisition of the English language, they have been exposed more often to highly frequent and thus more conventionalized linguistic and semantic patterns than to low frequency

[22] http://www.natcorp.ox.ac.uk/ (1 June 2016)
[23] http://corpus.byu.edu/coca/ (1 June 2016)

patterns which are less conventionalized. In the following, a detailed description of frequency information from the corpus is provided.

Raw frequencies (i.e., actual occurrences in the corpus) for the different metaphorical expressions were compiled from the COCA from both sections, the written and the spoken section. Although the source text and the target texts are written texts (translation is defined as a written genre as opposed to interpreting, which is oral), both language modes were included, because language learning and language proficiency typically are associated with both modalities. Thus, familiarity with a metaphorical expression originates in both written and spoken discourse. A set of search rules was established to ensure a unified search procedure:

1. Exact expressions are prioritized if they occur in the corpus including different inflectional forms (e.g., singular and plural forms of nouns, different verb forms), which initially do not alter the metaphorical meaning of the expression.
2. In cases where no exact matches are found, relevant syntactic structures (constructions) are searched for. For example, for the expression *churned the markets* no exact hits were elicited from the corpus. Thus, the search for any form of the verb *churn* + article + noun was executed: *[churn].[v*] [at*] **.
3. In general, all results are examined for non-metaphorical uses, which are excluded. For example, the result list for *[churn].[v*] [at*] ** (*churned the markets*) contained non-metaphorical uses, i.e. physical uses like *churning the water*, *churning the surface*, which were excluded from the list. Fifteen out of the 129 tokens remained on the list. Frequency lists for search strings displaying 500 tokens and more were subject to a percentage rule.

Figure 4 below depicts a typical search string for an expression. The search result output is given in figure 5. Figure 4 demonstrates the search string for the expression *in Store* from the heading of the article (*What's in Store for Wall Street and the Markets in 2014?*). In the following, the calculation of raw frequency numbers for all expressions will be demonstrated by means of this example.

Figure 4: COCA search string example

The noun *store* is searched for as a lemmatized form (all inflectional forms are displayed in the search result) indicated by square brackets. The lemmatized search was based on the assumption that morpho-syntactic variability in tense and number interferes rarely with meaning and contributes to the likelihood that speakers have encountered the metaphorical expression previously. The part of speech tag *[n*]* ensures that the result list only contains tokens containing *store* as a noun, and not any form of the verb *to store*. The following frequency list resulted from the search string:

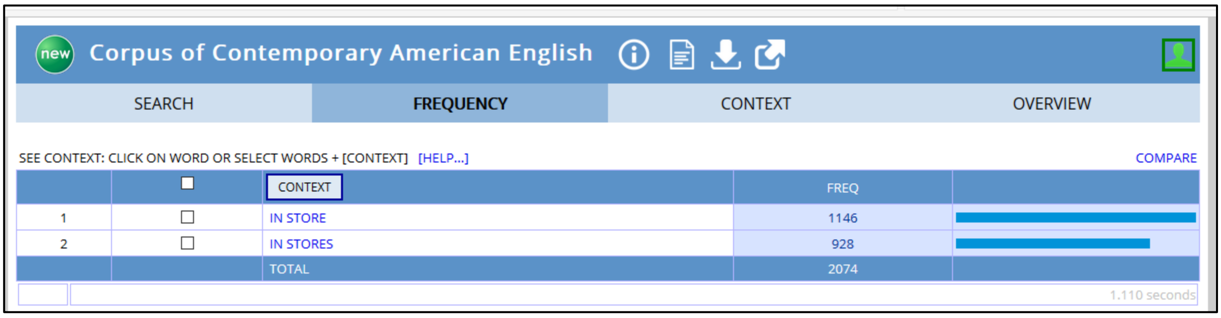

Figure 5: COCA search string example result

In general, frequency lists displaying up to 500 tokens were examined for non-metaphorical uses in their entirety. Non-metaphorical tokens were excluded from the search result. Thus, counts registered for those expressions are actual counts (i.e., metaphorical tokens). In the example above however, the singular phrase *in store* is represented with 1146 tokens in the corpus, and the plural phrase *in stores* with 938 tokens. Therefore, a percentage rule was applied for frequency lists displaying more than 500 tokens. The first 100 tokens were examined for non-metaphorical uses. The number of those uses was converted into a percentage, which was then deducted from the total number of tokens. Thus, the percentage reduction accounted for an estimated average adjustment of the occurrence of non-metaphorical tokens for the specific search string. For the present example, 15 non-metaphorical tokens were identified for the phrase *in store*, which accounted for a reduction of the total number of tokens (1146) by 15 percent, leaving a total of 974 metaphorical tokens. For the plural expression *in stores*, all tokens were identified as non-metaphorical, which means that the frequency count for this expression was zero.

Following this procedure, estimated frequencies for all 47 expressions were compiled. However, due to the specificity of some expressions (they did not appear in the corpus), a number of search strings required adjustment in the form of changes to the syntactic structure of the search string (see rule 2 above). The expressions *boosting global car sales* (alternatively *boosting * sales*) and *hacked Twitter account* (alternatively *hacked * account*) did not elicit any frequency measurements and were therefore deleted from the list reducing the data set to 45 metaphorical expressions constituting potential AOIs for analysis 2.

In a second step, to ensure representativeness and comparability of the data, absolute raw frequencies, that is, raw frequencies for all inflectional versions of the expressions (e.g., *flash crash* and *flash crashes*) were added up, and normalized figures (per ten million words) were collocated. Thereafter, the results were sorted according to normalized frequencies from lowest to highest value (see figure 6 below).

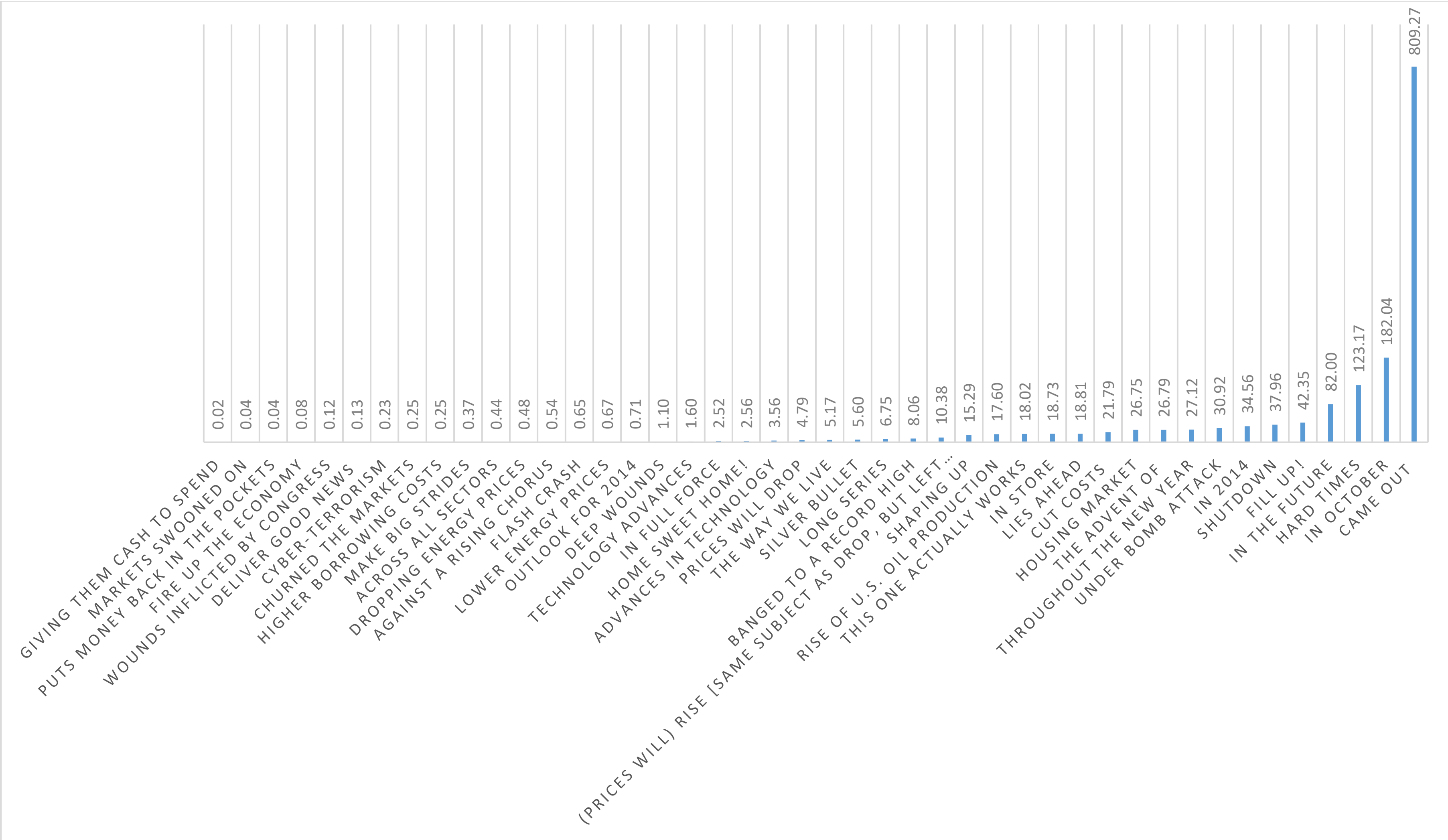

Figure 6: Expressions sorted by normalized frequencies (smallest to largest) with the exception of MARKETS

Figure 6 depicts the distribution of the expressions from lowest to highest per ten million words. With a value of 2406.87, the noun *Markets* was distinctively more represented than any other expression. For reasons of convenience and visualization, the phrase has been left out of the figure. However, the reader should be aware that *Markets* belongs on the right-hand end of the scale. Since frequency is operationalized as a measurement of conventionality along a continuum, the following three conventionality categories were defined: low conventionality, medium conventionality and high conventionality. In designating these categories, terminology used by for example Goatly (1997) and Newmark (1983) is deliberately avoided. Goatly's classification is based on semantic analysis of the vehicle (source domain) of a metaphor, while Newmark developed his taxonomy from a viewpoint of translation and translator training. In the present study, on the other hand, frequencies were compiled as measurements for and indicators of actual language use, and thus, (only) in a wider perspective, as representations of conceptual structuring. Since, however, the analysis is quantitative, employing quantitative markers like *low*, *medium* and *high* seems more adequate, although admittedly not uncontroversial. As discussed previously, establishing a few number of categories to represent a data set has its disadvantages. A picture of uniformity and clear-cut separation between the categories, and thus between the observations, is created, which does not necessarily convey the complete composition of the data set. Furthermore, since the data extracted from the corpus represents a larger data set, that is, actual language use, such an approach is not meant to imply that there are clear-cut lines (or even given values) for what can be counted as low, medium and high frequency words in a language. In order to operationalize frequency measurements as indicators of conventionality levels in this study however, a few methodological choices needed to be undertaken which are helpful to organize and split the data set in meaningful units (in this case into the three frequency categories *low*, *medium* and *high frequency*), but do not necessarily claim replicability for other sets of data, or even generalizability to the English language. In order to find demarcation lines for the three frequency categories, cumulative frequencies of normalized frequencies for all 44 expressions in Figure 4 above, plus *Markets*, were generated. Cumulative frequencies sum up all frequency values up to and including a specific frequency value. Thus, cumulative percentages account for the amount of percent of the data set that is represented by a certain number of frequency values. In this case, demarcation lines defining one-, two- and three-thirds of the data set were aimed at.

The left-hand column in Table 3 displays the expressions according to their value of normalized frequency. The right-hand column displays the cumulative frequencies in terms of percentages. For example, the expression *fire up the economy* has a normalized frequency value of .08. This normalized value is represented in the data set once and accounts for 2.2 percent of the complete frequency data set. The three expressions displaying a lower frequency value than 0.8 (i.e., *giving them cash to spend*, *markets swooned* and *puts money back in the pockets*) and the current expression *fire up the economy* represent a cumulative percentage of 8.9 percent of the data set. Since the categorization into conventionality classes is tripartite, a category delineation was drawn at around 33 percent (after *lower energy prices*) and 66 percent (after *this one actually works*), each category representing approximately one third of the data set. Again, this procedural method is chosen to simplify the process of categorizing expressions. This does not imply that conventionality classes are equally large, and therefore that exactly one third of the linguistic inventory of a language belongs to one category, and one third to another category etc.

Table 3: Frequency measurements per expression-cumulative percentages

Expressions	**Normalized Frequency**	**Frequency in Data Set**	**Percent in Data Set**	**Cumulative Percent in Data Set**
giving them cash to spend	.02	1	2.2	2.2
markets swooned/puts money back in the pockets	.04	2	4.4	6.7
fire up the economy	.08	1	2.2	8.9
wounds inflicted by Congress	.12	1	2.2	11.1
deliver good news	.13	1	2.2	13.3
cyber-terrorism	.23	1	2.2	15.6
churned the Markets/higher borrowing costs	.25	2	4.4	20.0
make big strides	.37	1	2.2	22.2
across all sectors	.44	1	2.2	24.4
dropping energy prices	.48	1	2.2	26.7
against a rising chorus	.54	1	2.2	28.9
flash crash	.65	1	2.2	31.1
lower energy prices	.67	1	2.2	33.3
outlook for 2014	.71	1	2.2	35.6
deep wounds	1.10	1	2.2	37.8
technology advances	1.60	1	2.2	40.0
in full force	2.52	1	2.2	42.2
Home Sweet Home!	2.56	1	2.2	44.4
advances in technology	3.56	1	2.2	46.7
prices will drop	4.79	1	2.2	48.9
the way we live	5.17	1	2.2	51.1
silver bullet	5.60	1	2.2	53.3
long series	6.75	1	2.2	55.6
banged to a record high	8.06	1	2.2	57.8
(prices will) rise	10.38	1	2.2	60.0
shaping up	15.29	1	2.2	62.2
rise of U.S. oil production	17.60	1	2.2	64.4
this one actually works	18.02	1	2.2	66.7
in Store	18.73	1	2.2	68.9
lies ahead for 2014?	18.81	1	2.2	71.1

cut costs	21.79	1	2.2	73.3
housing market	26.75	1	2.2	75.6
The advent of	26.79	1	2.2	77.8
throughout the new year	27.12	1	2.2	80.0
under bomb attack	30.92	1	2.2	82.2
in 2014	34.56	1	2.2	84.4
shutdown	37.96	1	2.2	86.7
Fill up!	42.35	1	2.2	88.9
in the future	82.00	1	2.2	91.1
hard times	123.17	1	2.2	93.3
in October	182.04	1	2.2	95.6
came out	809.27	1	2.2	97.8
Markets	2072.06	1	2.2	100.0
Total		**45**	**100**	

Since category boarders are drawn rather arbitrarily according to cumulative percentages, and there is no linguistically founded basis to claim that the expression *lower energy prices* with 33.3 percent belongs to the low frequency category, while *outlook for 2014* with 35.6 percent belongs to the medium frequency category, medians for all categories, that is central values, were calculated. Thus, the central cumulative percentage value for the low frequency category is .25, which are the expressions *churned the markets* and *higher borrowing costs*. For the medium frequency category, the median is 4.98, a value that is situated between the expressions *prices will drop* and *the way we live*. Finally, the median for the high frequency category is 32.74, which represents a value between the expressions *under bomb attack* and *in 2014*. The frequency category demarcation lines (red) and the respective median values (yellow) are marked in Figure 7. Note that for reason of visualization, *Markets* is not represented in the figure, but is part of the calculations (cumulative percentages as well as median values). The expressions representing central values in their respective frequency categories constitute core members of these categories, thus representing low, medium and high frequency expressions without being in close proximity to each other.

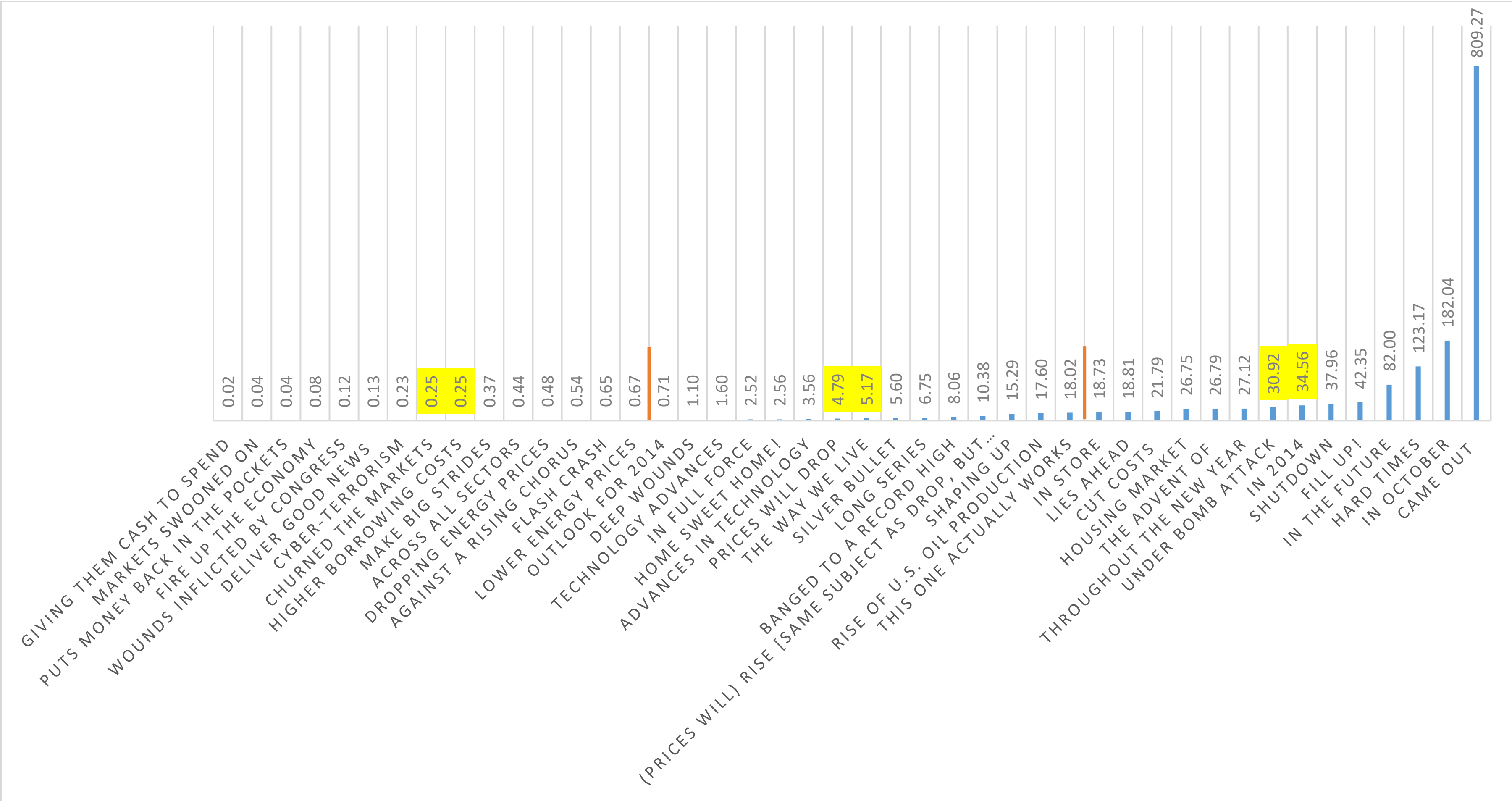

Figure 7: Expressions sorted by normalized frequencies (smallest to largest) and frequency categories with the exception of MARKETS

Choosing four expressions per frequency category around the central value representing a certain degree of conventionality was considered adequate for the present investigation. Thus, 12 expressions (four expressions from each of the three frequency categories) were chosen to be investigated to answer research question 2.

In order to perform the analysis of production time on the 12 expressions chosen as described, and give a more comprehensive picture of the translation process, a number of additional variables (besides production time, translation strategy and year of advancement in the study program) was selected to be included into the analysis. The subsequent section gives a detailed account of all variables and introduces the statistical model and methods applied to the data to answer the research questions.

3.5.2 Data analysis: The statistical models

In general, a translation process is composed of a number of components (e.g., the translator, the language combination, the translation direction etc.), which shape the process and constitute characteristic properties of the process. Regarding the cognitive implications of translation, Shreve and Lacruz (2014) note that "translation is a higher-order cognitive process, a complex sequence of cognitive activities based on the progression, outcomes and interactions of other more fundamental cognitive processes"(p. 107). In empirical research on translation processes, the researcher is interested in investigating those activities and their interactions or interdependencies in order to be able to learn more about the process. To be able to make statements about general commonalities of translation processes, researchers collect a sufficient number of similar processes to analyze them quantitatively. Statistical analysis and statistical modelling provide the means to an organized analysis, interpretation and modelling of a data set collected to answer empirical research questions. In the present study, the particular aspect of the translation process that is investigated is the production time of metaphorical expressions as an indicator of cognitive effort. Driven by the research questions, the outcome of the measurement of production time is assumed to be subject to change according to the choice of translation strategy and the degree of advancement in the study program. However, from the body of previous literature on translation processes, it is clear that a statistical model including merely those three variables (*Total Production Time*, *Translation Strategy,* and *Participant Group*)[24] gives a rather simplified picture of the processes in question, and may thus lack explanatory power. It is therefore necessary to increase the number of variables (characteristic of the process) in order to be able to draw a more detailed picture of the translation processes in question, and increase the explanatory power of the models. Additional variables in the current models have partly been adapted from Sjørup (2013, p. 123 *ff*.), and partly been developed for the specific research questions in these analyses.

In the following figures, the statistical models for the analyses are illustrated. Due to grammatical differences between the two target languages Norwegian and German, which will be discussed in detail later, the German analysis needed to be complemented with a an additional variable. Thus, there are two statistical models, one illustrating the analysis of the Norwegian data set, and one illustrating the analysis of the German data set. The variables are thereafter described beginning with the dependent variable *Total Production Time* and continuing with the explanatory variables in the order they appear in the model from left to right. The order of the variables in the model does not account for any order of importance in terms of their interrelations with the dependent variable.

[24] Henceforth, variable denotations will be given in italic letters.

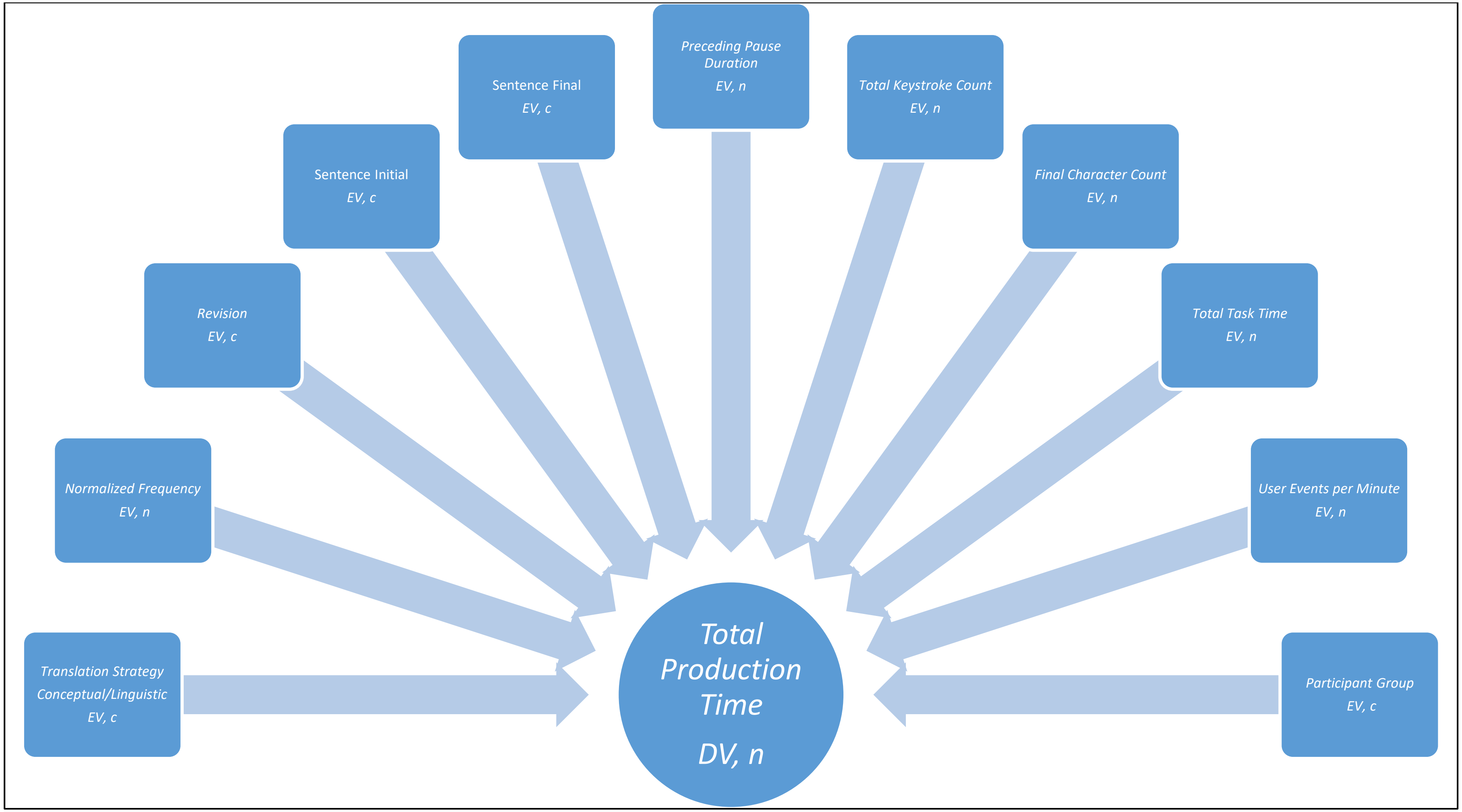

Figure 8: Model for Norwegian language group (DV = dependent variable; EV = explanatory variable; c = categorical; n = numerical)

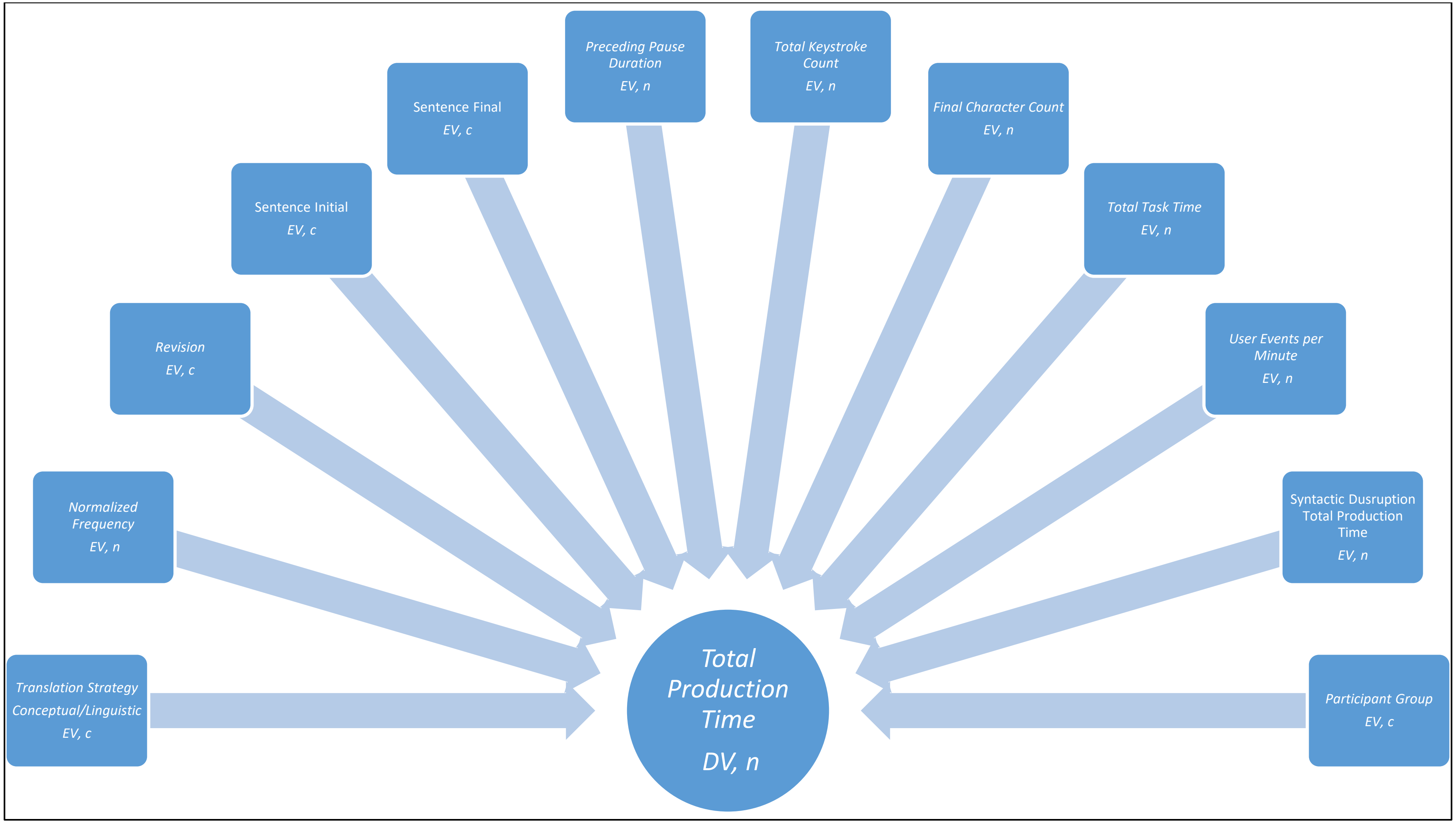

Figure 9: Model for German language group (DV = dependent variable; EV = explanatory variable; c = categorical; n = numerical)

3.5.2.1 Variables

In the following, all variables are described in the order they appear in the models starting from the left.

Dependent variable (DV)

Total Production Time (numerical): As described previously, keylogging by means of the software tool TRANSLOG II has been employed to facilitate the measurement of production time as indicators of cognitive effort.[25] The basic assumption behind this approach is that writing (in this case typing on a keyboard) is a "distinct feature of production of the TT" (Sjørup, 2013, p. 94). Hence, the records of the emergence of the target text through keyboard activities (keystrokes) provided by the software are considered evidence of the production of the target text.

The analysis of production time consisted of two main steps:

1. identification of all keystrokes belonging to the production of a target text AOI phrase in all translations (Norwegian, German)
2. time measurement comprising all identified keystrokes for each target text expression

In the following, a detailed description of the two steps is provided starting with the identification of relevant keystrokes.

Linear views (a visual representation of each screen activity in chronological order) were generated for all translations. For the sake of convenience, it was decided to display only keyboard events in the linear views, since all other types of events, which such a linear view can display (e.g., interface events, fixation events, mouse events), were not of interest for the analysis. Figure 10 below provides an example of such a linear view.

[25] TRANSLOG also offers an eye-tracking component, which may be used in combination with the keystroke logging. However, since eye-tracking has not been employed in this study, it is disregarded in the description of the software here.

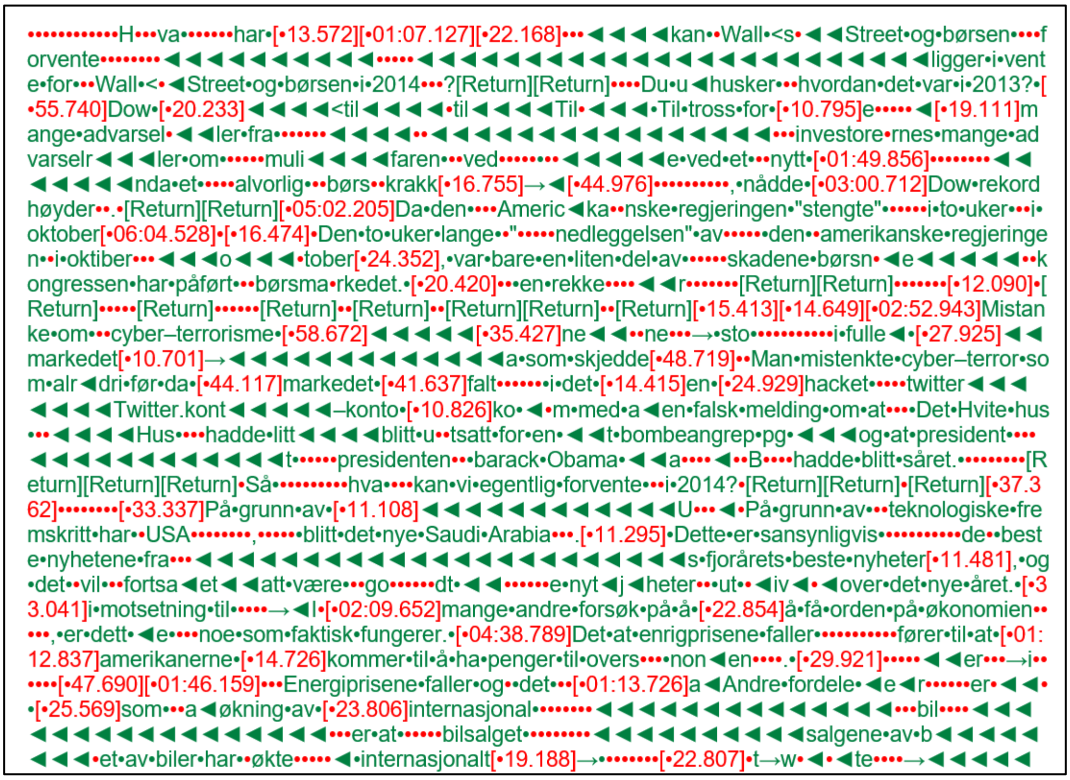

Figure 10: Linear view in TRANSLOG II

The linear view displays the evolution of the target text event by event. The red dots represent pauses rounded up to a length of one second per dot. Longer pauses are given numerically in squared brackets (e.g., [13.572] indicates a pause length of 13.572 seconds). In order to improve the visualization of the linear view, the color green was chosen to display all keystroke events. Green dots symbolize the pressing of the space bar, and inverted green triangles (◀) indicate that the BACKSPACE key was pressed. Finally, [RETURN] designates the use of the RETURN key, and keyboard cursor navigation activities indicating horizontal or vertical movement through the text are represented by arrows (e.g., →, ←, ↑, ↓).

There are two different categories of target text production events which are of interest for this study: text production and text elimination. These categories are evidenced by different types of keystrokes: text production is marked by text input keystrokes (e.g., characters, space bar, RETURN key), while deletion is executed by the BACKSPACE key or the DELETE button (A. L. Jakobsen, 2006, p. 101). Comparing linear views with the replays of the TRANSLOG log files, all keystrokes involved in the production of a source text equivalent in the target text (text production and text deletion) were identified in all translated texts.

This includes revisions carried out at a later point during the translation process, for example, during a general revision phase subsequent to a first draft translation of the complete source text.

Research shows that there are three visibly identifiable stages in a translation process: "an initial orientation phase, a middle drafting phase, and an end revision and monitoring phase" (A. L. Jakobsen, 2002, p. 192). For the present study, there are two reasons to justify the inclusion of target text revisions. Firstly, Jakobsen observes that "expert translators, while in fact drafting their translations much faster than student translators, spent relatively more time on end revision than did student translators" (p. 192). Thus, it is important to include time spent on revising target text AOIs into the measurement of production time, since advanced students may proceed through the initial drafting phase faster, but spend more time on revising later, which requires additional cognitive effort. Secondly, during revision processes at a later point in time, there may be a change of translation strategy type. For example, in the drafting phase, a participant translated an expression by selecting the translation strategy type M-M. However, in the subsequent revision phase changes were made to the translated expression in the target text that resulted in a change of translation strategy type from M-M to M-PP (paraphrasing). Thus, the strategy recorded according to the finished target text and included in analysis 1 is M-PP. Excluding revisions from the production time measurement however, would record the time measurement of the initial drafting phase, which in this case pertains to the strategy M-M, but place the measurement under the strategy category M-PP. This example illustrates the difference between product- and process-based analyses within empirical translation research. Product-based analyses allow for a comparison between source- and target text items which answers to questions investigating *what* has happened during the translation process, that is, what has happened to a source text expression in the target text. Process-based analyses, on the other hand, answer to how this has happened, that is, process analyses give a more complete insight into the process of translating. Excluding keystrokes (and thus time measurements) of revisions from the analysis would have altered the picture of the translation process given by the data set and distorted the interpretation of the data. Revisions were identified by comparing linear views and log file replays. The measurements of keystrokes and production time were added to the measurement of the initial text production during the drafting phase.

TRANSLOG II enables researchers to log time measurements for single keystroke events, groups of events or a complete target text production, thus facilitating the measurement of production time for specific parts of the text and related production processes. Single keystroke events are either text input keystrokes, deletion keystrokes or cursor navigation keystrokes. Groups of events may be combinations of these keystrokes (e.g., a number of text input and deletion keystrokes), which result in different keylogging patterns. Consider the example in Figure 11 below.

Figure 11: Illustration measurement keystroke events in TRANSLOG II

The marked logging data in the figure above indicates a production pattern consisting of both text production and text deletion keystrokes. The software logs five text input keystrokes (text production): four characters (*godt*) and a space bar (·).This input operation is immediately followed by two deletion keystrokes executed by pressing the backspace key ◄◄ (text elimination), which is then followed up by new text input (*e*). This pattern indicates a revision process correcting the morphological form of the adjective, which is dependent on the grammatical properties of the succeeding noun. Following this, there is text input (*nyt*), a deletion (◄), new input (*j*), a new deletion (◄) and more input (*heter*). Again, the deletion operations correct text input, which may, in this case, be due to two successive typing errors. The keystroke logging pattern described here forms the Norwegian phrase *gode nyheter* (*good news*).

Boundaries between groups of keystroke events forming keystroke patterns are determined by the researcher according the research question(s). One may choose to look at a group of keystroke events resulting in the production of a single linguistic unit in the target text (*gode*), a phrase consisting of several linguistic units (*gode nyheter*), a clause, or higher syntactical structures. For the purpose of this study, metaphorical expressions consisting of one or more linguistic units (phrases) were chosen (Section *3.5.1.1*). Thus, the measurement for keylogging patterns (groups of keystroke events) investigated in this analysis may comprise text production and text elimination keystrokes as well as cursor navigation keystrokes. In the following, the time measurement process related to keystroke events will be specified.

The variable *Total Production Time* contains numeric values representing "a measure in milliseconds of the time spent on production of the translation of the ST AOI (both planning and actual typing of the translation)" (Sjørup, 2013, p. 125). Hence, the production of the target text expression is twofold: planning, which may be marked by, for example, reading and/or on- and offline research, and a physical production phase, which is marked by typing (see above). Miller (2006) remarks that "[a] simple definition of planning centres on the idea of the speaker retrieving items from his/her relevant linguistic system in line with the intended communicative goal" (p. 15). It needs to be pointed out that planning- and typing phases are not two clearly separated parts of the production process, but that planning "will also occur throughout the writing episode, as the writer responds both to the text produced so far and to considerations of the communicative goal in the light of audience, purpose and topic, and so on" (p. 19). In the keylogging data, planning phases are considered to be represented by pauses, in writing research also referred to as non-fluencies (Miller, 2006, p. 16) or disfluencies (Wengelin, 2006, p. 110). Admittedly, pauses in text production may be attributed to a number of different processes not necessarily related to cognitive processes involved in planning target text production (e.g., reading other, unrelated parts of the text, external distractions, interruptions). Schilperoord (1996) considers pauses to be "behavioral reflections of the cognitive processes involved in changing attentional states" (p. 9). Dragsted (2004) claims that with regard to cognitive segmentation processes, pauses directly preceding a translation unit can be attributed to the mental processing of this particular translation unit. Therefore, pauses as indicators of cognitive processing are connected to subsequent text production (as opposed to preceding text production) (p. 87).

Muñoz Martín and Martín (2016, p. 71) sum up findings on pause data and cognitive load according to two characteristics: pause density and pause length. They establish three pause categories: short pauses, mid pauses and long pauses, and find that "short and mid pauses were unrelated to long pauses, pointing to different behaviors and perhaps to different cognitive processes" (p. 88). Lacruz, Shreve and Angelone (2012) relate higher pause density in post-editing to higher cognitive load. Immonen and Mäkisalo (2010) find that "the larger the unit, the longer the pause preceding it" (p. 46), and Foulin (1998) states that "variations in pause duration can be understood as variations in the cognitive cost of the processes underlying written production" (p. 614-615). Therefore, since pause duration correlates with cognitive effort and pause placement is related to subsequent text production, Sjørup's procedure in measuring production time was followed and "pauses preceding the AOI TT equivalents were included in the measure whereas any pauses immediately after the word were taken to be related to subsequent words" (2013, p. 127).

Applying these considerations to the measurement of production time, time measurements started after the last keystroke immediately preceding the first keystroke that was identified as part of the production of a ST AOI equivalent in the target text, and stopped immediately after the final keystroke of the ST AOI correspondent. Consider the Norwegian translation of the ST AOI *advances in technology* in the example in Figure 12 below.

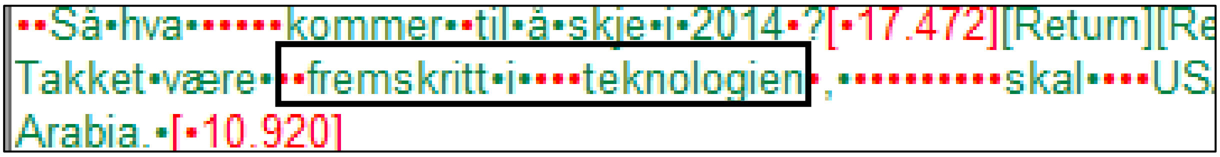

Figure 12: Illustration production time measurement in TRANSLOG II

In the majority of cases, the last keystroke preceding the production of the target text expression is a space bar (as indicated by the green dot following the Norwegian verb form *være*), which is attributed to the production of preceding text (*cf.* Wengelin, 2006, p. 114; inactivity before a letter and after a space bar preceded by a letter). The measurement stopped after the keystroke corresponding to the final letter *n* of the noun *teknologien* (*technology*). In this example, there is no space bar immediately succeeding the final letter, since the phrase is part of a higher syntactical structure (a clause), and the comma marks the separation of this clause from the next. In most cases, however, the last keystroke was a space bar, which was included into the measurement.

If revisions were carried out at a later point in time, the production of the final target text expression progressed in stages clearly separated in time by the production of other parts of the text. Some measurements concern therefore keystrokes carried out to produce fragments of the complete target text expression (e.g., revisions of single characters or individual linguistic units) as evidenced in the example in Figure 13.

Figure 13. Illustration time measurement revisions in TRANSLOG II

In this example, the Norwegian participant decided, at a later point in time, to revise the initial translation of the ST AOI *cyber-terrorism* to the Norwegian noun *cyberterrorisme* by replacing the modifier adjective *cyber* with the noun *nett* (*net*). Thus, the final target text linguistic item is *nett-terrorisme*. The time measurement of the revision starts with the first keystroke that can clearly be allocated to the production of the revision of the target text expression, a deletion keystroke indicated by the inverted triangle (◄). The measurement stops with the last keystroke of the new linguistic item *nett*. Pauses preceding the measurement of revision productions needed to be treated differently than in the initial drafting phase, where pauses were included into the measurement. In the example above, the pause after the last keystroke preceding the revision (→) indicated by red dots cannot conclusively be attributed to the production of the revision, and thus to the cognitive processing of the metaphorical expression. A comparison of the linear view with the log replay revealed that the cursor navigation activity indicated by the green arrow occurred in a different part of the target text. The pause time was therefore not included into the time measurement. As a rule, time measurements for revision processes started with the first keystroke of the production of the target text expression. Thus, preceding pauses were excluded. In a last step, time measurements for all parts of the production of a target text expression (initial drafting phase and revisions) were added up.

Explanatory variables (EV)

Translation Strategy Linguistic (categorical): This variable category consists of the twelve linguistic translation strategy types identified in analysis 1. The intention is to explore whether or not different linguistic realizations belonging to one conceptual category affect the measurement of production time as indicator of cognitive effort. In other words, whether or not some linguistic realizations require more cognitive effort than others in relation to a conceptual change or a conceptual similarity between source- and target text expression.

Translation Strategy Conceptual (categorical): Also in analysis 2, it was decided to differentiate between the level of linguistic changes from the source to the target language and the conceptual level of changes (*cf.* Section 3.5.2). This variable category contains the five different conceptual translation strategy types identified in analysis 1 (i.e., M-M, M-D, M-PP, DEL, NT). It aims at answering the question whether or not conceptual change and/or similarity between source- and target language expression have an influence on production time as indicator of cognitive effort.

Normalized Frequency (numerical): The numerical values in this variable are the normalized frequencies of the source text metaphorical expressions as descriptors of conventionality levels (*cf.* Section *3.5.1.1*). Source text expressions were chosen according to their normalized frequency values clustering around three mean cut-off values representing a low, medium, and high frequency category. It is assumed that increasing frequency has a decreasing effect on production time.

Revision (categorical): This variable accounts for whether or not the participants returned to the translated expressions to carry out revisions (i.e., changes on the grammatical or linguistic level) after having produced other parts of the text, or in a revision phase following the first completion of the whole translation. As opposed to Sjørup (2013, p. 128), the measurement of the dependent variable *Total Production Time* includes all text production events related to the target text expression. This means that measurements (i.e., keystroke counts as well as time measurements) for initial text production and revisions were added up. Whether or not revisions were carried out has an influence on the measurement of production time (revisions contribute to the extension of production time), which makes the inclusion of this variable necessary. However, the variable only records a YES or NO with regards to revisions and not the number or length of any singular revision operation. It was not regarded necessary for this investigation to record the exact details of the revision operations (e.g., number of revisions), since the necessary measurements are included in the respective variables *Total Production Time* and *Total Keystroke Count*.

Sentence Initial (categorical): This variable, as well as the next variable *Sentence Final*, are adapted from Sjørup (2013, pp. 128-129). Sjørup remarks that

> the position of the translation unit could have an effect on the pause frequency and duration as well as typing speed" and that it is "likely that participants would engage in more planning and deliberation activities when initiating production of a sentence. (p. 129)

She refers to Immonen (2006) who found "pause duration was greatest between paragraphs and diminished down towards the smaller linguistic units" (p. 329). The measurement of production time in this study starts with the last keystroke of the unit preceding the target text expression. Thus, it includes any pauses preceding the production of the target text expression. It was therefore deemed necessary to control for the influence of pause duration variation due to syntactic structures in the target text, for example the possibility of longer pauses before expressions which start a paragraph or a sentence as opposed to expressions which are located in the middle of a sentence.

Expressions were considered sentence initial, if all or some of the linguistic elements belonging to the target text expression were part of the first syntactic constituent of a sentence. For example, in a number of German translations of the source text item *shutdown* (*die Stilllegung*), the subject phrase was extended with the adjective phrase *zweiwöchig* (*two-week*) forming the phrase *die zweiwöchige Stilllegung* (*the two-week shutdown*). In the English source text, information regarding the duration of the shutdown appears later in the sentence. However, in a large number of German translations, it was moved into the subject phrase. Since the initial target text expression, *Stilllegung*, is a member of the first syntactic unit in the target text sentence, it is still considered sentence-initial although there is another linguistic unit preceding it. The variable is categorical in that it records whether the expression is located sentence initial or not (YES/NO).

Sentence Final (categorical): The same applies to target text expressions which are located at the end of larger syntactic structure (e.g., sentence, paragraph). Sjørup argues that "participants were likely to engage in sentence-final revision, which could perhaps have an effect on the frequency and duration of pauses as well as typing speed" (2013, p. 128). The variable carries the same values as the previous variable: YES/NO.

It needs to be noted that Sjørup does not find any significant effects of these two variables on her dependent variable *Production Time*. However, since earlier research (e.g., Immonen 2006) suggests a certain degree of influence on the position of the translation unit in the syntactic structures of a translation unit, it was decided to include these two variables into this study nevertheless.

Preceding Pause Duration (numerical): The relationship between planning and typing as part of the production process has been established previously. Pauses are considered indicators of cognitive processing related to the planning phase of language production, and are an important part of the investigation of temporal processes in written language production (*cf.* Miller, 2006; Wengelin 2006). Gould (1980) states that, on average, planning as signified by pause time accounts for almost two-thirds of the total production time of a written text (p. 112). In order to account for the differentiation between planning and typing as part of the production process, it is necessary to take pause length as part of the measurement of total production time into consideration.

The investigation of pauses in translation studies (as well as writing studies) is a prolific field of research, and has produced (and still produces) a substantial body of theoretical and empirical literature on, for example, pause location and pause duration. In relation to production time in translation, Muñoz Martín and Martín (2016) point out that "[o]ften, slower time per word is not due to slower key-pressing – many typing movements are automatized – but rather to longer 'micro level pauses' at relevant points, such as those between syllables and prefixes" (p. 71). An extensive investigation of pauses on a micro level such as this is, for several reasons, not feasible for the present study. It was therefore decided to record the length of the pause preceding the typing of the target text expression in a separate variable, but to consider intermediate pauses (in-between typing target text expression, e.g., between letters, syllables or words) integrated measurements of the value of *Total Production Time*. It is assumed that most cognitive effort is invested in a first time planning phase (indicated by a preceding pause), and that intermediate pauses assume a control function, that is re-reading, revision, etc. A more detailed analysis of pause data (micro- and macro level, position etc.) may be the subject of another study.

Regarding pause duration, Wengelin (2006) refers to a pause as inactive typing behavior "which is longer than what can be expected to be necessary merely for finding the next key" (p. 111). Furthermore, she points to corpus research on monolingual writing, which shows that the normal mean transition time between keystrokes for university students is 0.181 seconds (181 *ms*). Therefore, an inactive period (pause duration) similar or lower to this value is not considered a pause according to the use of the concept in this study. On the contrary, it was necessary to raise the threshold in order to acknowledge that the participants are bilingual language users, and, in the case of the German participants, that the location of some characters on the keyboard was different to what they were used to (Section *3.1*). The threshold was therefore, somewhat arbitrarily, raised to 0.5 seconds (500 *ms*). Any inactive period similar or above that value is considered a pause unrelated to typing speed, but to cognitive processing associated with text production planning.

Thus, the variable *Preceding Pause Duration* refers to the length of the pause preceding the first keystroke of the target text expression in the drafting phase. The time is measured in milliseconds starting after the last keystroke immediately preceding the first target text word and stopping before the first keystroke belonging to the first target text word. Consider the example in Figure 14 again.

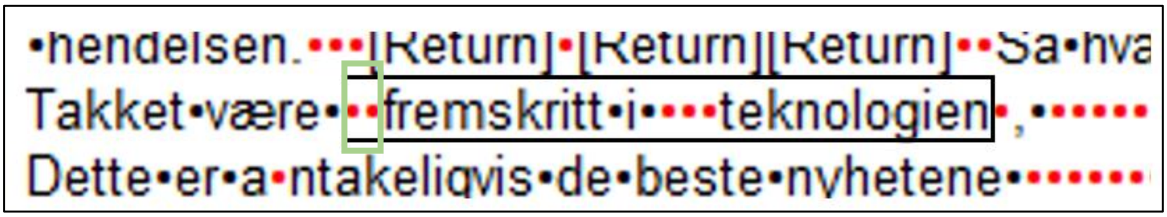

Figure 14: Illustration measurement preceding pause length in TRANSLOG II

The black frame indicates the time measurement of the variable *Total Production Time*, whereas the green frame marks the measurement of the variable *Preceding Pause Duration*. In the linear view, red dots representing a pause length of one second are merely simplified visual aids. The variable contains exact measurements (e.g., 1.561 seconds). The pause measurement is part of the total production time measurement, and the relationship between the length of the pause preceding the production and the total production time of target text expressions to the choice of translation strategy and the advancement in the study program is of interest here.

Total Keystroke Count (numerical): This variable is similar to Sjørup's variable *Character Count* (2013, p. 127-128). As the term suggests, Sjørup defines this variable as "a total measure of all alphabetical characters typed during production of TT AOI equivalents, both deleted and final characters" (p. 128). Referring to Göpferich (2009, p. 20), she argues that character count may not directly be connected to cognitive effort, but that the level of typing expertise (e.g., familiarity with the keyboard, speed) may. However, Sjørup excludes other typing events like the space bar and the BACKSPACE bar arguing that such events were not in all cases clearly related to the production of specific expression. Thus the term *character count*. In the present study, the variable refers to the number of keystrokes executed to produce the target text expression, both initial production and revisions at a later point in the text production process (revision phase). This includes the pressing of the space bar after the last keystroke belonging to the target text expression. This is in line with the definition of the measurement of production time starting after the last keystroke of the word immediately preceding the target text expressions and ending with the last keystroke of the last linguistic unit of the target text expression (most often the space bar). Keystroke counts include also the backspace as indicator of deletion of previous keystrokes. Since both the pressing of the space bar and the backspace bar are part of the emergence of the final translation solution in the target text, and thus generate measureable production time values, it was decided to include these typing operations into the keystroke count. By carefully examining linear views and replay TRANSLOG files, it was in all cases possible to determine whether these keystrokes belonged to the evolution of the target text expression or to other text production events. However, deletions executed by marking characters, words or strings of words with the computer mouse could not be counted, since it was difficult to determine these operations from the linear view. The linear view indicates the mouse movement, but since the deletion was carried out by writing the new text over the marked one, no keystroke count for the deletion operation itself was possible. Such operations were only visible by replaying the log files. Similar to deletion and substitution operations executed using the backspace bar, the new (or substitute) keystrokes (characters, space bars, backspaces) were then counted. Furthermore, full stops indicating sentence endings in cases where the target text expressions were located at the end of a sentence (sentence final) were not included into the keystroke count since these punctuation marks do not directly belong to the expression, but to the entire syntactical unit, that is the sentence.

Final Character Count (numerical): Since the preceding variable *Total Keystroke Count* includes a variety of typing operations (characters, space bars, BACKSPACES), the number of keystrokes executed to produce a target text expression does not necessarily reflect the length of the final translated expression. In other words, a small number of keystrokes does not necessarily represent a short expression in the final translation and a large number of keystrokes does not inevitably point to a long expression in terms of character count in the final target text version. Since it is assumed that conceptual changes between source- and target language indicated by particular translation strategies (e.g., M-D, M-PP) cause longer production time, it may be assumed that the number of keystrokes in relation to the final character count (e.g., large number of keystrokes but small number of final characters) is an indicator of this interdependency. For example, a short expression requiring a conceptual change (e.g., translation strategy M-D) may cause a relatively high number of keystrokes due to changes and revisions. On the other hand, expressions with a large final character count (e.g., multiple word expressions) may be translated in one go (selecting translation strategy types which do not include a conceptual change between source- and target language is required) without or with few corrections (deletions and re-typing), which results in a relatively small number of keystrokes. Yet another reason to include this variable into the model is the aforementioned level of typing expertise. Less advanced students may exhibit poorer typing skills, which may cause a discrepancy between final character count and keystroke count due to revisions, and thus influence production time.

The variable *Final Character Count* is a variable based on the linguistic characteristics of the translation product, that is target text expression, while the variable *Total Keystroke Count* captures the evolutionary process of the target text expression.

Total Task Time (numerical): This variable provides a measurement of the total time the participants used to finish the task (text production, revision, and pauses included). The measurement starts with the activation of the TRANSLOG II session and ends with the participants pressing the STOP button. The value is provided by the software and transformed into milliseconds to concur with the measurement of the dependent variable *Total Production Time*. Since the participants were not given any particular time restriction regarding finishing the task (only a two-hour window to complete the task, which they were not informed about prior to the experiments), individual differences in terms of working speed need to be taken into account when measuring production time. Thus, the measurement of production time for the individual target text expressions needs to be evaluated in relation to the total task time, which may be influenced by, for example, typing speed, and pause data related to, for example, re-reading, planning processes or online searches. Differences regarding typing speed (*cf.* the description of the variable *Total Keystroke Count* above; Göpferich 2009) are assumed to be accounted for by the next variable in the model.

User Events Per Minute (numerical): This variable is incorporated into the model to account for individuality in terms of average working speed as indicated by keyboard activity. As mentioned earlier, it may, for example, be assumed that less experienced participants type slower than more experienced ones, or that their translations are characterized by a larger number of pauses or longer pauses. Such factors have an influence on the measurement of keyboard activities and need to be integrated into the statistical model. Therefore, the variable *User Events Per Minute* contains a value for the average keyboard activity per minute, that is, how many keystrokes a participant has executed per minute on average. This includes text production (characters, numbers, punctuation marks, space bars, RETURN keys etc.) as well as text elimination (BACKSPACE).

Syntactic Disruption Total Production Time (numerical): The syntactical system of the German language differs considerably from the English (as well as the Norwegian) system. Hemforth and Konieczny (2000) point out that German grammar is marked by "its relatively free word order, its rather rich morphology, and the variable positioning of the main verb" (p. 3). English, on the other hand, they remark "is a language with a relatively fixed ordering of verbal arguments with a general subject-verb-object ordering" (p. 3). These differences in terms of grammar impact the analysis, interpretation and especially comparison of the data (of both language groups) in this study to such a degree that it needed to be taken into consideration by adding a specific variable.

The German sentence structure is such that the syntactic structure of complex verb phrases (phrases consisting of a number of finite and/or infinite verb forms) in the predicate may be interrupted by other (attributive) parts of the sentence, which places parts of the verb phrase onto the end of the clause. For example, in the following simple main clause, the direct object (a noun phrase) is inserted in-between the auxiliary verb form and the past participle verb form of the present perfect verb construction.

(1) (GER) Er hat Eier gekauft.
(EN) He has eggs bought.
(EN) (*He has bought eggs.*)

The noun phrase *Eier* (*eggs*) splits the verb phrase *hat gekauft* (*has bought*) into the auxiliary verb *hat* (*has*) and the part participle *gekauft* (*bought*). In compound sentences, there is an additional change in word order within the verb phrase in subordinate clauses. While main clauses follow the general order of finite verb form preceding any other infinite verb form (infinitive, participle), the order is reversed in subordinate clauses, that is, the infinite verb form precedes the finite verb form.

(2) (GER) Er sagt, dass er Eier gekauft hat.
(EN) He says that he eggs bought has.
(EN) (*He says that he has bought eggs.*)

The participle form *gekauft* (*bought*) now precedes the finite auxiliary verb *hat* (*has*) and the (now unified) verb phrase concludes the sentence. At the same time, the position of the direct object noun phrase (*Eier-eggs*) has been moved between the subject (*er-he*) and the verb phrase.

For the analysis of the data in the present study, the differing phrase and clause structures in German posed a challenge. While the source text expressions were complete phrases, the constituents of some German target text expressions were scattered across a clause as illustrated in the following example:

(3) (ST) a year that could **make big strides** in restoring the world to prosperity

(GER) ein Jahr, das **große Schritte** zur Wiederherstellung der Hochkonjunktur
(EN) a year, that big strides for the restoration of prosperity

(GER) der Welt **machen** könnte
(EN) of the world make could

The source text metaphorical expression as well as the constituents of the corresponding target text equivalent expression are marked in bold. While the verb form (*make*) and the direct object noun phrase (*big strides*) form a unit in the English source text expression, the German translation, due to the syntactic rules described above, is interrupted by the prepositional phrase (*zur Wiederherstellung der Hochkonjunktur der Welt – for the restoration of prosperity of the world*). The direct object noun phrase (*große Schritte – big strides*) precedes the verb phrase (*machen könnte – make could*), which is placed at the end of the clause. In addition, the order of the verb forms in the verb phrase is reversed placing the infinite verb form (*machen*) before the finite verb form (*könnte*).

While Norwegian clause and sentence structures are comparable to English syntactical rules, and the recording of production time was unproblematic, the splitting of expressions in the German target texts posed a problem for the measurement of production time. From a cognitive point of view, it can be assumed that there is no cognitive shutdown of the metaphorical expression during the typing of the intervening text parts (e.g., the attributive prepositional phrase). Hemforth and Konieczny (2000) argue that "[v]erbs not only carry information about the number of arguments they subcategorize for but also information about their thematic structure and the ordering of arguments with respect to their thematic prominence" (p. 7). Although these arguments originate in monolingual text comprehension and production (spoken and written), they are applicable to translation. During text comprehension, meaningful connections between sentence constituents (e.g., arguments and verb phrases) can only be established after the complete intake of all information (e.g., the complete sentence). In translation, information decoding (comprehension) of the arguments pertaining to a verb phrase as well as the decoding of a verb phrase itself is located in the comprehension phase (reading of the source text). Thus, the logic of the semantic relationship between the different syntactic constituents of a sentence (i.e., how arguments are related to a verb phrase) is assumed to be present in the translator's mind during the production phase, even though the argument precedes the production of the verb phrase. Therefore, one cannot draw a clear line between the cognitive processing of the different syntactic constituents of, for example, a sentence, even if it is assumed that less experienced translators progress in a word-to-word manor through a translation task. However, in order to ensure comparability of the data between the two language groups, the measurement of production time could not include the intervening material (e.g., prepositional phrase in the example), but needed to be restricted to the constituents of the target text expressions. To be able to account for the influence of the German syntactic system on production time of the target text expressions, a variable was established which records the details of the syntactic disruption of the translated expressions in the target text. In the example given above, the production time measurement of the prepositional phrase *zur Wiederherstellung der Hochkonjunktur der Welt* was recorded.

The measurements recorded in this variable correspond to the equivalent variable *Total Production Time*. The measurement starts after the last keystroke immediately preceding the first target text word of the intervening text and stops with the last keystroke immediately preceding the next constituent of the target text equivalent of the source text metaphorical expression. In Example 3 given above, the measurement started after the last keystroke belonging to the first part of the target text equivalent, that is *große Schritte*, and ended with the last keystroke preceding the production of the next part of the target text expression, which is *machen*. All text production in-between those two textual units was measured as part of the syntactic interruption.

Participant Group (categorical): Participants are categorized according to two specific group membership characteristics: language and year of study. Language indicates whether the participant belonged to the Norwegian- or the German group. The second characteristic indicates whether the participant was in his or her 1st, 2nd, or 3rd year of studies when participating in the study.

1st year students who participated twice in the study (beginning and end of 1st year) belong to two groups, one for each participation.

In the following, the statistical method employed to analyze the data captured by the different variables will be introduced.

3.5.2.2 Statistical Method: Regression analysis

Sjørup observes that

> one of the benefits of a regression model is that the model makes it possible to carry out experiments with authentic texts rather than texts constructed specifically for the purpose of an experiment. The differences in variables such as text length, word frequency and length may be taken into account in this type of statistical model, permitting the researcher to use a more ecologically valid experimental setup. (2013, p. 113)

In addition to investigating effects of specific variables, regression models enable researchers to predict the values of one variable (*DV*, dependent variable) from one or more other variables. In a majority of statistical analysis, these variables are referred to as independent variables or explanatory variables (*cf.* Section *3.5.2.1*). However, in regression analysis, variables which are assumed to effect the outcome of the dependent variable are called predictor variables, because they are considered to predict the outcome of the dependent variable as opposed to being analyzed as causing an effect on the dependent variable (Field, 2009, p. 7). Henceforth, to accommodate the specific type of statistical method chosen for this study (i.e., regression analysis), the explanatory variables established in the previous sections will be referred to as *predictor variables*. Due to its predictive character, regression analysis exceeds the explanatory power of the collected data and increases generalizability of the findings (Field, 2009, p. 198). Thus, regression analysis is considered advantageous for the present study for two reasons: the inclusion of variables which support ecological validity (Sjørup, 2013) as well as its strength in terms of potential generalizability.

A multiple regression model allows for a controlled and targeted introduction of a number of predictor variables into a model. However, substantial consideration should be paid to the manner of entering the variables, which, ideally, should be based on sound theoretical evaluations. In *hierarchical regression,* predictors can be divided into two categories: known, existing predictors which are based on previous research, and new explorative predictors which are meant to extend models developed in previous research. Field remarks that "as a general rule, known predictors (from other research) should be entered into the model first in order of their importance of predicting the outcome" (2009, p. 212). Predictors may also be entered in their entirety all at once. This method is referred to as *forced entry* and does not require the researcher to make decisions regarding a hypothetical importance of predictors in terms of their particular influence on the dependent variable. S*tepwise regression* is based on mathematical evaluations by statistics software, which evaluates predicted effects and assesses the order of predictors entered into the model based on these evaluations.

Since the analyses at hand are, to a large extent, based on previous research (Sjørup, 2013) and an extension of this previous research, it was decided to employ *hierarchical regression*. Predictors originating in or conforming to those in Sjørup's research are entered into the model first, before new, explorative predictors, which accommodate the methodological approach and the overall research aim of the present study (e.g., *Participant Group, Syntactic Disruption Total Production Time* etc.) are added. Furthermore, predictors are added blockwise according to a number of different considerations (e.g., thematic affiliation, research questions). The following table gives an overview of the order in which the variables are entered into the model.

Table 4: Blockwise hierarchical regression model

block	predictor variable	explanation
1.	*TS Lex/TS Conc*	These predictors conform to Sjørup's translation strategy types.
2.	*Normalized Frequency*	This predictor conforms to Sjørup's mean familiarity.
3.	*Revision* *Sentence Final* *Sentence Initial*	These predictors originate in Sjørup, and have not undergone any changes.
4.	*Syntactic Disruption Total Production Time* *Preceding Pause Duration* *Total Keystroke Count* *Final Character Count* *Total Task Time* *User Events Per Minute*	These predictors are added for the sole purpose of the present research project. Except for *Preceding Pause Duration* and *Syntactic Disruption Total Production Time*, all predictors in this block concern physical measurements of working speed.
5.	*Participant Group*	This predictor has been added to the research since the overall aim of the project is to investigate differences between subject groups (research questions 2a and 2b).

The predictor variables are added into the model in five blocks. Blocks 1, 2, and 3 contain predictors originating in Sjørup's research, and are listed hierarchically in order of their assumed effect on the dependent variable *Total Production Time*. Hence, the choice of translation strategy type in Block 1 is considered more useful in terms of predicting the dependent variable than *Normalized Frequency* etc. Blocks 4 and 5 contain predictor variables which are added for the purpose of this particular study. Additional information on the inclusion of the predictor variables in the regression model is given in the rightmost column.

3.6 Summary

This chapter introduced key concepts and definitions of constructs (e.g., translation strategy) that have been implemented in the study. The data collection process and methods have been explained in detail (e.g., software, participant groups), and theoretical foundations for methodological decisions (e.g., the measurement of normalized frequency) have been presented. Finally, the statistical method (regression analysis) and the variables have been introduced. Thus, the foundation for the presentation of the results in the next chapter has been laid.

4. Results

This chapter presents the results of the analyses aiming to answer the following research questions:

1. Which metaphor translation strategy types do the different subject groups select?

1a. Are there differences or similarities between the groups according to their advancement in the study program (1st, 2nd, 3rd year)?
1b. Are there differences or similarities between the two different L1 groups (Norwegian, German)?

2. What is the relationship between production time and translation strategy?

2a. Do these results vary across the subject groups according to their advancement in the training program?
2b. Do these results vary across the subject groups according to the target language (Norwegian, German)?

According to the research questions, the chapter is divided into the presentation of the results in two sections: analysis 1 answering research question 1 (a, b) and analysis 2 answering research question 2 (a, b). Research questions 3 and 4 will be addressed in Chapter 5.

4.1 Analysis 1: Translation Strategy Types

In this section the results from analysis 1, the analyses of types of translation strategies as described in Section *3.4.2*, are reported. The results are presented for each language group (Norwegian, German) separately. Furthermore, the analyses are divided into the two different superordinate types of strategy categories: linguistic translation strategy types and conceptual translation strategy types. The aim is to give a comprehensive overview of similarities and/or changes on the linguistic as well as on the conceptual level, which, in turn, is assumed to influence translation processes as measured by production time in analysis 2.

4.1.1 Norwegian participant group

The group consists of ten participants: four 1st year students, three 2nd year students, and three 3rd year students. The data set comprises 658 tokens: 14 translations of the 47 metaphorical expressions. The four 1st year students translated the text twice, once at the beginning and once at the end of their first year of studies. Hence, there are 14 translations. Tables 5 and 6 below give a general overview of the data set and its composition.

Table 5: Token distribution Norwegian data set

participant group	n	%
Norwegian_1stYear_Beg	188	29
Norwegian_1stYear_End	188	29
Norwegian_2ndYear	141	21
Norwegian_3rdYear	141	21
Total	**658**	**100**

The data set consists of 658 observations of translation strategy types (linguistic and conceptual) applied to the 47 metaphorical expressions. Of these 658 observations, 58% (2 x 29%; 376 tokens) are derived from the translations of the 1st year students, and 21% (141) from the 2nd and 3rd year students respectively.

Table 6: Distribution linguistic translation strategy types-NOR

TS linguistic	n	%
M-M	205	31
M1-M2	116	18
M-D	156	24
M1-D1	36	5
M-PP	87	13
DEL	30	5
M-M/Del	5	1
MX-MY	1	0
M1X-M2Y	8	1
MX-DY	9	1
NT	5	1
Total	**658**	**100**

In the Norwegian data set, 11 different linguistic translation strategy types were observed. Table 6 displays the distribution of the 658 observations among those 11 strategy types. For example, the strategy M-M, a word-to-word translation, is represented in 31% of the cases, that is with 205 observations, regardless of participant group.

Table 7 reports the results for the analysis of the distribution of the linguistic translation strategy types per participant group.

Table 7: Crosstabulation linguistic translation strategy types per participant group-NOR

			Translation Strategy (linguistic)											Total
			M-M	M-D	M1-M2	M-PP	M1-D1	DEL	M1X-M2Y	M-M/DEL	MX-DY	NT	MX-MY	
Participant Group	1stYear_Beg	n	59	52	29	23	12	7	2	0	2	1	1	**188**
		%	31	28	15	12	6	4	1	0	1	1	1	**100**
	1stYear_End	n	52	43	37	28	10	12	1	1	3	1	1	**188**
		%	28	23	20	15	5	6	1	1	2	1	1	**100**
	2ndYear	n	54	30	24	14	5	5	2	3	2	2	2	**141**
		%	38	21	17	10	4	4	1	2	1	1	1	**100**
	3rdYear	n	40	31	26	22	9	6	3	1	2	1	1	**141**
		%	28	22	18	16	6	4	2	1	1	1	1	**100**
Total		**n**	**205**	**156**	**116**	**87**	**36**	**30**	**8**	**5**	**9**	**5**	**5**	**658**
		%	**31**	**24**	**18**	**13**	**5**	**5**	**1**	**1**	**1**	**1**	**1**	**100**

The left hand column displays the different participant groups: 1st, 2nd, and 3rd year students. As mentioned previously, the 1st year students participated twice: once at the beginning of their first year in the program (October 2014), and once at the end of their first year (end of April 2015). Thus, the results for this group reported in the table depict the translation behavior of the same students at two different points in time: at the beginning of their studies (Beg) and at the end of their first year (End). The groups of 2nd and 3rd year students consist of different students. The upper row displays the 11 different linguistic translation strategy types identified in this data set in the order of selection (for an in-depth description of the strategy types see Section *3.4.2*). The subsequent rows give both actual counts and percentages for each translation strategy type per specific participant group, while the respective columns display actual counts and percentages per translation strategy type for all participant groups.

From this point forward, the term *selection* (and its respective verb forms) are used to describe the translation behavior of the participants regarding the translation strategy types. This does not imply that the participants consciously and actively selected a translation strategy type during the translation of the metaphorical expressions (*cf.* Section *3.4.1*, definition of construct translation strategy). The term is rather chosen to highlight that, at any given point in the translation process, there were other options available to them (e.g., any of the other strategy types identified in the material). Whether these options were consciously considered or not is not of importance here. The following sections will first give an account of the results of the analyses per participant group, before presenting results across participant groups.

Both at the beginning and at the end of their first year, the 1st year students display a clear preference for the word-to-word translation strategy type M-M (31% and 28%). This is followed closely by the M-D strategy (28% and 23%), which represents a change of conceptual mapping and lexis, a completely new metaphor in the target text so to speak. Only at this point do first year students resort to the M1-M2 strategy, where there is no change at the conceptual level, but a change in lexis (15% and 20%). Finally, paraphrasing into non-metaphorical language (M-PP) is selected in 12% and 15% of the cases, while complete deletion (DEL) is adopted as a strategy in only 4% and 6% of the cases. It is noticeable that, although still low in comparison to the other strategy types just mentioned, the number of complete deletions has almost doubled from the first point of observation (Beg) to the second point of observation (End). In terms of application, the following order of application of strategy types can be concluded for the 1st year students, both at the beginning and at the end of their first year: M-M → M-D → M1-M2 → M-PP → M1-D1 → DEL. The remaining strategy types display minor numbers of occurrences.

The 2nd year students display the same order of selection as the 1st year students. With 38%, the translation strategy type M-M is selected most often by this group. There is a significant gap to the next strategy type, which is M-D with 21%, followed by M1-M2 with 17%, paraphrasing (M-PP) with 10% and M1-D1 and DEL with 4% respectively. All other strategy types occur in low numbers.

The 3rd year group exhibits similar tendencies as the two previous groups. The M-M strategy is selected in 28% of the cases, followed by M-D (22%), M1-M2 (18%), M-PP (16%), M1-D1 (6%), and finally DEL with 4%.

Summing up, there is a clear tendency of all participant groups to resort to the word-to-word strategy type (M-M) more often than to any other strategy type. The quantitative order of selection for all strategy types is as follows:

1. M-M
2. M-D
3. M1-M2
4. M-PP
5. M1-D1
6. DEL
7. MX-DY, M1X-M2Y, M-M/DEL, NT, MX-MY

Differences between the remaining five strategy types are so small that they are collapsed into one category.

Although the order of selection is identical for all participant groups, there are, however, some noticeable differences when comparing the groups to each other. Firstly, the 2nd year group resorts to the M-M strategy type more often than the 1st year group (beginning and end) or the 3rd year group. Secondly, the M-D strategy type, which is assumed to be selected more often by advanced translators (Jensen 2005) and to require increased cognitive effort (Sjørup 2013), is chosen more often by the 1st year beginners group than by any other group. Finally, deletion strategy types (DEL, M-M/DEL), which Jensen assumes are preferred strategy types for inexperienced translators, are located on the lower end of the order of selection, that is chosen rarely by all participants, irrespective level of experience.

A correlation test reveals significance only for the correlations between the 2nd year group and the strategy variables M-M and M-M/DEL (Appendix J). In other words, there is a correlation between the number of times these strategy types were selected and the affiliation of the participants to this participant group. Looking at adjusted residuals, this correlation can be explained in more detail (Appendix J). Adjusted residuals assess the strength of the difference between observed and expected counts (if the null hypothesis were true) in a data set. A score equal or greater than -1.96/1.96 indicates a significant difference between the two counts. A negative deviation points toward under-representation, while a positive score indicates over-representation. The adjusted residuals for the translation strategy types M-M and M-M/DEL exhibit a score of 2.1. Thus, the positive deviation implies that there is an over-representation of these translation strategy types for this particular group, meaning that this group selected these two strategies more often than could have been expected from the overall data.

Moving on to the conceptual level, Table 8 displays the frequency data for the conceptual translation strategy types. The types of conceptual strategies comprise varying numbers of linguistic translation strategy types (see Section *3.4.2*). Linguistic translation strategy types under the heading of similar conceptual mappings in source- and target text expressions (M-M) are represented in 51% of the observations in the data set. Thus, in about half of the translations of all metaphorical expressions by all participants there was no conceptual change involved.

Table 8: Distribution conceptual translation strategy types-NOR

TS conceptual	n	%
M-M	335	51
M-D	201	31
M-PP	87	13
DEL	30	5
NT	5	1
Total	**658**	**100**

In 31% of the cases, change into another conceptual mapping occurred (M-D), whereas in 13% of the cases the translation resulted in a conceptual demetaphorization into non-metaphorical language (M-PP). With respectively 5% and 1%, strategy types of deletion (DEL) and non-translation (NT) constitute a small fraction of the data set.

Table 9 provides an overview of the conceptual translation strategy types per participant group. The upper row displays the translation strategy types based on differences and similarities of conceptual mappings: similar conceptual mappings (M-M), different conceptual mappings (M-D), paraphrase (M-PP), deletion (DEL), and non-translation (NT). Each conceptual strategy type consists of a number of specific linguistic strategy types. The conceptual type M-M for example consists of the linguistic strategy types M-M, M1-M2, MX-MY and M1X-M2Y. The order in which the conceptual strategy types are listed in the table (from left to right), is also the order of selection of conceptual strategy types for all participant groups (most selected to least selected).

Table 9: Crosstabulation conceptual translation strategy types per participant group-NOR

			Translation Strategy (conceptual)					Total
			M-M	M-D	M-PP	DEL	NT	
Participant Group	1stYear_Beg	n	91	66	23	7	1	**188**
		%	48	35	12	4	1	**100**
	1stYear_End	n	91	56	28	12	1	**188**
		%	48	30	15	6	1	**100**
	2ndYear	n	83	37	14	5	2	**141**
		%	59	26	10	4	1	**100**
	3rdYear	n	70	42	22	6	1	**141**
		%	50	30	16	4	1	**100**
Total		**n**	**335**	**201**	**87**	**30**	**5**	**658**
		%	**51**	**31**	**13**	**5**	**1**	**100**

It becomes apparent that linguistic strategy types which do not include any change of conceptual mapping (M-M) are selected most often by all groups. Even though, as shown in Table 6, the linguistic translation strategy type M-D is ranked second in the order of selection for all groups (above other strategies which include various linguistic changes), the sum of translation strategy types indicating no change of conceptual mapping outranks the ones indicating a change of conceptual mapping. The metaphorical translation strategy types (M-M, M-D) are followed by two non-metaphorical types in the following order: paraphrasing (M-PP), deletion (DEL). Non-translation (NT), where there is no change on either level, is the least preferred by either group.

Testing for correlation between the quantitative selection of the different strategy types and the participant groups, significance cannot be established beyond $p \leq .05$ for any of the variables. There is no significant correlation between the amount of selection of conceptual translation strategy types and the affiliation to a specific group of participants, that is the advancement in the study program. However, looking at adjusted residuals once more, the 2nd year group exhibits significant deviation for the translation strategy category M-M (see Appendix K). A positive score of 2.1 implies that there is over-representation of this translation strategy type for this particular group. In other words, this group selected strategies which do not include a conceptual change from source- to target text more often than could have been expected from the data in general.

In conclusion, all Norwegian participant groups select the word-to-word linguistic translation strategy type most often. This is followed by a change of metaphor from source- to target text. Not until this point are different linguistic as well as conceptual changes selected. Paraphrasing appears to have a central role in the translations of all groups in that it is high up on the list of selection. Deletion occupies a middle position. Analyses of the conceptual category of strategy types confirm that strategy types pertaining to conceptual similarity between source- and target text are preferred by all groups, followed by conceptual changes, paraphrasing, and deletion. Thus, relief strategies like paraphrasing and deletion (*cf.* Jensen 2005, Sjørup 2013) are selected less often by all groups. Statistical significance could not be established between the amount of selection of the strategy types and participant groups. This indicates that the groups in general behave rather similar. The 2nd year group does however stand out in that the participants of this group select specific strategy types related to similar conceptual mappings more often than could be expected from the data set.

The results of the analyses for the German participant group are presented in the next section.

4.1.2 German participant group

The group of German participants consists of 17 students: eight 1st year students, four 2nd year students, and five 3rd year students. One of the 1st year students did not participate in the second round of experiments in July 2015. The initial translation by this student in November 2014 is however included in the data set. Therefore, the complete data set consists of 1128 observations: 24 translations of the 47 metaphorical expressions. Tables 10 and 11 summarize the general composition of the data set.

Table 10: Token distribution German data set

participant group	n	%
German_1stYear_Beg	376	33
German_1stYear_End	329	29
German_2ndYear	188	17
German_3rdYear	235	21
Total	**1128**	**100**

Of the 1128 observations, 62% (33%, 29%; 705 tokens) originate from translations by the 1st year students. Another 17% are derived from the translations of the 2nd year group and 21% from translations of the 3rd year group.

Table 11 displays the frequency distribution of the 1128 observations among the 12 observed linguistic translation strategy types in this data set.

Table 11: Distribution linguistic translation strategy types-GER

TS (Linguistic)	**n**	**%**
M-M	317	28
M1-M2	192	17
M-D	222	20
M1-D1	62	5
M-PP	179	16
DEL	89	8
M-M/DEL	14	1
MX-MY	2	0
M1X-M2Y	6	1
MX-DY	10	1
NT	19	2
M-M/NT	16	1
Total	**1128**	**100**

For example, a shift of conceptual mapping and lexis as indicated by the translation strategy M-D is represented in 20% of the observations (222 tokens) in the data set, regardless of participant group.

Table 12 reports the results for the analysis of the distribution of the linguistic translation strategy types per participant group in order of selection. The second row, 1stYear_End, is missing 47 observations (329 instead of 376), because one student did not return for the second experimental wave. The upper row displays the twelve linguistic translation strategy types identified in this data set. In addition to the eleven strategy types identified in the Norwegian data set and presented in the previous section, the German translation revealed the implementation of an additional translation strategy type: M-M/NT. This strategy consists of a word-to-word translation of one or several metaphorical item in a phrase, while one or several other metaphorical items were kept in the source language, that is English.

At both points in time (beginning and end of first year, the 1st year students exhibit a clear preference for the word-to-word translation strategy M-M (27%). The second most preferred strategy for this group is the replacement of the source text metaphor with a different metaphor in the target text (M-D, 19% and 20% respectively). Interestingly, the selection of the strategy types thereafter differs between the first translation of the text in November 2014 and the second translation in June/July 2015. During the first round of experiments, a change of lexis (M1-M2, 18%) was selected more often than paraphrasing into non-metaphorical language (M-PP, 15%). By the end of the year however, this tendency has marginally changed and the paraphrasing strategy (18%) is selected slightly more often than a change of lexis (17%). These strategies are followed by the deletion strategy (DEL, 9%), a change in conceptual mappings but similar lexis (M1-D1, 4% and 5% respectively). The remaining strategies range from zero to two percent.

Table 12: Crosstabulation linguistic translation strategy types per participant group-GER

			Translation Strategy (linguistic)												Total
			M-M	M-D	M1-M2	M-PP	DEL	M1-D1	NT	M1X-M2Y	M-M/DEL	M-M/NT	MX_DY	MX_MY	
Participant Group	1stYear_Beg	n	101	72	69	58	35	18	4	4	8	3	3	1	**376**
		%	27	19	18	15	9	5	1	1	2	1	1	0	**100**
	1stYear_End	n	89	67	56	58	31	13	4	1	3	4	2	1	**329**
		%	27	20	17	18	9	4	1	0	1	1	1	0	**100**
	2ndYear	n	60	36	27	24	12	16	4	0	3	4	2	0	**188**
		%	32	19	14	13	6	9	2	0	2	2	1	0	**100**
	3rdYear	n	67	47	40	39	11	15	7	1	0	5	3	0	**235**
		%	29	20	17	17	5	6	3	0	0	2	1	0	**100**
Total		**n**	**317**	**222**	**192**	**179**	**89**	**62**	**19**	**6**	**14**	**16**	**10**	**2**	**1128**
		%	**28**	**20**	**17**	**16**	**8**	**5**	**2**	**1**	**1**	**1**	**1**	**0**	**100**

The 2nd year students exhibit the same order of preference as the 1st year beginner students. The word-to-word strategy (M-M) is selected in 32% of the cases. This strategy is followed by the M-D strategy with 19% and the M1-M2 strategy with 14%. The paraphrasing strategy is with 13% the fourth most selected strategy type in this group. Evidently, the difference between M1-M2 and paraphrasing (M-PP) is quite small (1%). Deletion is selected scarcely (6%), but more often than non-translation (NT, 2%). The remaining strategy types exhibit low percentages ranging between zero and one percent.

In general, the 3rd year group follows the same pattern as the two previous groups. The M-M strategy type is the designated strategy (29%) followed by the change in conceptual mappings and lexis (M-D, 20%). For this group, however, there is no difference in selection of the M1-M2 strategy and paraphrasing. Both exhibit a percentage value of 17%. Finally, the M1-D1 strategy was chosen in six percent of the cases by this group, followed by deletion with five percent. The remaining strategies exhibit values between zero and three percent. Particularly the strategies involving image-schematic changes (MX-MY, M1X-M2Y, MX-DY) are scarce or non-existent in this data set.

In conclusion, all three participant groups show a clear tendency to select the word-to-word translation strategy (M-M) before any other strategy. The order of preference for all strategy types across groups is the following:

1. M – M (word-to-word)
2. M – D (different metaphor)
3. M1 – M2 (similar mapping, linguistic change)
4. M – PP (paraphrasing)
5. DEL (deletion)
6. M1 – D1 (different mapping, similar lexis)
7. NT, M-M/NT, M-M/DEL, MX-DY, M1X-M2Y, MX-MY

Due to the low percentages, the remaining six strategy types are combined into one ranking category.

In a comparison across groups, some interesting differences can be observed. Also in the German data set, the 2nd year group resorts to the M-M translation strategy type more often than the other groups. Interestingly, although differences are minor, the 1st year group, at both points in time, resorts to this strategy less than the 2nd and the 3rd year group (27% as opposed to 32% and 29%). For all three groups, a change in lexis (M1-M2) and paraphrasing (M-PP) are very close in terms of percentages. For the 3rd year group, these two strategies even exhibit the same numbers (17%). However, the 2nd year group resorts to paraphrasing less than the other groups (13% as opposed to 15/18% and 17%). Deletion is situated rather low on the order of selection for all groups. Non-translation (NT) is selected by the 1st year students in merely one percent of the cases, by the 2nd year students in two, and by the 3rd year students in three percent of the cases. The same applies to the hybrid strategy involving non-translation (M-M/NT). There is a minor increase from one to two percent from the 1st year students to the 2nd and 3rd year students. Finally, strategies involving image-schematic changes are (close to) non-existent in the German data set (MX-MY, M1X-M2Y, MX-DY). Statistically significant correlations between the amount of selection of the different strategy types and the individual participant groups cannot be established (Appendix L). An analysis of residuals reveals that the data of 2nd year group contains more instances of the selection of the M1-D1 strategy type (different mapping, similar lexis) than could be expected (adjusted residual 2.0), and the 3rd year group less instances of the deletion strategy type (adjusted residual -2.1) (see Appendix L).

Table 13 displays the frequency distribution of the conceptual translation strategy types for the German data set.

Table 13: Distribution conceptual translation strategy types-GER

TS (conceptual)	n	%
M-M	531	47
M-D	294	26
M-PP	179	16
DEL	89	8
NT	35	3
Total	**1128**	**100**

Conceptual translation strategy types involving similar conceptual mappings in the source- and target language are represented in 47% of the observations in the data set, and thus dominate the translations of the German students. Thereafter, changes in the conceptual mappings during the translation have been carried out in 26% of the cases, and paraphrasing in 16% of the cases. Strategies involving deletion stand for eight percent and non-translation in a mere three percent of the cases. The latter strategy types are selected the least by all participant groups. Table 14 reports on the distribution of the conceptual translation strategy types across the different participant groups.

Table 14: Crosstabulation conceptual translation strategy types per participant group-GER

			Translation Strategy (conceptual)					**Total**
			M-M	M-D	M-PP	DEL	NT	
Participant Group	1stYear_Beg	n	183	93	58	35	7	376
		%	49	25	15	9	2	100
	1stYear_End	n	150	82	58	31	8	329
		%	46	25	18	9	2	100
	2ndYear	n	90	54	24	12	8	188
		%	48	29	13	6	4	100
	3rdYear	n	108	65	39	11	12	235
		%	46	28	17	5	5	100
Total		n	531	294	179	89	35	1128
		%	47	26	16	8	3	100

The order of the translation strategy types in the table (from left to right) is also the order of preference for all participant groups from highest to lowest as established in the previous table. Differences between the groups are rather marginal. In all groups, strategy types pertaining to similar mappings (M-M) dominate the translations of the participants. The 2nd and 3rd year groups select metaphor changes (M-D), and non-translation (NT) more often than the two 1st year groups, who, in turn, select deletion (DEL) more often than the two more advanced groups. Significance could not be established for the correlation between the number of tokens per translation strategy type and the participant groups. Residual analysis shows significant negative divergence from the expected count for the deletion strategy for the 3rd year group (see Appendix M). This group appears to select deletion less than could be expected from the data set (adjusted residual -2.1).

In summary, strategy types pertaining to similar conceptual mappings in source- and target text are selected most often by the German participant groups, followed by changes in mappings. Paraphrasing dominates over deletion and non-translation. Thus, all groups turn to metaphorical solutions more often than to non-metaphorical realizations of the source text expression in the target text (M-PP, DEL). There are only marginal differences between the different groups. However, non-translation is present more often in the data of the most advanced group, the 3rd year group than in any other group. Deletion, on the other hand, is chosen more often by the less experienced 1st year groups.

4.1.3 Comparison Norwegian and German language groups

In general, the two language groups exhibit similar results. On the linguistic level, the four most selected strategy types (M-M, M-D, M1-M2, M-PP) follow the same order in both the Norwegian and the German data sets. While the German group selects deletion more often than the M1-D1 strategy, the Norwegian groups exhibit the opposite behavior. The only noteworthy difference is the selection of the non-translation strategy type (NT), which is high up on the order in the German data set, while its selection in the Norwegian data set is rather negligible. From the data, it is not possible to determine what causes this difference between the two language groups. One can only speculate about reasons. For example, non-translation may have been a specific part of the training component of the German participants, while it has not been addressed to the same degree in the Norwegian program.

On the conceptual level, both data sets are alike. Both language groups resort to strategy types pertaining to similar conceptual mappings more often than to different mappings. Non-metaphorical strategy types (paraphrasing, deletion) are selected less. Thus, participants select more metaphorical (M-M, M-D) than non-metaphorical strategy types (M-PP, DEL). The case of non-translation (NT) has been discussed above. Comparing the individual participant groups from each language group, an interesting observation can be made. The Norwegian 2nd year group stands out in that the participants exhibit a substantial increase in the selection of strategy types pertaining to similar mappings (M-M). The respective German group does not exhibit a comparable development. In general, however, the participant groups of the two language groups display comparable results. Differences compared to each other (e.g., 2nd year Norwegian and 2nd year German) as well as in terms of development from participant group to participant group (i.e., development from 1st year beginners to 3rd year group regarding a specific strategy type) are so small that they may be attributed to individual differences rather than to generalizable group differences.

4.2 Analysis 2: Production Time

The results of analysis 1 describe a general tendency of all participant groups in both language groups to resort to metaphorical translation strategy types, most often to strategies which retain the conceptual mapping of source text metaphorical expressions in the target text expressions (M-M). Non-metaphorical strategy types like paraphrasing (M-PP), deletion (DEL) as well as non-translation (NT) are selected less. This section reports the results of analysis 2, which is the analysis of the effect of the translation strategy types on production time for the different subject groups (*cf.* Section *3.5*). The specific research questions are repeated here:

2. What is the effect of translation strategy type on production time?

2a. Do these results vary across the subject groups according to their advancement in the training program?

2b. Do these results vary across the subject groups according to the target language (Norwegian, German)?

The analyses include the different predictor variables deemed relevant as presented and described in detail in Section *3.5.2*, and are based on subsets of the same two data sets that were explored in analysis 1. The subsets are limited to the translation of the 12 metaphorical expressions chosen for this analysis (*cf.* Section *3.5.1.1*). In line with the presentation of the results for analysis 1, results are first presented for the two language groups separately, before a comparison of the two is undertaken. In a first step, the characteristics of the subsets will be described.

4.2.1 Norwegian participant group

The group consists of four 1st year students, who translated the text at two different points in time, three 2nd year students, and three 3rd year students, resulting in 14 translations of each of the 12 expressions. The distribution of observations according to the different participant groups is listed in Table 15 below.

Table 15: Observation Token Distribution Norwegian Data Subset

participant group	n	%
Norwegian_1stYear_Beg	48	29
Norwegian_1stYear_End	48	29
Norwegian_2ndYear	36	21
Norwegian_3rdYear	36	21
Total	**168**	**100**

The data set consists of 168 observations, whereof 58% (2 x 29%, 96 observations) are derived from the translations of the 1st year students, and 21% (36 observations) from the 2nd and 3rd year students respectively.

At this point, it is necessary to discuss the implications of a low number of observations for the results of the statistical analyses, and therefore the implications such a low number has on the potential generalizability of the results. It has been discussed previously that the population to draw participants from for both data sets (number of students in the respective study programs) was rather low. As a consequence, few students participated in the study, and thus the number of observations which form the basis for the regression analyses is low as well (small sample size). This has an impact on statistical significance testing. Small sample sizes often cause non-significant statistical correlations and effects. If statistical significance is achieved, this is due to effect size. In other words, significant effects are large effects in small sample sizes, which, in many cases are untrustworthy, since a normal distribution cannot be readily assumed for small sample sizes. Generalizability is thus reduced for results obtained from studies with small sample sizes. On the other hand, statistically non-significant effects cannot automatically be dismissed from respective models, but need to be evaluated in the light of sample size. This highlights that this study is, in many aspects, an explorative study, which does not necessarily aim at generalizability of its results, but is rather looking for patterns, which may be investigated further. Non-significant p – values can therefore not automatically lead to the exclusion of variables. Re-testing with larger sample sizes, if possible, increases reliability of significance results. In the following, a distribution analysis of translation strategy types (both linguistic and conceptual category) similar to analysis 1 is conducted for this particular data subset.

Given that the subset for the present analysis is based on a selection of source text expressions (12 out of the 47), it contains observations conforming to seven different types of linguistic translation strategies. Thus, three of the 10 strategy types identified in the complete data set (MX-MY, M-M/Del and NT; *cf.* Section *4.1.1*) are not present in the subset, because they were not selected for any of the 12 metaphorical expressions that form the basis of this subset. Table 16 displays the distribution of the 168 observations across the seven strategy types and the four participant groups.

Table 16: Distribution Translation Strategy Type Linguistic per Participant Group-NOR

			Translation Strategy Type (linguistic)							
			M-M	M1-M2	M-PP	M-D	DEL	M1-D1	M1X-M2Y	**Total**
Participant_Group	1stYear_Beg	n	20	10	7	8	1	1	1	**48**
		%	42	21	15	17	2	2	2	**100**
	1stYear_End	n	13	13	9	7	4	1	1	**48**
		%	27	27	19	15	8	2	2	**100**
	2ndYear	n	19	7	5	4	0	0	1	**36**
		%	53	19	14	11	0	0	3	**100**
	3rdYear	n	10	10	7	7	0	1	1	**36**
		%	28	28	19	19	0	3	3	**100**
Total		**n**	**62**	**40**	**28**	**26**	**5**	**3**	**4**	**168**
		%	**37**	**24**	**17**	**15**	**3**	**2**	**2**	**100**

Comparable to the analysis of the complete data set, the strategy types are ordered according to their quantitative selection from left to right. The M-M strategy is represented the most in the subset with 62 observations in total (37%), while the M1-D1 strategy and the M1X-M2Y strategy are represented by a mere 2% (three and four observations respectively). The distribution across participant groups shows that there are considerable differences between the groups regarding the most represented strategy M-M. While the beginners group (1stYear_Beg) and the 2nd year group account for approximately 50% of the cases, the end group (1stYear_End) and the 3rd year group turn to this solution in less than a third of the translations (27% and 28%). Interestingly, the groups exhibit the same aggregation pattern, although with a less distinctive difference, also for the paraphrasing strategy (M-PP) and the M1-M2 strategy. With regard to paraphrasing, the beginners group and the 2nd year group show similar results (15% and 14%), while the end group and the 3rd year group display similarity with a value of 19% each. Thus, it appears as if the 1st year end group and the 3rd year group exhibit similar behavioral patterns. Deletion (DEL) has been selected exclusively by the 1st year group (5 observations), and particularly during their second round of translation (4 observations, 1stYear_End). It needs to be pointed out here that those four observations are evenly distributed across the four participants in this group, that is, each participant selected the deletion strategy once. None of the participants of the other groups deleted any of the 12 expressions in their translations. There are minor differences between the groups regarding translations selecting the M-D strategy ranging from 11% (2nd year) to 19% (3rd year). The 2nd year group selected this strategy the least, while the participants of the 3rd year group chose it more often than the other participants. The distribution of strategy types across participant groups follows a somewhat different pattern in this subset than in the complete data set. For example, there are only minor differences between the groups concerning the selection of the word-to-word strategy (M-M) in the complete data set, while, as pointed out, there are considerable differences in the subset. The subset has thus resulted in a different distributional pattern than found in the complete data set for the Norwegian language group.

The following table gives an overview of the distribution of the observations according to the classification into conceptual translation strategies within this data subset.

Table 17: Distribution Translation Strategy Type Conceptual per Participant Group-NOR

			Translation Strategy Type (conceptual)				
			M-M	M-D	M-PP	DEL	**Total**
Participant_Group	1stYear_Beg	n	31	9	7	1	**48**
		%	65	19	15	2	**100**
	1stYear_End	n	27	8	9	4	**48**
		%	56	17	19	8	**100**
	2ndYear	n	27	3	6	0	**36**
		%	75	8	17	0	**100**
	3rdYear	n	21	8	7	0	**36**
		%	58	22	19	0	**100**
Total		n	**106**	**28**	**29**	**5**	**168**
		%	**63**	**17**	**17**	**2**	**100**

The M-M strategy (conceptual similarity) exhibits the highest percentage value in total (63%) compared to the other strategy types. There are, however, minor differences between the groups. While the 2nd year group selects this strategy in three-fourths of the instances (75%), the 1st year end group and the 3rd year group resort to such translation solutions in little over half of the cases (56% and 58%). The tendency discussed for the previous table is replicated in this table: the 1st year end group and the 3rd year group exhibit similar behavioral patterns concerning this strategy type. Strategies requiring a conceptual change from one metaphor to another (M-D) are the least selected by the 2nd year group (8%) and the most by the 3rd year group (22%). There is little variation between the different groups regarding the paraphrasing strategy. Numbers range from 15% for the beginners group to 19% for the 3rd year group. As mentioned previously, deletion strategy types have been selected by the 1st year groups exclusively.

However, within these groups, the participants resort to deletion strategy types the least (2% and 8%).

In summary, for the translation of the 12 metaphorical expressions in this subset, strategy types pertaining to conceptual similarity between source- and target text (M-M) are selected most often by all groups, while deletion is chosen the least, and by the 1st year groups exclusively. The 2nd year group displays divergent results in that the M-M strategy type is chosen more often than by the participants of any other group, and that there is a clear preference for the paraphrasing strategy (M-PP) over a conceptual change (M-D).

In the following sections, the relationship between types of translation strategies and production time is explored employing stepwise hierarchical multiple regression analysis (*cf.* Section *3.5.2.2*). The analyses take into consideration the complete set of variables introduced by the model (*cf.* Section *3.5.2.1)*. Following the procedure for analysis 1, the analysis is divided into the two different superordinate strategy categories: linguistic and conceptual translation strategy types. The results are presented for the linguistic strategy types first.

4.2.1.1 Linguistic Translation Strategy Types

In line with the model presented in Table 4 in Section *3.5.2.2*, the variables were entered into the model in five blocks according to a number of criteria (e.g., based on previous research). In each block, new variables are added to previous ones. Thus, each additional block represents an extended model. A number of the individual strategy types were deleted from this particular analysis by the statistical software, because they were constants or exhibited missing correlations: MX-MY (image-schematic change), M-M/DEL (partial deletion) and NT (non-translation). The model summary below lists the variables which are included in each block and details the predictive power of the individual models with regard to the dependent variable *Total Production Time*.

Table 18: Model Summary Blockwise Regression Linguistic Translation Strategy Types-NOR

Model Summary

Model	Adjusted R Square	Sig.
1	.044	.038
2	.042	.051
3	.131	.000
4	.143	.001
5.1	.156	.000
5.2	.148	.001
5.3	.137	.001
5.4	.138	.001

1. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2

2. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency

3. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final

4. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Total_Keystroke_Count, User_Events_Per_Minute

5.1 Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_1stYear_Beg

5.2 Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_1stYear_End

5.3 Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_2ndYear

5.4 Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_3rd Year

The variables included in each model entered into the analysis in each block (1, 2, 3 etc.) are given below the summary table. The values of the *Adjusted R Square* refer to the scope of change in *Total Production Time* that can be predicted by the predictor variables in each model. The *Adjusted R Square* takes the number of variables into consideration which, according to the calculations, may predict the dependent variable. Therefore, it was decided to report this value instead of the corresponding simple *R Square*, which is a general value that can change with an increase or a decrease in number of predictor variables. The variables in model 1 account for 4.4% of the predicted variation in *Total Production Time* (adjusted R square .044), whereas the variables in model 2 account for 4.2% variation (adjusted R square .042), etc. Thus, the predictive power of the model decreases slightly by adding the variable *Normalized Frequency* in model 2, which means that model 1 possesses more predictive power than model 2. However, from there on, predictive power increases (although slightly) with each model, that is, the more variables are added for each model, the higher is the predictability of the values represented by the dependent variable *Total Production Time* up until the inclusion of the first participant group (1st year beginners group) in model 5.1 (15.6%). Interestingly, predictive power decreases again with the inclusion of the remaining participants groups. In general, however, predictive power does not exceed 15.6%, which is to be considered rather low. In conclusion, the model represented by block 5.1 possesses the highest predictive power of all the models analyzed in the different blocks. An ANOVA test reveals that all models are significant fits of the overall data if $p \leq .05$ (Sig.). In other words, the unity of predictor variables contributes to predicting the dependent variable *Total Production Time*, and the models are therefore considered valid.

The following analyses present the regression results for each model and explore in detail the relationship between the dependent variable *Total Production Time* and the predictor variables for the different linguistic translation strategy types given the additional predictor variables in each model. Regression coefficients measure the mean variability in *Total Production Time* for a change of one unit in a given predictor variable while all other predictor variables are fixed. As will become evident shortly, although the models are deemed significant (ANOVA), the majority of relationships between individual predictor variables and the dependent variable *Total Production Time* are statistically non-significant. This may indicate that the specific predictor variable is not a meaningful addition to the model, or it may be a result of the relatively low number of observations in the data set in general. Significance values refer to the specific relationships between one predictor variable and the dependent variable. However, there may be an amalgamation effect of several predictor variables added to the model in one block, which may explain the significance results for the individual models. In addition, the inclusion of additional predictor variables may have an effect on already existing variables in the model, which is interesting to explore in itself. Such effects are not covered by the individual significance calculations. Non-significant predictor variables will therefore not be excluded from the analyses, but used to describe what can be interpreted as general tendencies in terms of change of not only the dependent variable *Total Production Time*, but other predictor variables as well.

Unstandardized B – values refer to the individual contribution of each predictor variable (e.g., linguistic translation strategy type) as a predictor of the dependent variable *Total Production Time*, if the predictor variable is increased by one unit. Positive values refer to a positive effect on the dependent variable, whereas negative values indicate a negative effect. Thus, the values specify an increase (positive values) or decrease (negative values) of *Total Production Time* in milliseconds.

In all models, the variable representing the strategy type M-M (word-to-word strategy) is not included in the tables. This particular linguistic strategy type has been chosen to represent a reference strategy, which all other strategy types are compared to. This is based on two theoretical considerations: Firstly, it is assumed that strategy types that do not require a conceptual change from source- to target text expression and little or no variation in vocabulary, exhibit lower production time values than any other strategy types (*cf*. Sjørup 2013). This particular strategy type does not require any conceptual changes and no (or very few) changes to the lexis. It is thus assumed to require the least production time. Secondly, the quantitative analysis presented in Table 16 identifies this particular strategy type as the (or one of the) most selected strategy types in all participant groups. Thus, an interdependency between amount of strategy selection and production time is assumed. The values displayed for the remaining strategy types are calculated based on a comparison to the values of the reference strategy. Furthermore, the strategy variables in all following tables are listed according to the order of selection established for the complete data set in analysis 1, starting with the most selected strategy (after the reference strategy M-M), which, in the present case, is M-D. It has been decided to present the order according to analysis 1, and not according to the order in the subset, because the former represents a more comprehensive picture of the translation behavior of the participants of this study. Furthermore, the 12 expressions have been chosen based on a different variable (*Normalized Frequency*), and not based on type of translation strategy.

For the sake of clarity and readability, models 1 to 3 are given in Appendix N, and the results of the analyses are briefly summarized here. Starting from model 4, which includes all predictor variables except the individual participant groups which are added in model 5, the analyses will be presented in-depth.

Model 1 represents the most basic model in the analysis consisting of the different linguistic translation strategy types (predictor variables) represented in the subset (*cf.* Table 63, Appendix N). For example, with each additional token, production time for expressions translated by selecting the M1-M2 strategy (similar mappings, different lexis) is predicted to increase *Total Production Time* by almost 16 seconds (15546.135 *ms*). This strategy is selected less than the word-to-word strategy (M-M) by the Norwegian participants, and is marked by an increase in production time. The same tendency (increase) applies to the strategies M-PP, M-D, and M1-D1. The values for these strategy types are positive indicating an, at times rather substantial, increase in predicted production time values. However, this increase in production time does not concur with the quantitative order of selection, that is, the strategy types selected less do not exhibit larger production time values. According to Sjørup (2013), translators appear to select strategies that are marked by smaller production time values more often than strategies which require longer production time. In model 1, predicted production time for the paraphrasing strategy (M-PP) increases less than the more selected strategy M1-M2. Furthermore, other strategy types further down the order of preference exhibit negative *B-values*, indicating that these strategy types are expected to reduce predicted production time, although they are less selected. Only two of the predictor variables, M-D (different mappings, different lexis) and M1-D1 (different mappings, partly same lexis) show significance if $p \leq .05$. The remaining effects of the linguistic translation strategy types on *Total Production Time* are statistically non-significant, that is, chances are high that there is no relationship between the two variables in question in the present data set. In other words, the values of the one cannot readily be used to predict the values of the other. However, as mentioned previously, with the inclusion of additional predictor variables in the following models, the predictor variables of model 1 may undergo changes which are worthwhile to describe.

In model 2 (Table 64, Appendix N), the variable *Normalized Frequency* as a measurement of metaphor conventionality is introduced into the model. In this and the following analyses, the effect of the newly added predictor variable/variables of each block and *Total Production Time* will be explored first, before a potential change of the different translation strategy variables is described. The effect of *Normalized Frequency* on predicted production time is negative, that is, with an increase in the measurement of normalized frequency, production time is predicted to be reduced by a little more than half a second (639.539 *ms*). Thus, the higher the normalized frequency value, and thus the more conventional the use of a source text expression is assumed to be in English, the faster it is predicted to be translated into Norwegian. The introduction of *Normalized Frequency* into the model has an impact on the different strategy variables as well. Predicted production time values decrease slightly for the three most selected strategy types M1-M2, M-PP and M-D, and substantially for the

M1X-M2Y strategy. As in the previous model, only the strategy variables indicating a conceptual change from source- to target text (M-D and M1-D1) exhibit significant p – values below the .05 mark.

In model 3 (Table 65, Appendix N), the predictor variables *Revision*, *Sentence Initial* and *Sentence Final* are added. If a target text expression is revised, production time is predicted to increase by just over 2 minutes (130143.685 *ms*). This positive relationship between the predictor variable and the dependent variable is perhaps not surprising given that returning to and changing parts of the text after an initial production phase requires additional time. Thus, it is not surprising either that the relationship between the two variables is statistically highly significant (p ≤.001). It is therefore more interesting to look at the two other predictor variables in this block, *Sentence Initial* and *Sentence Final*. They have the opposite effect on predicted production time. When source text expressions are located at the beginning of a sentence, production time increases by about 12 seconds (12405.013 *ms*), whereas it decreases with 21 seconds (-21285.187 *ms*) when the expression is located at the end of a sentence. Thus, although the effect is not substantiated by a significant p – value, Sjørup's claim that "participants would engage in more planning and deliberation activities when initiating production of a sentence" (2013, p. 129) as opposed to finalizing a sentence is supported by the present data.

There is an interesting development to be observed when looking at the strategy variables. In this model, the relationship between the effect of the strategy variable M1-M2 changes direction. While in the two previous models, production time values increase for this strategy type, they now decrease. This implies that the newly introduced variables in this model, revision and the position of the source text expression in the sentence, have a considerable negative effect on production time of target text expressions that were translated by selecting this strategy type.

Model 4 (Table 19) represents the model which includes all predictor variables except for the group variables (model 5). A number of variables related to the physical production process are added in model 4. *Preceding Pause Duration* is not considered evidence of physical production speed, but is added to this model, since it is a new variable, which is not based on previous research (i.e., Sjørup) (*cf*. Section *3.5.2.2*). Two of the variables added in this block have little effect on predicted production time. *Preceding Pause Duration* increases production time values by merely .549 *ms* and *Total Task Time* by a mere .006 *ms*. These correlations are not statistically significant either (p = .104, p = .767). The variables *Total Keystroke Count* and *Final Character Count* exhibit a positive effect on the dependent variable. With each additional keystroke used to produce an expression, production time is predicted to increase by half a second (499.574 *ms*). For each additional character constituting the final target text expression, production time increases by about 4 seconds (3666.125 *ms*). None of those relationships are statistically significant.

*Table 19: Multiple regression analysis TS_LEX – model 4-NOR**

Model		Unstandardized B	Sig.
4	(Constant)	40267.494	.759
	TS_LEX_M_D	35354.408	.306
	TS_LEX_M1_M2	-18069.648	.548
	TS_LEX_M_PP	-18571.522	.581
	TS_LEX_M1_D1	149167.239	.077
	TS_LEX_DEL	1419.369	.982
	TS_LEX_M1X_M2Y	-28848.178	.691
	Normalized_Frequency	-1139.671	.220
	Revision	119106.689	.000
	Sentence_Initial	7327.851	.811
	Sentence_Final	-10903.040	.770
	Preceding_Pause_Duration	.549	.104
	Total_Keystroke_Count	499.574	.468
	Final_Character_Count	3666.125	.730
	Total_Task_Time	.006	.767
	User_Events_Per_Minute	-693.742	.527

*Dependent variable: *Total_Production_Time*

Finally, *User Events Per Minute* has a negative effect on production time. An increasing value of this predictor variable reduces the predicted time value by about half a second (693.742 *ms*). At first sight, this effect may appear rather surprising given that an increase in average keyboard activity might be expected to increase production time. However, looking at the analysis, it appears that the more keys participants hit on average per minute, the faster they produce target text expressions. Since the variable *User Events Per Minute* measures average working speed of the participants, it is not surprising that the more keyboard activity is registered per minute, the faster expressions are translated. Increased keyboard activity is considered a marker of increased working speed.

Regarding the different strategy variables in this model, the effect of the deletion strategy is reversed into a positive effect (1419.369 *ms*). Since *Preceding Pause Duration* in itself has little effect on production time, it is unlikely to assume that this variable stands for the altered development of the deletion strategy. It is rather plausible to assume that those observations which include keystroke counts for this strategy type (that is when attempts were made to translate the expression in the target text, but eventually the expression was discarded from the translation), turn the effect into a positive one. The other strategy variables remain largely unchanged by the introduction of the additional variables in this model. Time values vary ever so slightly from the previous model, effect types (positive, negative) however stay unaltered, which results in the same tendency in terms of the order of selection. Some of the less selected strategy types exhibit lower production time values than other, strategy types which are represented more often.

Models 5.1, 5.2, 5.3 and 5.4 represented in Tables 20, 21 ,22 and 23 introduce the final variables, the different participant groups. These models explore what effect the affiliation to a specific participant group, and thus the progress in the study program, may have on production time. The groups are introduced each by each in order to explore predicted effects for each group individually.

In model 5.1 (Table 20) participant group 1, the 1st year beginners group, is added. The group has a considerable positive effect on predicted production time, 43 seconds (43006.892 *ms*). The effect is, however non-significant ($p = .069$). Regarding the specific translation strategy types, the deletion strategy increases its value considerably from about 1 second in model 4 (1419.369 *ms*) to 8 seconds (8216.958 *ms*). Thus, this group increases production time when choosing this strategy, which indicates that the participants spend some time on those expressions before finally deciding to omit them from the target text. This is also in line with the observations in Table 16, that this strategy type is selected by participants of the two 1st year groups exclusively. The remaining strategies exhibit very little to extremely little change compared to the previous model.

*Table 20: Multiple regression analysis TS_LEX – model 5.1 Participant Group 1st year beginners-NOR**

Model		Unstandardized B	Sig.
5.1	(Constant)	73271.331	.587
	TS_LEX_M_D	36641.926	.285
	TS_LEX_M1_M2	-12630.488	.674
	TS_LEX_M_PP	-15167.172	.650
	TS_LEX_M1_D1	145572.788	.082
	TS_LEX_DEL	8216.958	.897
	TS_LEX_M1X_M2Y	-25765.847	.721
	Normalized_Frequency	-1135.456	.218
	Revision	114660.931	.001
	Sentence_Initial	5435.508	.858
	Sentence_Final	-7680.440	.836
	Preceding_Pause_Duration	.610	.071
	Total_Keystroke_Count	577.210	.399
	Final_Character_Count	3579.053	.734
	Total_Task_Time	-.001	.961
	User_Events_Per_Minute	-1123.161	.313
	Participant_group_1stYear_Beg	43006.892	.069

*Dependent variable: *Total_Production_Time*

In general, the order of the strategies in terms of selection does not initiate a positive increase in effect on predicted production time. Strategies characterized by conceptual sameness, but linguistic changes (M1-M2, M1X-M2Y) and the paraphrasing strategy (M-PP) have a reductive effect on production time, while strategies which comprise conceptual changes between source- and target text expression (M-D, M1-D1) increase predicted production time. The only statistically significant effect in this model is the effect of revision. The variable *User Events Per Minute* (average keyboard activity per minute), which in model 4 displayed a negative effect of about half a second, experiences an additional negative increase to more than a second (-1123.161 *ms*). The variables *Sentence Initial* and *Sentence Final* retain their opposing relation. The location of the source text expression at the end of a sentence expedites the translation of these expressions by approximately 8 seconds (-7680.440 *ms*), while translation slows down by about 5.5 seconds (5435.508 *ms*) when the expression starts a sentence.

Model 5.2 (Table 21) presents the results of the analysis for participant group 2, which is the 1st year end group.

*Table 21: Multiple regression analysis TS_LEX – model 5.2 Participant Group 1st year end-NOR**

Model		Unstandardized B	Sig.
5.2	(Constant)	40353.195	.758
	TS_LEX_M_D	39522.973	.253
	TS_LEX_M1_M2	-12352.892	.683
	TS_LEX_M_PP	-14534.037	.666
	TS_LEX_DEL	20592.152	.752
	TS_LEX_M1_D1	157852.914	.061
	TS_LEX_M1X_M2Y	-26491.709	.715
	Normalized_Frequency	-1081.834	.243
	Revision	117924.196	.001
	Sentence_Initial	5170.454	.866
	Sentence_Final	-12611.647	.735
	Preceding_Pause_Duration	.505	.136
	Total_Keystroke_Count	493.898	.472
	Final_Character_Count	3356.133	.751
	Total_Task_Time	.009	.648
	User_Events_Per_Minute	-738.721	.499
	Participant_group_1stYear_End	-33046.432	.170

*Dependent variable: *Total_Production_Time*

There are a few noteworthy changes to be observed for this group. In contrast to their first participation in the study at the beginning of their first year of studies (43006.892 *ms*), the participants exhibit now a negative effect of 33 seconds (-33046.432 *ms*) on predicted production time. Thus, the participants appear to translate faster than they did during the first round. The effect is however non-significant (*p* = .170). The positive increasing development of the deletion strategy seen during the first round of experiments continues. Predicted production time increases substantially from 8 seconds in model 5.1 to about 21 seconds (20592.152 *ms*) in the current model. The participants of this group appear to spend quite some time on the translation of expressions which are eventually erased from the target text, more so than during their first attempt on the translation at the beginning of their first semester. The M1-D1 strategy (conceptual change, partly same lexis) is marked by an increase of about 12 seconds compared to the previous analysis (145572.788 *ms* to 157852.914 *ms*). The remaining strategies follow the same development as in the previous model: strategies requiring conceptual changes during the translation process are marked by positive relationships to predicted production time, while solely linguistic changes and paraphrasing have a negative effect. The variable *User Events per Minute*, which is marked by a negative increase at the beginning of their studies, is now back to the approximate level of the value in model 4 (-738.721 *ms*), indicating that this group does not have any effect on this variable. While the variable *Sentence Initial* remains close to unchanged compared to the previous model, the negative value of the variable *Sentence Final* increases to 13 seconds (-12611.647 *ms*). Thus, the negative influence on predicted production time is larger for this group at the end of their first year than at the beginning of their studies. Except for the variable *Revision*, effects are statistically non-significant.

The third participant group, the 2nd year group (model 5.3, Table 22), exhibits a negative effect on predicted production time as well. Less so, however, than the previous group, the 1st year end group. The predicted production time value is reduced by 7 seconds (-7132.554 *ms*) as opposed to 33 seconds in the preceding model. Nonetheless, the effect is highly non-significant (*p* = .817). There is an interesting change to the value of the deletion strategy: it now carries a negative value (-221.044 *ms*), indicating that there is a decreasing effect on predicted production time. This is not surprising, since this group actually does not exhibit any tokens for this variable, that is, the participants of this group did not select this strategy. Effects are predicted effects calculated based on the complete data set. Thus, if a participant of this group would translate an expression selecting the deletion strategy, production time is predicted to decrease.

*Table 22: Multiple regression analysis TS_LEX – model 5.3 Participant Group 2nd year-NOR**

Model		**Unstandardized B**	**Sig.**
5.3	(Constant)	50204.813	.717
	TS_LEX_M_D	34521.793	.322
	TS_LEX_M1_M2	-18408.913	.542
	TS_LEX_M_PP	-19580.853	.565
	TS_LEX_DEL	-221.044	.997
	TS_LEX_M1_D1	146524.894	.086
	TS_LEX_M1X_M2Y	-29425.128	.687
	Normalized_Frequency	-1143.370	.220
	Revision	118343.809	.001
	Sentence_Initial	7123.405	.817
	Sentence_Final	-10464.962	.780
	Preceding_Pause_Duration	.564	.103
	Total_Keystroke_Count	521.737	.454
	Final_Character_Count	3765.272	.724
	Total_Task_Time	.005	.792
	User_Events_Per_Minute	-801.902	.502
	Participant_group_2ndYear	-7132.554	.817

*Dependent variable: *Total_Production_Time*

The M1-M2 strategy increases negatively by about 4 seconds to -18 seconds as opposed to the two previous groups. Hence, the 2nd year group exhibits faster translation behavior for this strategy type. The remaining strategies show little change of values, and there are no changes to the direction of relation to predicted production time (positive or negative).The variables *Sentence Initial* and *Sentence Final* follow the same pattern as discussed earlier. The positive value for the former increases slightly (7123.405 *ms*), while the negative value for the latter decreases by about 2 seconds to -10 seconds (-10464.962 *ms*). Besides *Revision*, effects are statistically non-significant.

Finally, in model 5.4 (Table 23) the most advanced group, the 3rd year group is added to the model.

*Table 23: Multiple regression analysis TS_LEX – model 5.4 Participant Group 3rd year-NOR**

Model		Unstandardized B	Sig.
5.4	(Constant)	44712.585	.735
	TS_LEX_M_D	35599.992	.304
	TS_LEX_M1_M2	-18057.137	.549
	TS_LEX_M_PP	-17393.288	.607
	TS_LEX_M1_D1	149454.964	.077
	TS_LEX_DEL	-879.011	.989
	TS_LEX_M1X_M2Y	-27876.184	.702
	Normalized_Frequency	-1153.232	.216
	Revision	119577.626	.000
	Sentence_Initial	7925.346	.797
	Sentence_Final	-10122.884	.787
	Preceding_Pause_Duration	.556	.101
	Total_Keystroke_Count	486.051	.482
	Final_Character_Count	3587.831	.736
	Total_Task_Time	.004	.855
	User_Events_Per_Minute	-615.500	.582
	Participant_group_3rdYear	-11962.663	.705

*Dependent variable: *Total_Production_Time*

The group itself has a negative effect of 12 seconds (-11962.663 *ms*) on predicted production time. This is more than the 2nd year group but less than the 1st year end group. The effect is however largely non-significant (p = .705). With regard to the different strategy variables, the deletion strategy continues its negative development reducing predicted production time by close to 9 seconds. Thus, based on a zero token value, also this group is predicted to work faster when selecting this strategy. The value of the M1-M2 strategy is very close to the respective value of the 2nd year group (- 18 *s*). Thus, in relation to this strategy, both the 2nd and the 3rd year group decrease predicted production time slightly more than the two 1st year groups, which exhibit values of about – 12.5 seconds. The remaining strategy variables are hardly affected by the introduction of the 3rd year group and developmental patterns resemble the patterns discussed for the previous three models/groups. The variables *Sentence Initial* and *Sentence Final* exhibit virtually no change from the previous group, the 2nd year group. Compared to the two 1st year groups, the value for *Sentence Initial* has increased further by about 2 seconds (7123.405 *ms*), while the value for *Sentence Final* (-10464.962 *ms*) is smaller than for the end group (-12611.647 *ms*), but larger than for the beginners group (-7680.440 *ms*).

In conclusion, with regard to the linguistic translation strategy types, the quantitative order of selection of the strategies established in analysis 1 does not concur with a clearly definable development in terms of predicted production time. The less/lesser used strategies do not, by default, generate longer predicted production time values than the ones that are used more often. Overall, compared to the word-to-word strategy (M-M), the M1-M2 strategy (similar mapping, linguistic changes), paraphrasing (M-PP) and the M1X-M2Y strategy (similar mapping, linguistic changes, image-schematic change) exhibit decreasing effects (shortened production time), while conceptual and linguistic changes (M-D, M1-D1) increases production time (prolong production time). Deletion increases predicted production time for the two least experienced groups (1st year groups), while it decreases it for the two more experienced groups (2nd and 3rd year group). This deviation is most likely caused by a zero observation value in the data set for the latter two groups. However, strategy variables exhibiting negative effects cluster on the top end of the order of selection (M1-M2, M-PP). *Normalized Frequency* as an indicator of metaphor conventionality decreases predicted production time values slightly and constantly in all models, indicating that the more frequent the expressions are, the less time they require to translate. However, this appears to have little effect on the three most selected strategy variables M1-M2, M-PP, and M-D.

Revision, on the other hand, has a significant effect on predicted production time, which is not surprising given the fact that additional changes to draft translations require more time. The location of the source text expression at the beginning or the end of the sentence has a distinct relation to predicted production time in that it increases predicted time requirement when located at the beginning and decreases when located at the end. The measurements of preceding pause duration and physical text production speed have very little effect on predicted production time.

Finally, a comparison of all four participant groups discloses that the 1st year group is predicted to translate the slowest of all the four participant groups. Interestingly, when the same participants underwent the experiment anew at the end of their second semester, they produced the largest negative effect on predicted production time of all groups. This may be due to a memory effect, because these participants had translated the same text about nine months earlier. The 3rd year group translates faster than the 2nd year group. In general, strategies which are marked by a conceptual change from source- to target text are also marked with positive effects on predicted production time values, that is, these strategy types are predicted to slow down the translation process. Strategy types which involve only linguistic changes from source- to target text expression, on the other hand, carry negative values, indicating that predicted production time decreases when these strategies are selected. The effect of the variable *User Events Per Minute* is only noteworthy for the beginners group. For the remaining three groups, the value does not exhibit any change from model 4 (without any participant group) worth mentioning. The same applies to the variables that have not yet been mentioned in this analysis. These variables either do not have any effect on predicted production time whatsoever (e.g., *Total Task Time*, *Preceding Pause Duration*), or the introduction of the different participant groups does not have any considerable effect on these variables. In the following section, the analysis will be performed anew, taking into consideration the conceptual translation strategy types.

4.2.1.2 Conceptual Translation Strategy Types

The regression analysis for this category of strategy types follows the same steps, exploring the same models as the analysis for the linguistic translation strategy types. The strategy type M-M is a reference category and thus included in the analyses not as predictor variable but in the constant, which is the dependent variable *Total Production Time*.

Table 24 gives a detailed overview of the five blocks, the variables included in every block representing each model, and the respective calculations of predictive power. Model 5 is represented four times, once for each individual participant group. The variable non-translation (NT) has been removed by the statistical software due to the low number of observations. The *Adjusted R Square* values for each block indicate that there is a constant increase in predictive power of the models represented in each block. Model 1 predicts 4.6% (.046) of *Total Production Time* values, while model 5.1 (1st year beginners group) entails 16.2% (.162) predictive power. Models 5.2, 5.3 and 5.4 introducing the remaining participant groups, however, exhibit reduced predictive power falling below the level of model 4. In general, predictive power is low for each of the models. The ANOVA test for this analysis calculates significance for all blocks, that is, all models are significant fits for the complete set of data with values below $p \leq .05$.

Table 24: Model Summary Blockwise Regression Conceptual Translation Strategy Types – NOR

Model Summary

Model	Adjusted R Square	Sig.
1	.046	.013
2	.047	.018
3	.131	.000
4	.148	.000
5.1	.162	.000
5.2	.153	.000
5.3	.142	.000
5.4	.143	.000

1 Predictors: (Constant), TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP

2 Predictors: (Constant), TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency

3 Predictors: (Constant), TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final

4 Predictors: (Constant), TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Total_Keystroke_Count, User_Events_Per_Minute

5.1 Predictors: (Constant), TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_1stYear_Beg

5.2 Predictors: (Constant), TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_1stYear_End

5.3 Predictors: (Constant), TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_2ndYear

5.4 Predictors: (Constant), TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_3rd Year

Models 1 to 3 are to be found in Appendix O. Model 1 (Table 66), investigates the predictability of production time, as calculated from the reference strategy M-M, by the other conceptual translation strategy variables. The conceptual translation strategy types in all tables are ordered according to the order of selection for the complete data set established in Section *4.1.1*, starting with the most selected strategy types (after the reference strategy M-M) M-D and M-PP, which exhibit equal numbers. Both of these strategy types display positive predicted effects on production time, that is, production time is predicted to increase if one of these strategy types is selected, as opposed to the use of the strategy type M-M. In other words, in comparison to the retention of the conceptual mapping in the target text expression (M-M), changes to the conceptual mapping from source- to target text expression (M-D), or paraphrasing into non-metaphorical language (M-PP) are predicted to increase production time. However, while the M-D strategy is marked by a substantial increase, the paraphrasing strategy exhibits a relatively small increase. Although both strategy types have been chosen by the participants equally often, production time differs considerably. The deletion strategy, on the other hand, reduces predicted production time. In other words, source text expressions that are omitted from the target text, exhibit lower production time values than the conceptual retention strategy M-M. This is not surprising, since many observations included in the deletion variable carry a value of zero. However, due to the definition of this variable (inclusion of translation attempts which after all results in a deletion of the source text expression in the target text), predicted production time is only reduced partly and not completely. Only the predicted effect of the M-D strategy is statistically significant below the .05 level in this model ($p = .001$).

In model 2 (Table 67, Appendix O), the variable *Normalized Frequency* is introduced. The new variable itself has a small negative effect on predicted production time. The values of the M-D and the deletion strategy change marginally compared to the respective values in model 1, while the value for paraphrasing is reduced by almost half to less than 3 seconds. However, except for the M-D strategy, none of the effects are statistically significant in the model.

The introduction of the variables *Revision, Sentence Initial* and *Sentence Final* (model 3, Table 68, Appendix O) causes some interesting changes to the existing variables in the model. In this model, revision prolongs production time and the effect is statistically significant (p > .001). The location of source text expressions at the beginning of a sentence increases production time, while sentence final location leads to reduced production time values. With regard to the individual strategy types, the new variables cause two changes in direction: the paraphrasing strategy has now a reducing effect on production time, while the deletion strategy carries positive values, that is, its use causes prolonged production time values. It is difficult to determine which of the three additional variables in this model may contribute to these changes, but one may speculate that the negative turn of the paraphrasing strategy is caused by the location of these expressions at the end of the source text sentence, while the positive turn of the deletion strategy may be caused by a large amount of revision carried out on those expressions. The positive effect of the M-D strategy variables is statistically significant (p = .026).

*Table 25: Multiple regression analysis TS_CONC – model 4-NOR**

Model		**Unstandardized B**	**Sig.**
4	(Constant)	54074.782	.680
	TS_CONC_M_D	56983.137	.069
	TS_CONC_M_PP	-9285.073	.762
	TS_CONC_DEL	5425.211	.931
	Normalized_Frequency	-1285.087	.152
	Revision	116513.322	.001
	Sentence_Initial	5124.370	.864
	Sentence_Final	-900.387	.980
	Preceding_Pause_Duration	.608	.069
	Total_Keystroke_Count	463.956	.488
	Final_Character_Count	1627.666	.872
	Total_Task_Time	.004	.832
	User_Events_Per_Minute	-853.653	.433

*Dependent variable: *Total_Production_Time*

In model 4 (Table 25), *Preceding Pause Duration* and the measurements of physical working speed are added. All five variables have little to extremely little effect on predicted production time. *Preceding Pause Duration* and *Total Task Time* for example increase predicted production time by less than 1 millisecond. None of the effects are statistically significant.

The variable *Sentence Final* remains negative, but is reduced by almost 11 seconds to -.9 seconds (-900.387 *ms*) indicating that one or several of the new variables in this model have, although little effect on the dependent variable, a rather substantial effect on the variable *Sentence Final*. The paraphrasing strategy continues its negative contribution to predicted production time increasing the reduction by about 7 seconds to -9 seconds (-9285.073 *ms*). The effect of a conceptual change (M-D) is still positive, but the effect is no longer statistically significant (p = .069).

Model 5 (Tables 26, 27, 28 and 29) describes the contribution of the different participant groups to the prediction of production time. Model 5.1 (Table 26) presents the results of the analysis for the 1st year beginners group. This group has a substantial positive effect on predicted production time values with an increase of almost 45 seconds (44684.470 *ms*). Although close to the significance line, the group effect is non-significant (p = .057). Regarding the different strategy variables, the deletion strategy is most noteworthy. The value doubles from 5.5 seconds (5425.211 *ms*) in model 4 to 11 seconds (10731.457 *ms*) in the present model, prolonging predicted production time for target text expressions that were categorized as deletions. This indicates that this group spent a considerable amount of time on the translation of expressions that were eventually not included into the translated text. The effect is however highly non-significant (p = .863). The remaining two strategy variables are mainly unaffected by the introduction of the participant group as a variable into the model. Production time values are decreased by about 2 seconds compared to the previous model.

*Table 26: Multiple regression analysis TS_CONC – model 5.1 Participant Group 1st year beginners-NOR**

Model		Unstandardized B	Sig.
5.1	(Constant)	87940.450	.503
	TS_CONC_M_D	54926.579	.077
	TS_CONC_M_PP	-7654.145	.802
	TS_CONC_DEL	10731.457	.863
	Normalized_Frequency	-1297.249	.145
	Revision	112805.148	.001
	Sentence_Initial	4009.262	892
	Sentence_Final	1929.493	.957
	Preceding_Pause_Duration	.667	.045
	Total_Keystroke_Count	569.911	.392
	Final_Character_Count	1553.330	.877
	Total_Task_Time	-.003	.886
	User_Events_Per_Minute	-1270.785	.249
	Participant_Group_1stYear_Beg	44684.470	.057

*Dependent variable: *Total_Production_Time*

Total Task Time, a variable which has extremely little effect on the dependent variable also in this model, changes its direction from a previously positive value to a slightly negative value (-.003 *ms*). The variable *Sentence Final* changes direction from a negative value (decrease in production time) in model 4 to a positive value in the present model. Production is estimated to increase by close to two seconds (1929.493 *ms*), when a source text expression is located at the end of a sentence. However, values are still smaller than when the source text expression starts a sentence (*Sentence Initial* increase of 4009.262 *ms*).

The 1st year end group (model 5.2, Table 27) displays a negative predicted effect on *Total Production Time* of about 34 seconds (-33803.173 *ms*). Thus, at the end of their first year, the participants of this group translate considerably faster than at the beginning of their studies.

*Table 27: Multiple regression analysis TS_CONC – model 5.2 Participant Group 1st year end-NOR**

Model		Unstandardized B	Sig.
5.2	(Constant)	55114.600	.673
	TS_CONC_M_D	59429.722	.058
	TS_CONC_M_PP	-7624.416	.803
	TS_CONC_DEL	23162.681	.717
	Normalized_Frequency	-1257.955	.160
	Revision	116200.118	.001
	Sentence_Initial	3742.720	.900
	Sentence_Final	-2758.444	.939
	Preceding_Pause_Duration	.562	.093
	Total_Keystroke_Count	483.700	.468
	Final_Character_Count	1222.473	.904
	Total_Task_Time	.008	.708
	User_Events_Per_Minute	-879.055	.418
	Participant_Group_1stYear_End	-33803.173	.155

*Dependent variable: *Total_Production_Time*

Conceptual changes from source- to target text require increased time as indicated by the positive value (59429.722 *ms*), which increases by about five seconds compared to the group's first translation round. Thus, the increasing effect appears to be amplified in this group. The value of the paraphrasing strategy remains virtually unchanged in comparison to the value of the previous model (production time decrease). Finally, this group stands for a considerable increase of 23 seconds (23162.681 *ms*) in predicted production time when deletion is chosen. This is more than twice as much as when the participants underwent the experiment for the first time at the beginning of their 1st year (*cf.* Table 26). Thus, this group appears to spend an even larger amount of time on expressions which are eventually deleted from the translation.

The variable *Sentence Final*, which now carries a negative value again, reduces predicted production time by approximately 3 seconds (-2758.444 *ms*). Thus, regarding this variable, the 1st year students have a negative impact on predicted production time at the end of their first year as opposed to at the beginning of their first year of studies. Except the effect of revision, none of the effects are statistically significant, although the value for the M-D strategy variable is close to the demarcation line (p = .058).

*Table 28: Multiple regression analysis TS_CONC – model 5.3 Participant Group 2nd year-NOR**

Model		**Unstandardized B**	**Sig.**
5.3	(Constant)	64059.488	.642
	TS_CONC_M_D	55943.869	.078
	TS_CONC_M_PP	-9975.239	.747
	TS_CONC_DEL	3844.492	.952
	Normalized_Frequency	-1284.787	.154
	Revision	115673.081	.001
	Sentence_Initial	4914.708	.870
	Sentence_Final	-441.559	.990
	Preceding_Pause_Duration	.623	.067
	Total_Keystroke_Count	486.345	.473
	Final_Character_Count	1720.501	.866
	Total_Task_Time	.004	.856
	User_Events_Per_Minute	-964.963	.416
	Participant_Group_2ndYear	-7365.593	.809

*Dependent variable: *Total_Production_Time*

The 2nd year group (model 5.3, Table 28) also contributes negatively to predicted production time values with a value of approximately -7 seconds (-7365.593 *ms*). This is less than the previous group, indicating that the participants of this group work slower than the participants of the 1st year end group (but still faster than the 1st year beginners group, model 5.1). The effect is, however, non-significant ($p = .809$). Looking at the deletion strategy, the 2nd year group exhibits the lowest values of the three groups analyzed so far. Compared to the previous group (increase by 23 seconds), predicted production time values increase by only four seconds (3844.492 *ms*) if this strategy is chosen. As mentioned previously, this is probably because this group did not select deletion as a strategy during the translation of any of the expressions that constitute the basis for the analyses in this subset. The effect of the variable *Sentence Final* is negative for the 2nd year group as well. Less so, however, than for the previous group. Predicted production time is reduced by less than half a second (-441.559 *ms*) as opposed to close to three seconds for the 1st year end group. Effects are non-significant in this model with the exception of the revision effect.

Finally, the 3rd year group (model 5.4, Table 29) reduces the predicted value of *Total Production Time* by approximately 13 seconds (-12903.380 *ms*). This is almost twice as much as the 2nd year group, but still considerably less than the 1st year end group (34 seconds). The effect is not statistically significant ($p = .681$). Paraphrasing and conceptual changes vary very little compared to the previous groups (up to four seconds either way), and the general tendencies observed in the previous models continue: paraphrasing reduces predicted production time, while a conceptual change increases values considerably. The deletion strategy exhibits values comparable to the 2nd year group for the same reasons mentioned above.

Interestingly, the variable *Sentence Final* carries a (minimally) positive value for this group indicating that the position of the source text expression at the end of the sentence causes the participants of this group to slow down ever so slightly (177.749 *ms*). However, this is still less compared to the directly opposed variable *Sentence Initial* (5697.065 *ms*). In other words, also the participants of this group translate expressions faster when they are situated at the end of a source text sentence as opposed to the beginning. None of the effects are statistically significant (except revision).

*Table 29: Multiple regression analysis TS_CONC – model 5.4 Participant Group 3rd year-NOR**

Model		Unstandardized B	Sig.
5.4	(Constant)	58868.854	.656
	TS_CONC_M_D	57275.997	.068
	TS_CONC_M_PP	-8238.960	.790
	TS_CONC_DEL	2955.888	.963
	Normalized_Frequency	-1299.482	.149
	Revision	117034.054	.001
	Sentence_Initial	5697.065	.849
	Sentence_Final	177.749	.996
	Preceding_Pause_Duration	.617	.066
	Total_Keystroke_Count	447.792	.505
	Final_Character_Count	1598.238	.875
	Total_Task_Time	.002	.925
	User_Events_Per_Minute	-769.411	.488
	Participant_Group_3rdYear	-12903.380	.681

*Dependent variable: *Total_Production_Time*

In conclusion, the analyses reveal that the quantitative order of selection of strategy types is not determined by increasing (positive) or decreasing (negative) effects on predicted production time. For example, model 4 exhibits the largest negative effect (reduction of predicted production time) for one of the least selected strategy types, the paraphrasing strategy. One of the most selected strategy types, on the other hand, the M-D strategy, displays values with the largest increasing effect on predicted production time, indicating that it takes the longest to translate expression by selecting a change in conceptual mapping from source- to target text. However, conceptual changes are selected more often than strategy types which are predicted to require less time to implement into the translation (e.g., paraphrasing). *Normalized Frequency*, the variable representing conventionality levels, exerts a slight negative effect on *Total Production Time*, speeding up production marginally.

Starting with model 4 (all variables except the individual participant groups), this variable does not exhibit any notable change. The location of the source text expression at the end of a sentence is, as Sjørup (2013: 129) remarks, characterized by decreasing production time effects, while the opposite position, at the beginning of a sentence, is accompanied by increasing effects. The variables introduced in model 4 (*Preceding Pause Duration*, measurements of working speed) do not have any notable effect on predicted production time.

Finally, with regard to the different participant groups, the analyses show that the three advanced groups (the groups that have undergone translator training in the program) have a negative effect on predicted *Total Production Time*, while the 1st year beginners group increases predicted production time considerably. Interestingly, the 1st year end group, consisting of the same participants as the 1st year beginners group, stands for the largest decreasing effect (largest difference from the beginners group). In other words, the participants of the 1st year end group exhibit larger reductive values than any of the other groups (memory effect). The group with the second largest value is the 3rd year group followed by the 2nd year group. In terms of specific strategy variables, the 1st year end group, which, according to the analysis, is predicted to exert the largest negative effect on predicted production time, exhibits the largest positive values for the deletion strategy and the M-D strategy compared to the other groups. This indicates that, compared to the reference strategy, the participants of this group invest more time in the translation of expressions which are either deleted or which require a conceptual change than any of the other two groups. Differences between the remaining predictor variables both within the groups and across groups are rather inconsiderable. Statistical significance cannot be established for the majority of variables in the models. Revision is the only variable which consistently carries significant p-values.

4.2.2 German participant group

In what follows, the specific characteristics of the subset of the German participant group are described. This language group consists of eight 1st year students, four 2nd year students, and five 3rd year students. One of the 1st year students did not return for the second round of experiments at the end of the

1st year. Thus, the data subset comprises 24 (instead of 25) observations of each of the 12 individual metaphorical expressions. Table 30 below provides an overview of the distribution of those observations according to the different participant groups.

Table 30: Observation Token Distribution German Data Set

participant group	n	%
German_1stYear_Beg	96	35
German_1stYear_End	72	26
German _2ndYear	48	17
German _3rdYear	60	22
Total	**276**	**100**

The subset consists of a total of 276 observations, whereof 61% are derived from the translations of the 1st year students (168 observations), 17% from the 2nd year students (48 observations), and 22% from the 3rd year students (60 observations). The number of observations in this subset is larger than in the Norwegian subset (276 as opposed to 168), which, considering the statistical power of the analyses, may yield an increased number of statistically significant effects. This discrepancy in number of observations and its effect on statistical significance needs to be carried in mind when comparing the analyses of the two language groups. Regarding the present subset, the distribution of the specific linguistic and conceptual translation strategies across the different participant groups is presented in Tables 31 and 32.

Table 31: Distribution Translation Strategy Type Linguistic per Participant Group-GER

			Translation Strategy Type (linguistic)										Total
			M1-M2	M-M	M-PP	M-D	DEL	M1-D1	NT	M-M/DEL	M1X-M2Y	MX-MY	
Participant Group	1stYear_Beg	n	28	23	18	8	10	6	1	2	0	0	**96**
		%	29	24	19	8	10	6	1	2	0	0	**100**
	1stYear_End	n	22	16	13	10	5	3	2	0	0	1	**72**
		%	31	22	18	14	7	4	3	0	0	1	**100**
	2ndYear	n	12	11	5	9	4	6	1	0	0	0	**48**
		%	25	23	10	19	8	13	2	0	0	0	**100**
	3rdYear	n	18	15	10	8	2	3	3	0	1	0	**60**
		%	30	25	17	13	3	5	5	0	2	0	**100**
Total		**n**	**80**	**65**	**46**	**35**	**21**	**18**	**7**	**2**	**1**	**1**	**276**
		%	**29**	**24**	**17**	**13**	**8**	**7**	**3**	**1**	**0**	**0**	**100**

The overview of the distribution of the linguistic translation strategy types (Table 31) shows that ten of the 12 linguistic strategy types identified in the complete German data set in analysis 1 are represented in the subset. The strategies MX-DY (different conceptual mappings, different lexis, image-schematic change) and M-M/NT (similar conceptual mappings, same lexis, deletion of one or more linguistic items) have not been selected during any of the translations of the 12 expressions that are object of analysis 2 for the German language group. The strategy type that is present most often in the subset is the M1-M2 strategy (similar conceptual mappings, change in lexis) with 80 observations (29%), followed by the M-M strategy with 65 observations (24%) and paraphrasing with 46 observations (17%). The M-D strategy accounts for 13% of the observations (35 observations) and the deletion strategy for 8% (21 observations), followed by the M1-D1 strategy with 7% (18 observations). The remaining strategies occur in very small numbers.

Looking at the distribution across the different groups, M1-M2 is the most selected strategy in all four groups, whereas the M-M strategy is the strategy which is chosen second most by all groups. Paraphrasing is selected most often by the participants of the 1st year groups, both at the beginning (19%) and at the end (18%) of their first year, and the least by the 2nd year group. This group, on the other hand, stands for the largest number of strategy types involving a conceptual change (M-D, M1-D1) with respectively 19% and 13%. The M-D strategy is chosen the least by the beginners group. This group stands however for the largest amount of deletion (10%). Finally, non-translation (retention of the source text expression), a strategy which has only been selected in the German subset, is mostly selected by the 3rd year group.

Table 32 presents the distribution of the conceptual translation strategy types. The subset comprises all five conceptual strategies identified for the complete data set in analysis 1.

Table 32: Distribution Translation Strategy Type Conceptual per Participant Group-GER

			Translation Strategy Type (conceptual)					Total
			M-M	M-D	M-PP	DEL	NT	
Participant Group	1stYear_Beg	n	53	14	18	10	1	**95**
		%	55	15	19	10	1	**100**
	1stYear_End	n	39	12	13	6	2	**72**
		%	54	17	18	8	3	**100**
	2ndYear	n	23	15	5	4	1	**48**
		%	48	31	10	8	2	**100**
	3rdYear	n	34	11	10	2	3	**60**
		%	57	18	17	3	5	**100**
Total		**n**	**149**	**52**	**46**	**22**	**7**	**276**
		%	**54**	**19**	**17**	**8**	**3**	**100**

Overall, strategy types retaining the source text metaphor in the target text (M-M) clearly dominate the subset (54%). This is followed by the replacement of the source text metaphor with a different metaphor in the target text (M-D) and paraphrasing (M-PP). With respectively 19% and 17%, the latter two strategy types differ only slightly. Finally, deletion (8%) is preferred to non-translation (3%). Across the groups, minor variations can be observed. All groups resort to strategy types within the M-M category most often (in about half of the cases). Thereafter, the 1st year group (both beginning and end) resorts more often to paraphrasing than to finding a different metaphor (M-D), while the 2nd and 3rd year group display the reverse behavior to differing degrees. A preference for the M-D strategy over paraphrasing is rather clear for the 2nd year group (31% as opposed to 10%). However, the difference in preference is minimal for the 3rd year group (18% as opposed to 17%). The deletion strategy is used most often by the beginners group, while non-translation is most prevalent in the 3rd year group.

Summing up, all groups select strategy types which do not require a conceptual change from source- to target text, in particular the M1-M2 strategy, which comprises some form of a linguistic change to the target text expression, most often. The 1st year groups select strategy types involving a conceptual change (M-D, M1-D1) the least, but omit source text expressions from their translations the most. The 2nd year group, on the other hand, selects conceptual changes the most. Both the 2nd and the 3rd year group prefer conceptual changes to paraphrasing, while the 1st year groups exhibit the opposite behavior. Finally, non-translation, which is a specificity of the German subset, is selected most often by the most advanced group, the 3rd year group.

In the following section, the relationship between the different translation strategy variables and production time in the German subset will be explored.

4.2.2.1 Linguistic Translation Strategy Types

The analyses of the German subset are executed similarly to the Norwegian analyses, with the exception of the addition of an extra variable which accounts for the different syntactic requirements of the German language (*cf*. Sections *3.5.2.1* and *3.5.2.2*). The model summary (Table 33) details the individual variables entered into the model in each block and the respective predictive power of each model.

In contrast to the Norwegian analyses, none of the variables have been removed by the software due to missing correlation. The *Adjusted R Square* value increases for each model except for model 2, which introduces *Normalized Frequency* into the model. The same trend is visible in the Norwegian data (*cf.* Table 18). Predictive power is generally low for the first three models. Only between 9% and 18% of the variation in predicted production time may be explained by the combination of the variables in each of these blocks. However, starting with model 4 and the introduction of measurements of preceding pause length, syntactic disruption and physical working speed, predictive power increases considerably.

Table 33: Model Summary Blockwise Regression Lexical Translation Strategy Types-GER

Model Summary

Model	Adjusted R Square	Sig.
1	.095	.000
2	.093	.000
3	.181	.000
4	.474	.000
5.1	.472	.000
5.2	.473	.000
5.3	.473	.000
5.4	.477	.000

a. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2

b. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency

c. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final

d. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Syntactic Disruption

   Total Production Time, Total_Keystroke_Count, User_Events_Per_Minute,

e. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Syntactic Disruption *Total Production Time*, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_1stYear_Beg

f. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Syntactic Disruption

   Total Production Time, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_1stYear_End

g. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Syntactic Disruption

   Total Production Time, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_2ndYear

h. Predictors: (Constant), TS_LEX_DEL, TS_LEX_M1_D1, TS_LEX_M1X_M2Y, TS_LEX_M_D, TS_LEX_M_PP, TS_LEX_M1-M2, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, Total_Task_Time, Final_Character_Count, Preceding_Pause_Duration, Syntactic Disruption *Total Production Time*, Total_Keystroke_Count, User_Events_Per_Minute, Particpant_Group_3rd Year

Between 47% and 48% of variation is now explained by the different models. An ANOVA test ascribes significant overall fit of the different models to the data with $p \leq .001$.

In the different models, the strategy variables are arranged according to the order of selection established in analysis 1. However, in contrast to the Norwegian subset, the most selected strategy in this subset is the M1-M2 strategy, and not the reference strategy M-M (*cf.* Table 31). As established earlier, the M-M strategy is chosen as reference strategy, because, based on theoretical considerations, production time for expressions translated by selecting this strategy is assumed to be shortest. In addition, analysis 1 of the complete data set revealed that M-M is the most selected strategy by all German participant groups. Thus, although the order of preference is different in the German subset, the M-M strategy remains the reference strategy.

In model 1 (Table 69, Appendix P), several strategy variables are predicted to reduce production time: M1-M2, M-PP, DEL and M-M/DEL. The remaining strategy variables display increasing values. Interestingly, amongst the strategy variables which exhibit positive values, variables that refer to linguistic change but conceptual similarity between source- and target text expression (M1X-M2Y, MX-MY) result in larger increases than strategy types including a conceptual change (M-D, M1-D1). For example, selecting the M-D strategy is predicted to cause an increase of about 11 seconds, whereas the MX-MY strategy (similar conceptual mappings, same lexis, image-schematic change) increases predicted production time by more than a minute. Furthermore, the retention of the source text expression in the target text (non-translation) accounts for one of the largest increases. This indicates that the participants spent quite some time on those expressions before eventually deciding to integrate the English expression into the German translations. Statistical significance can be established for the effects of the deletion strategy variable ($p = .037$) and non-translation ($p < .001$).

By itself, the variable *Normalized Frequency* (model 2, Table 70, Appendix P) has little effect on predicted production time, decreasing the value by as little as 135.529 *ms* (0.14 *s*). The effect is non-significant ($p = .473$). There is little to virtually no change to the values of the majority of the translation strategy variables compared to the previous model. However, one of the least selected strategy types exhibiting the largest positive value in the previous model, the MX-MY strategy, decreases by about 10 seconds to 53 seconds. Although this strategy is still predicted to increase production time more than any of the other strategies, it does so less than in the previous model. The non-translation strategy exhibits a change as well, increasing predicted production time by about 4 seconds. Thus, the measurement of *Normalized Frequency* may be assumed to have some kind of effect on those two strategy variables.

In model 3 (Table 71, Appendix P), the variables *Revision, Sentence Initial* and *Sentence Final* are added. Not surprisingly, the additional effort to correct or change already produced text (revision) increases the predicted time value. Translating source text expressions located at the beginning of a sentence is predicted to increase production time. Both variables, *Revision* and *Sentence Initial*, exhibit statistically significant effects (p = .005, p < .001). The variable *Sentence Final*, on the other hand, is marked by a negative value, indicating a reductive effect. The effect is non-significant (p = .240). The assumption that source text expressions positioned at the beginning of a sentence trigger increased production time may be assumed true for the German subset as well.

Regarding the individual strategy variables, a few changes from the previous model are evident. The M-D strategy, the deletion strategy and non-translation exhibit changes, although only the effect of non-translation is significant (p = .048). With the introduction of the new variables in model 3, the M-D strategy increases predicted production time by only about 6 seconds as opposed to 12 seconds in model 2. The selection of the deletion strategy still reduces predicted production time, however, only by approximately 9 seconds as opposed to 18 seconds in the previous model. Non-translation, a strategy marked with the largest positive values in the previous two models (i.e., longest predicted production time), displays the largest change in values. Although still positive, production time in this model is increased by merely 30 seconds as opposed to around one minute in the previous two models. Thus, effects, whether positive or negative, are reduced for these variables considering the entirety of variables in this model.

Model 4 (Table 34) introduces the variables of physical production speed, as well as the measurements of preceding pause duration and the duration of syntactic interruption (*cf.* Section *3.5.2.1*). None of the new variables have a noteworthy effect, ranging from 0.4 seconds increase (*Total Keystroke Count*) to a negative effect of 0.1 seconds (*Final Character Count, User Events Per Minute*).

*Table 34: Multiple regression analysis TS_LEX – model 4-GER**

Model		Unstandardized B	Sig.
4	(Constant)	10028.498	.591
	TS_LEX_M_D	-2398.242	.725
	TS_LEX_M1_M2	-9040.783	.083
	TS_LEX_M_PP	-9524.898	.141
	TS_LEX_DEL	-2816.123	.746
	TS_LEX_M1_D1	6669.292	.421
	TS_LEX_NT	-16385.366	.264
	TS_LEX_M_M_DEL	-3950.254	.856
	TS_LEX_M1X_M2Y	-17899.351	.596
	TS_LEX_MX_MY	59597.066	.051
	Normalized_Frequency	119.863	.581
	Revision	4598.283	.346
	Sentence_Initial	11425.399	.074
	Sentence_Final	-9249.667	.250
	Syntactic_Disruption_*Total_Production_Time*	.071	.567
	Preceding_Pause_Duration	.825	.000
	Total_Keystroke_Count	422.313	.000
	Final_Character_Count	-130.128	.647
	Total_Task_Time	.002	.475
	User_Events_Per_Minute	-128.995	.148

*Dependent variable: *Total_Production_Time*

The measurement of syntactic disruption in particular has a negligible increasing effect of .071 milliseconds, indicating that syntactic elements interrupting the production of the target text expression do not have any considerable effect on the production time of the expressions itself. Effects are significant for pause duration and keystroke count ($p < .001$).

With respect to the individual strategy variables, three strategy types change direction, that is, the selection of these strategy types decreases predicted production time instead of increasing it, as observed in the previous models. In other words, in the current model, these strategy types speed up translation instead of slowing it down. This development concerns the M-D strategy, non-translation and the M1X-M2Y strategy. For example, in the previous model non-translation increased predicted production time by about half a minute (29946.456 *ms*). In the current model however, predicted production time is reduced by 16 seconds (-16385.366 *ms*). This is an interesting development given that the newly introduced variables in themselves do not have a considerable effect on the dependent variable. They do, however, exhibit a noticeable effect on these strategy types. However, none of the effects are statistically significant (not even revision, $p = .366$), although the strategy variable MX-MY is close to the demarcation value ($p = .051$).

Starting with model 5.1 (Table 35), the four participant groups are added individually. The introduction of participant group 1 (1st year beginners) does not have any substantial effect on the dependent variable. The group itself has a negative effect of 1 second (-1020.836 *ms*) on predicted production time, which is non-significant ($p = .799$). However, compared to the previous model, the remaining variables stay largely unchanged by the addition of the group (changes of less than 1 *s*, no directional changes). The majority of strategy variables have thus a decreasing effect on the dependent variable. Only the M1-D1 and the MX-MY strategy types are predicted to increase production time values by 7 seconds (6680.849 *ms*) and 59 seconds (59216 *ms*) respectively. Amongst the strategy types exhibiting decreasing effects, the M1X-M2Y strategy and non-translation exhibit the largest reducing effects with 18 seconds (-18032.359 *ms*) and 16 seconds (-16623.073 *ms*) respectively. The image-schematic change (MX-MY, positive effect on predicted production time) appears to slow down this group slightly more than the previous group (61.5 *s* as opposed to 59 *s*). Effects are significant for pause duration and keystroke count ($p < .001$).

*Table 35: Multiple regression analysis TS_LEX – model 5.1 Participant Group 1st Year beginners-GER**

Model		Unstandardized B	Sig.
5.1	(Constant)	10498.107	.577
	TS_LEX_M_D	-2560.454	.709
	TS_LEX_M1_M2	-9039.117	.084
	TS_LEX_M_PP	-9527.471	.141
	TS_LEX_DEL	-2695.182	.758
	TS_LEX_M1_D1	6680.849	.421
	TS_LEX_NT	-16623.073	.259
	TS_LEX_M_M_DEL	-3291.752	.881
	TS_LEX_M1X_M2Y	-18032.359	.594
	TS_LEX_MX_MY	59216.345	.053
	Normalized_Frequency	121.881	.576
	Revision	4450.225	.366
	Sentence_Initial	11469.978	.074
	Sentence_Final	-9355.178	.246
	Syntactic_Disruption_*Total_ Production_Time*	.071	.568
	Preceding_Pause_Duration	.824	.000
	Total_Keystroke_Count	423.113	.000
	Final_Character_Count	-131.597	.644
	Total_Task_Time	.002	.491
	User_Events_Per_Minute	-126.924	.157
	Participant_group_1stYear_Beg	-1020.836	.799

*Dependent variable: *Total_Production_Time*

Table 36 includes the 1st year end group into the model. The negative effect on predicted production time seen in the previous model is amplified by this group. Production time is predicted to be reduced by about 2.5 seconds (-2510.202 *ms*), when the expressions are translated by the members of this group. The effect is, however, non-significant (p = .550).

*Table 36: Multiple regression analysis TS_LEX – model 5.1 Participant Group 1st Year end-GER**

Model		Unstandardized B	Sig.
5.2	(Constant)	10347.781	.580
	TS_LEX_M_D	-2235.814	.743
	TS_LEX_M1_M2	-8963.020	.086
	TS_LEX_M_PP	-9362.616	.149
	TS_LEX_DEL	-2892.458	.740
	TS_LEX_M1_D1	6426.626	.439
	TS_LEX_NT	-16280.060	.267
	TS_LEX_M_M_DEL	-4650.454	.831
	TS_LEX_M1X_M2Y	-17974.159	.595
	TS_LEX_MX_MY	61499.339	.046
	Normalized_Frequency	116.073	.594
	Revision	4769.756	.329
	Sentence_Initial	11399.731	.075
	Sentence_Final	-9190.223	.253
	Syntactic_Disruption_*Total_ Production_Time*	.065	.599
	Preceding_Pause_Duration	.825	.000
	Total_Keystroke_Count	425.710	.000
	Final_Character_Count	-138.172	.628
	Total_Task_Time	.002	.468
	User_Events_Per_Minute	-126.816	.156
	Participant_group_1stYear_End	-2510.202	.550

*Dependent variable: *Total_Production_Time*

It can be concluded that, for the members of this group, there has been a general positive development in terms of production speed from the beginning of their studies to the end of their first year. In other words, the students have become faster in translating. However, compared to the previous model, change is negligible for most of the variables (less than 0.5 seconds either way).The order of selection of the strategy types, which differs between those groups, however, does not follow any form of pattern regarding increasing or decreasing production time values. Effects are significant for the MX-MY strategy type

(p = .046), pause duration and keystroke count (p <.001).

Change is not observed between the effect on predicted production time of the 1st year end group and the next group, the 2nd year group (model 5.3, Table 37).

*Table 37: Multiple regression analysis TS_LEX – model 5.1 Participant Group 2nd Year-GER**

Model		Unstandardized B	Sig.
5.3	(Constant)	9552.275	.610
	TS_LEX_M_D	-2176.592	.750
	TS_LEX_M1_M2	-9104.411	.082
	TS_LEX_M_PP	-9677.968	.136
	TS_LEX_DEL	-2752.444	.752
	TS_LEX_M1_D1	7085.344	.395
	TS_LEX_NT	-16363.009	.265
	TS_LEX_M_M_DEL	-4298.763	.844
	TS_LEX_M1X_M2Y	-18081.686	.593
	TS_LEX_MX_MY	59311.238	.053
	Normalized_Frequency	119.760	.582
	Revision	4765.485	.330
	Sentence_Initial	11496.498	.073
	Sentence_Final	-9261.842	.250
	Syntactic_Disruption_*Total_ Production_Time*	.069	.579
	Preceding_Pause_Duration	.822	.000
	Total_Keystroke_Count	418.210	.000
	Final_Character_Count	-125.524	.660
	Total_Task_Time	.003	.442
	User_Events_Per_Minute	-126.010	.159
	Participant_group_2nd_year	-2550.838	.603

*Dependent variable: *Total_Production_Time*

Like the previous group, this group exhibits a negative effect of 2.5 seconds (-2550.838 *ms*) as well. The effect is non-significant (p = .603). The remaining predictor variables do not exhibit noteworthy changes (less than 0.7 seconds either way) compared to the previous group, and thus also to the 1st year beginners group. Effects are significant only for pause duration and keystroke count (p < .001).

*Table 38: Multiple regression analysis TS_LEX – model 5.1 Participant Group 3rd Year-GER**

Model		**Unstandardized B**	**Sig.**
5.4	(Constant)	5928.692	.753
	TS_LEX_M_D	-2448.176	.719
	TS_LEX_M1_M2	-8988.345	.084
	TS_LEX_M_PP	-8510.388	.141
	TS_LEX_DEL	-2043.138	.814
	TS_LEX_M1-D1	7201.042	.384
	TS_LEX_NT	-17631.018	.229
	TS_LEX_M_M_DEL	-2380.746	.913
	TS_LEX_M1X_M2Y	-19483.088	.563
	TS_LEX_MX_MY	61462.838	.044
	Normalized_Frequency	122.778	.571
	Revision	4521.835	.353
	Sentence_Initial	11844.741	.064
	Sentence_Final	-9827.209	.221
	Syntactic_Disruption_*Total_Production_Time*	.049	.690
	Preceding_Pause_Duration	.815	.000
	Total_Keystroke_Count	425.920	.000
	Final_Character_Count	-149.544	.599
	Total_Task_Time	.003	.442
	User_Events_Per_Minute	-101.184	.266
	Participant_group_3rd_year	6839.003	.144

*Dependent variable: *Total_Production_Time*

The most interesting effect is to be observed in the final group, the 3rd year group (Table 38). The majority of strategy variables exhibit a negative effect on production time, except the M1-D1 and MX-MY strategies. There are minor differences compared to the previous models, changes ranging up to 2.2 seconds. The strategy types involving paraphrasing (M-PP) and the partial deletion of linguistic items from the target text phrase (M-M/DEL) are marked by a reduced negative effect on predicted production time (reduces predicted production time, but less so than the other groups), while an image-schematic change retaining the lexis (MX-MY) exhibits an additional increased positive effect on predicted production time (increases predicted production time, even more so than the 1st year beginners group and the 2nd year group). Thus, either way, the participants of this group appear to translate slower than the other groups when selecting any of the three strategies just mentioned. On the other hand, non-translation (mostly selected by this group) and image-schematic changes involving linguistic changes (M1X-M2Y) both exhibit increased negative effects on predicted production time (reduces predicted production time, even more so than the other groups). Only the effect of the strategy variable MX-MY is statistically significant ($p = .044$). Of the remaining variables, pause duration and keystroke count exhibit significant effects ($p < .001$).

In summary, the order of selection of the different linguistic strategy types established previously does not concur with a clearly definable development in terms of predicted production time effects. The lesser used strategy types do not necessarily concur with an increased effect on predicted production time as opposed to the more selected strategy types. On the contrary, strategy types which are selected rather infrequently (e.g., strategy types involving image-schematic changes like MX-MY, M1X-M2Y) have a negative effect on production time (reduce predicted production time). Overall, *Normalized Frequency* as an indicator of metaphor conventionality increases time values indicating that the more frequent the expressions are, the more time is required to translate these expressions. However, this appears to have little effect on the three most selected strategy types M1-M2, M-PP, and M-D. Revision, on the other hand, has a significant positive effect on predicted production time. The location of the source text expression at the beginning or the end of the sentence has a distinct relation to predicted production time in that it increases predicted time requirement when located at the beginning and decreases when located at the end. The measurements of *Preceding Pause Duration* and physical text production speed do not have a noteworthy effect on predicted production time. This includes the measurement of syntactic interruption, which is specific to the German analyses. This suggests that syntactic elements not belonging to the production of the target expression do not have any significant effect on the production time of the expression itself. Effects for *Preceding Pause Duration* and *Total Keystroke Count* are they only effects which yield constant significant effects.

In general, considering the models including all predictor variables (models 4 to 5.4), strategy types which are characterized by a conceptual change from source- to target text are not necessarily marked with positive effects on predicted production time values (increasing predicted production time). While this holds true for the strategy type retaining the lexis (M1-D1), the M-D strategy, which involves both a conceptual and linguistic change, exhibits a negative effect on predicted production time (decreasing predicted production time). Paraphrasing, the strategy types involving some form of deletion (DEL, M-M/DEL) and non-translation (NT) exert a consistent negative effect on predicted production time.

Finally, the introduction of the different participant groups has no noteworthy effect on the linguistic strategy variables, that is, none of the strategy types change their effect in terms of an increase or decrease. A comparison of all four participant groups discloses that the most advanced group, the 3rd year group is predicted to increase production time and thus translate the slowest of all the four participant groups (positive effect on predicted production time). The remaining three (less experienced) groups exhibit negative effects (decreasing production time) and differences between these three groups are negligibly small. The same applies to group differences concerning the strategy variables, which are considered rather small indicating little change. In the following section, the analysis will be performed anew, taking into consideration the category of conceptual translation strategy types.

4.2.2.2 Conceptual Translation Strategy Types

Table 39: Model Summary Blockwise Regression Conceptual Translation Strategy Types – GER

Model Summary

Model	Adjusted R Square	Sig.
1	.098	.000
2	.098	.000
3	.177	.000
4	.467	.000
5.1	.465	.000
5.2	.465	.000
5.3	.465	.000
5.4	.468	.000

1 Predictors: (Constant), TS_CONC_NT, TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP

2 Predictors: (Constant), TS_CONC_NT, TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency

3 Predictors: (Constant), TS_CONC_NT, TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final

4 Predictors: (Constant), TS_CONC_NT, TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, User_Events_Per_Minute, Syntactic_Disruption_Total production Time, Preceding_Pause_Duration, Total_Keystroke_Count, Total_Task_Time, Final_Character_Count

5.1 Predictors: (Constant), TS_CONC_NT, TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, User_Events_Per_Minute, Syntactic_Disruption_Total production Time, Preceding_Pause_Duration, Total_Keystroke_Count, Total_Task_Time, Final_Character_Count, Particpant_Group_1stYear_Beg

5.2 Predictors: (Constant), TS_CONC_NT, TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, User_Events_Per_Minute, Syntactic_Disruption_Total production Time, Preceding_Pause_Duration, Total_Keystroke_Count, Total_Task_Time, Final_Character_Count, Particpant_Group_1stYear_End

5.3 Predictors: (Constant), TS_CONC_NT, TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, User_Events_Per_Minute, Syntactic_Disruption_Total production Time, Preceding_Pause_Duration, Total_Keystroke_Count, Total_Task_Time, Final_Character_Count,Particpant_Group_2ndYear

5.4 Predictors: (Constant), TS_CONC_NT, TS_CONC_DEL, TS_CONC_M_D, TS_CONC_M_PP, Normalized_Frequency, Sentence_Initial, Revision, Sentence_Final, User_Events_Per_Minute, Syntactic_Disruption_Total production Time, Preceding_Pause_Duration, Total_Keystroke_Count, Total_Task_Time, Final_Character_Count,Particpant_Group_3rd Year

The model summary (Table 39) provides an overview of the strength of predictability of each model. In general, predictability increases from model to model. There is, however, a minimal decrease with the introduction of the first three participant groups. The final model (5.4, 3rd year participant group) displays the largest value, and thus the most power of predictability.

Models 1 to 3 are to be found in Appendix Q. Model 1 (Table 72) presents the results of the analysis of the conceptual translation strategy types as predictors of *Total Production Time*. The strategies are listed according to the order of preference established in analysis 1 (Table 13). As previously, the constant is calculated based on the reference strategy type M-M. Predicted correlations are significant for the M-D strategy type (p = .01) and the NT strategy (p < .01). Paraphrasing and deletion are statistically non-significant, although the p-value for the deletion strategy only minimally exceeds the threshold value of .05. Those two latter strategy types are predicted to exert a negative effect on production time. Strategy types involving a change of conceptual mapping from source- to target text (M-D) are selected more often than paraphrasing and deletion, and exert an increasing effect on predicted production time. With an increase of 63 seconds, non-translation exerts the most prominent effect. This implies that participants spend rather long time on translation attempts before eventually deciding to retain the source text expression in the target text.

The introduction of the variable *Normalized Frequency* into the model (Table 73, Appendix Q) has a slight decreasing effect on predicted production time. The new variable has a negligibly small effect on the M-D strategy. Paraphrasing and deletion still affect predicted production time negatively, although slightly less than in the previous model. It appears as if the relative frequency of the source text expression in English does not have any effect on the production time of the target text expressions irrespective of choice of translation strategy type. The effects of the M-D variable (p = .008) and the deletion variable (p < .001) are significant.

In contrast, the addition of *Revision*, *Sentence Initial* and *Sentence Final* in model 3 (Table 74, Appendix Q) leads to a substantial change in a number of the strategy variables. As observed and discussed previously, revision has a statistically significant increasing effect on predicted production time. The same applies to the position of the source text expression at the beginning of a sentence. A sentence final position, on the other hand, reduces production time. The effect is however not statistically significant. The most substantial changes can be observed in the deletion strategy variable and the non-translation strategy variable: both exhibit considerably reduced values. Thus, the additional variables in this model appear to have an effect (either by themselves or in combination) on the production time of expressions translated by selecting these two strategy types.

Similar substantial effects can be observed in model 4 (Table 40). Overall, the additional variables in this model have a diminishing effect on predicted production time.

*Table 40: Multiple regression analysis TS_CONC – model 4-GER**

Model		**Unstandardized B**	**Sig.**
4	(Constant)	7019.910	.705
	TS_CONC_M_D	5648.418	.277
	TS_CONC_M_PP	-4905.938	.406
	TS_CONC_DEL	1732.756	.832
	TS_CONC_NT	-8938.960	.531
	Normalized_Frequency	90.479	.673
	Revision	4902.294	.310
	Sentence_Initial	8537.595	.174
	Sentence_Final	-10095.674	.201
	Syntactic_Disruption_Total_ Production_Time	.065	.562
	Preceding_Pause_Duration	.827	.000
	Total_Keystroke_Count	429.423	.000
	Final_Character_Count	-141.258	.623
	Total_Task_Time	.002	.535
	User_Events_Per_Minute	-126.528	.156

*Dependent variable: *Total_Production_Time*

The measurement of production time of syntactic elements interrupting the production of the source text expression exerts an increasing effect of only .065 milliseconds, which is extremely little. This is in itself an interesting observation, indicating that the processing of target text linguistic items related to the source text expression and those not directly related to the translation of the source text expression does not affect the production process. However, the effect is not statistically significant. The effects of *Preceding Pause Duration* and *Total Keystroke Count*, on the other hand, are significant. Hence, every additional keystroke is predicted to increase production time by 0.4 seconds, while every additional millisecond of pause immediately preceding the production of the target text expression increases production time by as little as 0.827 milliseconds. The most noteworthy change compared to the previous model concerns the deletion strategy variable, and the variables *Normalized Frequency* and *Sentence Initial*. The two former experience a change in direction in that the values are now positive indicating an increase in predicted production time as opposed to a reduction (deletion -3.6 *s* to 1.7 *s*; *Normalized Frequency* -.1 *s* to .09 *s*). In the case of *Normalized Frequency,* the change is however extremely small and none of the effects are statistically significant. The variable *Sentence Initial* is marked by a substantial reduction of the previous positive value of 26 seconds to 8.5 seconds. Thus, it may be assumed that the introduction of the additional variables has some form of an effect on those three variables, which can, however, not be described more thoroughly from this analysis alone.

The 1st year beginners group inserted in model 5.1 (Table 41) reduces predicted production time by approximately 1 second (-1111.668 *ms*). Considering the remaining variables however, there are no noteworthy changes to the previous model, that is, the values differ extremely little, which indicates that the group itself has little effect on the different variables. Paraphrasing is predicted to reduce production time (-4.9 *s*), that is, paraphrasing results in faster production time than a change of mappings and lexis (M-D, 5.5 *s*) and deletion (DEL, 1.8 *s*), which increase predicted production time.

*Table 41: Multiple regression analysis TS_CONC – model 5.1-GER**

Model		Unstandardized B	Sig.
5.1	(Constant)	7583.966	.685
	TS_CONC_M_D	5545.131	.288
	TS_CONC_M_PP	-4901.062	.407
	TS_CONC_DEL	1831.556	.823
	TS_CONC_NT	-9159.668	.523
	Normalized_Frequency	91.492	.670
	Revision	4766.775	.327
	Sentence_Initial	8578.165	.172
	Sentence_Final	-10182.637	.198
	Syntactic_Disruption_Total_ Production_Time	.065	.563
	Preceding_Pause_Duration	.826	.000
	Total_Keystroke_Count	430.285	.000
	Final_Character_Count	-143.188	.619
	Total_Task_Time	.002	.555
	User_Events_Per_Minute	-124.336	.166
	Participant_Group_1stYear_Beg	-1111.668	.781

*Dependent variable: *Total_Production_Time*

Non-translation is chosen only once by this group and the respective production time value for this observation is small (5.3 *s*) compared to other observations in this subset. It is thus not surprising that the effect is reductive. Significance is established only for *Preceding Pause Duration* and *Total Keystroke Count* (p < .01).

The effect of the 1st year end group on predicted production time (model 5.2, Table 42) is a negative effect of about 2 seconds (-1949.194 *ms*).

*Table 42: Multiple regression analysis TS_CONC – model 5.2-GER**

Model		**Unstandardized B**	**Sig.**
5.2	(Constant)	7246.899	.696
	TS_CONC_M_D	5582.337	.284
	TS_CONC_M_PP	-4846.019	.412
	TS_CONC_DEL	1740.948	.831
	TS_CONC_NT	-8964.641	.531
	Normalized_Frequency	89.709	.676
	Revision	4982.099	.303
	Sentence_Initial	8535.436	.174
	Sentence_Final	-10111.592	.201
	Syntactic_Disruption_Total_ Production_Time	.060	.594
	Preceding_Pause_Duration	.827	.000
	Total_Keystroke_Count	432.188	.000
	Final_Character_Count	-145.684	.613
	Total_Task_Time	.002	.528
	User_Events_Per_Minute	-124.896	.163
	Participant_Group_1stYear_End	-1949.194	.642

*Dependent variable: *Total_Production_Time*

Thus, the group has doubled its effect (although still relatively small) in the course of their first year of training. Production time is predicted to decrease (increased translation speed for the specific expressions in question) if translated by the participants of this group. However, the remaining variables in the model remain largely unchanged. Paraphrasing and non-translation are marked by production time reduction (-4.8 *s*, -9 *s*), while a change of metaphor and deletion stand for an increase (5.6 *s*, 1.7 *s*). Significance is established for the same two variables as in the previous models.

The 2nd year group in model 5.3 (Table 43) reduces predicted production time to a little more than 2 seconds (-2358.313 *ms*), which is only slightly more than the previous group, the 1st year end group.

*Table 43: Multiple regression analysis TS_CONC – model 5.3-GER**

Model		**Unstandardized B**	**Sig.**
5.3	(Constant)	6526.057	.726
	TS_CONC_M_D	5975.652	.255
	TS_CONC_M_PP	-4994.657	.398
	TS_CONC_DEL	1799.456	.826
	TS_CONC_NT	-8833.002	.537
	Normalized_Frequency	89.306	.678
	Revision	5069.131	.296
	Sentence_Initial	8589.378	.172
	Sentence_Final	-10078.645	.203
	Syntactic_Disruption_Total_ Production_Time	.064	.573
	Preceding_Pause_Duration	.824	.000
	Total_Keystroke_Count	425.618	.000
	Final_Character_Count	137.534	.633
	Total_Task_Time	.002	.501
	User_Events_Per_Minute	-123.584	.168
	Participant_Group_2ndYear	-2358.313	.633

*Dependent variable: *Total_Production_Time*

Interestingly, this is accompanied by a (small) positive value for the variable *Final Character Count*, which until now has been marked by a negative value. Thus, the group appears to have an effect on this variable to an extent where each additional character is predicted to increase production time by .1 second. In contrast, the three previous models that contain this variable (model 4, model 5.1, model 5.2), exhibit a decreasing effect of .1 seconds. Although minimal, the change is interesting to mention, since it refers to a directional change in effect. All strategy variables are largely unaffected by the introduction of the 2nd year group as compared to the two previous groups. Differences are negligible. A change of metaphor and deletion exhibit an increasing effect on predicted production time, while paraphrasing and non-translation display a decreasing effect. Significance is only established for the variables *Preceding Pause Duration* and *Total Keystroke Count*.

In the last model, the final and most advanced 3rd year group is introduced (Table 43). In contrast to the previous three participant groups, this group exhibits a positive effect on predicted production time. The value is increased by a little more than 6 seconds (6141.258 *ms*). In other words, taking into consideration all the variables in the model, production time for the metaphorical expressions is predicted to increase by 6 seconds when translated by the participants of this group.

*Table 44: Multiple regression analysis TS_CONC – model 5.4-GER**

Model		**Unstandardized B**	**Sig.**
5.4	(Constant)	3423.835	.855
	TS_CONC_M_D	5721.770	.270
	TS_CONC_M_PP	-4921.246	.403
	TS_CONC_DEL	2478.071	.762
	TS_CONC_NT	-9963.222	.485
	Normalized_Frequency	90.595	.672
	Revision	4849.460	.314
	Sentence_Initial	8889.768	.156
	Sentence_Final	-10581.897	.180
	Syntactic_Disruption_Total_ Production_Time	.044	.698
	Preceding_Pause_Duration	.818	.000
	Total_Keystroke_Count	432.986	.000
	Final_Character_Count	-156.163	.587
	Total_Task_Time	.002	.507
	User_Events_Per_Minute	-101.611	.265
	Participant_Group_3rdYear	6141.258	.191

*Dependent variable: *Total_Production_Time*

Final Character Count, which had been marked by an increasing value for the 2nd year group, is now negative again, resembling the values of the two 1st year groups in models 5.1 and 5.2. Thus predicted production time is reduced by about .15 seconds for each additional character in the final target text expression. The analysis reveals extremely little change in effect of the strategy variables on predicted production time compared to the other three participant groups. M-D increases predicted production time by about 6 seconds (5721.770 *ms*) and paraphrasing reduces it by 5 seconds (-4921.246 *ms*). Comparable to the other three groups, deletion increases predicted production time (2.5 *s*), and non-translation decreases it (-10 *s*). Statistical significance cannot be established for the majority of the variables.

In conclusion, except for the 3rd year group, all groups have an overall reductive effect on predicted production time considering all the variables in the models. Although the order of selection of conceptual strategy types varies between the different groups (analysis 1), their effect on predicted production time remains rather similar. A conceptual and linguistic change from source- to target text expression (M-D) increases predicted production time, while paraphrasing (M-PP) reduces it. Furthermore, deletion (DEL) increases predicted production time, which indicates that, on average, the participants of each group spend a considerable amount of time on attempting to translate these expressions, before they eventually decide to omit them from the target text. In contrast, the decision to adopt the English source text expression in the target text (NT) appears to take place rather quickly, since the reductive effect on predicted production time is relatively large for all three groups. None of the effects of the different strategy variables is statistically significant. *Normalized Frequency* as a measurement of metaphor conventionality displays a slight increasing effect. The contrasting effect of the position of the source text expression at the beginning or end of a sentence is corroborated also in this analysis of the variables. The effect of syntactic interruption is negligibly small, indicating that linguistic units not directly related to the translation of the source text expression do not have any noteworthy effect on the translation process. The remaining variables pertaining to the measurement of physical production do not exhibit considerable effects on predicted production time. However, two of these variables (*Preceding Pause Duration*, *Total Keystroke Count*) possess statistically significant effects.

In the subsequent sections, the results of the analyses will be compared for the two language groups.

4.2.3 Comparison Norwegian and German participant groups

The following analyses aim at answering research question 2b, examining whether or how results vary across the different subject groups according to the target language. The analyses will first concentrate on a general comparison of the two language groups (Norwegian and German), before looking at the specific participant groups individually, for example the 1st year beginners groups of both languages. The level of analysis will be scaled down for the present analyses, only comprising the models which include all variables, that is models 4 to 5.4. Model 4 serves the purpose of looking at the two different language groups in general, without taking specific participant groups into consideration, while models 5.1 to 5.4. comprise the individual participant groups. The effect of the different blocks of predictor variables on predicted production time and the associate change in the translation strategy variables has been discussed extensively in the previous sections of this chapter, and will therefore not be repeated here. However, differences of predictor variables other than the strategy variables will be addressed if applicable. In addition, the comparative analyses will be based on the predictor variables that are mutual to the two data sets. Predictor variables that are confined to one of the data sets (*TS LEX NT, TS LEX M-M/DEL, TS LEX MX-MY, TS CONC NT, Syntactic Disruption Total Production Time)* are therefore excluded from the analyses. In accordance with the previous sections, results will be presented for the linguistic translation strategy types first. Finally, the order of the strategies presented in each model is not necessarily the same in terms of selection for the two groups compared, since it may differ from group to group within and across the two target languages. For example, strategy types may have been selected in a different quantitative order by the Norwegian 2nd year group than by the German 2nd year group. For reasons of visualization and comparability however, the order is presented alike. Since the order of selection and respective differences between the individual participant groups have been discussed previously (*cf.* Section *4.1*), it will not be addressed again in this section.

4.2.3.1 Linguistic Translation Strategy Types

Overall, the Norwegian data exhibit larger time values than the German data. The majority of *B* – values in Table 45 display differing sizes. This implies that, on average, the Norwegian participants spent more time on the translation of the specific expressions than the German participants.

*Table 45: Comparison multiple regression analysis TS_LEX – model 4-NOR-GER**

		Norwegian		German	
Model		Unstandardized B	Sig.	Unstandardized B	Sig
4	(Constant)	40267.494	.759	10028.498	.591
	TS_LEX_M1_M2	-18069.648	.548	-9040.783	.083
	TS_LEX_M_PP	-18571.522	.581	-9524.898	.141
	TS_LEX_M_D	35354.408	.306	-2398.242	.725
	TS_LEX_DEL	1419.369	.982	-2816.123	.746
	TS_LEX_M1_D1	149167.239	.077	6669.292	.421
	TS_LEX_M1X_M2Y	-28848.178	.691	-17899.351	.596
	Normalized_ Frequency	-1139.671	.220	119.863	.581
	Revision	119106.689	.000	4598.283	.346
	Sentence_Initial	7327.851	.811	11425.399	.074
	Sentence_Final	-10903.040	.770	-9249.667	.250
	Preceding_Pause_ Duration	.549	.104	.825	.000
	Total_Keystroke_ Count	499.574	.468	422.313	.000
	Final_Character_ Count	3666.125	.730	-130.128	.647
	Total_Task_Time	.006	.767	.002	.475
	User_Events_Per_ Minute	-693.742	.527	-128.995	.148

*Dependent variable: *Total_Production_Time*

The table presents models 4 for both the Norwegian and the German language group side by side, containing the variables that are shared in the analyses of both groups. A number of variables in the table are interesting to look at since they display opposite characteristics for the two language groups, that is, values are positive indicating an increase in predicted production time for one language group, while values are negative indicating a reduction of predicted production time for the other language group. Regarding the strategy variables, the majority of variables display the same directional effect on the dependent variable for both groups. M1-M2, M-PP, and M1X-M2Y cause a reduction in predicted production time, and M1-D1 display an increasing effect for both groups. However, the strategy types M-D and DEL display an increasing effect for the Norwegian participants, while the effect is negative for the German group. Thus, selecting these strategies is predicted to cause the Norwegian participants to invest more time into the translation, while it causes the German students to invest less time. *Normalized Frequency*, on the other hand, displays a negative effect for the Norwegian language group (-1139.671 *ms*), whereas the effect is slightly positive for the German group (119.863 *ms*). This is an interesting difference indicating that the effect of metaphor conventionality measured by this variable appears to result in faster production time for the Norwegian participants, while it slows down production for the German students. Finally, the variable of *Final Character Count* displays an opposing development for the two language groups as well. The longer the final target text expression, the more time is spend by the Norwegian participants on the production process (3666.125 *ms*). However, for the German participants the effect is marginally negative (-130.128 *ms*) suggesting that the longer the final target text expression is, the faster production time is predicted to become. None of the relations discussed specifically are statistically significant for either group. The remaining effects are alike between both language groups. Revision increases production time, and the contrasting effects of the variables *Sentence Initial* and *Sentence Final* are comparable. In the following, the specific individual participant groups are compared.

Table 46 presents the comparison of the two 1st year beginners groups.

*Table 46: Comparison multiple regression analysis TS_LEX – model 5.1-NOR-GER**

		Norwegian		German	
Model		Unstandardized B	Sig.	Unstandardized B	Sig.
5.1	(Constant)	73271.331	.587	10498.107	.577
	TS_LEX_M1_M2	-12630.488	.674	-9039.117	.084
	TS_LEX_M_PP	-15167.172	.650	-9527.471	.141
	TS_LEX_M_D	36641.926	.285	-2560.454	.709
	TS_LEX_DEL	8216.958	.897	-2695.182	.758
	TS_LEX_M1_D1	145572.788	.082	6680.849	.421
	TS_LEX_M1X_M2Y	-25765.847	.721	-18032.359	.594
	Normalized_ Frequency	-1135.456	.218	121.881	.576
	Revision	114660.931	.001	4450.225	.366
	Sentence_Initial	5435.508	.858	11469.978	.074
	Sentence_Final	-7680.440	.836	-9355.178	.246
	Preceding_Pause_ Duration	.610	.071	.824	.000
	Total_Keystroke_ Count	577.210	.399	423.113	.000
	Final_Character_ Count	3579.053	.734	-131.597	.644
	Total_Task_Time	-.001	.961	.002	.491
	User_Events_Per_ Minute	-1123.161	.313	-126.924	.157
	Participant_Group_ 1stYear_Beg	43006.892	.069	-1020.836	.799

*Dependent variable: *Total_Production_Time*

The most noteworthy observation in this analysis are the contrasting values of the group variable itself. While production time is predicted to increase substantially when a participant of the Norwegian 1st year group translates the expressions (43006.892 *ms*, 43 *s*), it is predicted to decrease by about 1 second (-1020.836 *ms*) when a participant of the respective German group translates. The majority of variables exhibit the same negative or positive effects as discussed for the previous model. However, in addition to the opposing values described in model 4 (M-D, DEL, *Normalized Frequency* and *Final Character Count*), the variable *Total Task Time* displays a diametrical development. The effects are negligible (-0.001 *ms* for the Norwegian group and 0.002 *ms* for the German group), but imply that, as a general tendency, the longer the Norwegian participants need to complete the whole translation task, the smaller are the production time values they exhibit for the translation of the specific metaphorical expressions. The German participants, on the other hand, appear to translate the expressions slower, the longer it takes them to complete the whole translation task. None of the individual effects discussed are statistically significant for either group.

In Table 47, the two 1st year end groups are compared. Both language groups are predicted to exert a negative effect on *Total Production Time* (- 33046.432 *ms* and – 2510.202 *ms*), thus decreasing predicted production time. The size of the effect however differs. The Norwegian group exhibits a much larger effect (-33 *s*) than the German group (-2.5 *s*). Linguistic changes (M1-M2), paraphrasing (M-PP), and an image-schematic change (M1X-M2Y) carry negative values in both groups (decreasing production time), while M1-D1 carries a positive value for both groups (increasing production time). The previously observed differences persist for the M-D and the deletion strategy variables: effects are positive in the Norwegian group, but negative in the German group. In addition, *Normalized Frequency* and *Final Character Count* exhibit opposing effects in the two language groups as described previously. In addition, *Total Task Time* is marked by a positive value for both groups, indicating that total production time for the expressions is predicted to increase the longer the participants spend on the completion of the translation task. In the previous model, the effect was negative for the Norwegian 1st year beginners group. Statistical significance is not established for any of the variables discussed.

*Table 47: Comparison multiple regression analysis TS_LEX – model 5.2-NOR-GER**

Model		Norwegian		German	
		Unstandardized B	Sig.	Unstandardized B	Sig.
5.2	(Constant)	40353.195	.758	10347.781	.580
	TS_LEX_M1_M2	-12352.892	.683	-8963.020	.086
	TS_LEX_M_PP	-14534.037	.666	-9362.616	.149
	TS_LEX_M_D	39522.973	.253	-2235.814	.743
	TS_LEX_DEL	20592.152	.752	-2892.458	.740
	TS_LEX_M1_D1	157852.914	.061	6426.626	.439
	TS_LEX_M1X_M2Y	-26491.709	.715	-17974.159	.596
	Normalized_ Frequency	-1081.834	.243	116.073	.594
	Revision	117924.196	.001	4769.756	.329
	Sentence_Initial	5170.454	.866	11399.731	.075
	Sentence_Final	-12611.647	.735	-9190.223	.253
	Preceding_Pause_ Duration	.505	.136	.825	.000
	Total_Keystroke_ Count	493.898	.472	425.710	.000
	Final_Character_ Count	3356.133	.751	-138.172	.628
	Total_Task_Time	.009	.648	.002	.468
	User_Events_Per_ Minute	-738.721	.499	-126.816	.156
	Participant_Group_ 1stYear_End	-33046.432	.170	-2510.202	.550

*Dependent variable: *Total_Production_Time*

Table 48 encompasses the two 2nd year groups. These two groups display a coinciding negative effect on *Total Production Time* (-7132.554 *ms* Norwegian group, -2250.838 *ms* German group). The values differ, but not to the same extent as observed in the two 1st year end groups. The effects of the majority of variables concur for both groups, as described in the previous models. The same applies for the measurement of the deletion strategy, which carried positive values for the Norwegian participants in the past models (increasing predicted production time), as opposed to the negative values of the respective German groups. In the present model, the effect of deletion is negative also for the Norwegian participant group. Thus, the two language groups exhibit the same decreasing effect on *Total Production Time* when choosing to omit a source text expression from the target text.

*Table 48: Comparison multiple regression analysis TS_LEX – model 5.3-NOR-GER**

		Norwegian		German	
Model		Unstandardized B	Sig.	Unstandardized B	Sig.
5.3	(Constant)	50204.813	.717	9552.275	.610
	TS_LEX_M1_M2	-18408.913	.542	-9104.411	.082
	TS_LEX_M_PP	-19580.853	.565	-9677.968	.136
	TS_LEX_M_D	34521.793	.322	-2176.592	.750
	TS_LEX_DEL	-221.044	.997	-2752.444	.752
	TS_LEX_M1_D1	146524.894	.086	7085.344	.395
	TS_LEX_M1X_M2Y	-29425.128	.687	-18081.868	.593
	Normalized_ Frequency	-1143.370	.220	119.760	.582
	Revision	118343.809	.001	4765.485	.330
	Sentence_Initial	7123.405	.817	11496.498	.073
	Sentence_Final	-10464.962	.780	-9261.842	.250
	Preceding_Pause_ Duration	.564	.103	.822	.000
	Total_Keystroke_ Count	521.737	.454	418.210	.000
	Final_Character_ Count	3765.272	.724	-125.524	.660
	Total_Task_Time	.005	.792	.003	.442
	User_Events_Per_ Minute	-801.902	.502	-126.010	.159
	Participant_Group_ 2ndYear	-7132.554	.817	-2550.838	.603

*Dependent variable: *Total_Production_Time*

The strategy variable M-D is the only strategy variable in this model which continues to exhibit opposing effects for the two groups compared. The effect is positive for the Norwegian group (34.5 *s*) indicating a substantial increase in production time when selected by these participants as opposed to the negative effect in the German analysis (-2.1 *s*).

Finally, Table 49 presents the comparison of the two most advanced groups, the 3rd year groups.

*Table 49: Comparison multiple regression analysis TS_LEX – model 5.4-NOR-GER**

		Norwegian		German	
Model		Unstandardized B	Sig.	Unstandardized B	Sig.
5.4	(Constant)	44712.585	.735	5928.692	.753
	TS_LEX_M1_M2	-18057.137	.549	-8988.345	.084
	TS_LEX_M_PP	-17393.288	.607	-8510.388	.141
	TS_LEX_M_D	35599.992	.304	-2448.176	.719
	TS_LEX_DEL	-879.011	.989	-2043.138	.814
	TS_LEX_M1_D1	149454.964	.077	7201.042	.384
	TS_LEX_M1X_M2Y	-27876.184	.702	-19483.088	.563
	Normalized_Frequency	-1153.232	.216	122.778	.571
	Revision	119577.626	.000	4521.835	.353
	Sentence_Initial	7925.346	.797	11844.741	.064
	Sentence_Final	-10122.884	.787	-9827.209	.221
	Preceding_Pause_Duration	.556	.101	.815	.000
	Total_Keystroke_Count	486.051	.482	425.920	.000
	Final_Character_Count	3587.831	.736	-149.544	.599
	Total_Task_Time	.004	.855	.003	.442
	User_Events_Per_Minute	-615.500	.582	-101.184	.266
	Participant_Group_3rdYear	-11962.663	.705	6839.003	.144

*Dependent variable: *Total_Production_Time*

The two groups differ in their individual effects on predicted production time. While the Norwegian group exhibits a negative effect (-11962.663 *ms*) on predicted production time, the participants of the German group are predicted to cause prolonged production time values (6839.003 *ms*). This is a rather remarkable difference considering that this is the only German group that exerts a positive effect on predicted production time.

The strategy variable M-D and the variables *Normalized Frequency* and *Final Character Count* display opposing effects. The selection of the M-D strategy and the measurement of *Final Character Count* increase production time for the Norwegian participants, but decrease it in the case of the German participants. *Normalized Frequency*, on the other hand, exhibits a decreasing effect in the analyses for the Norwegian 3rd year group, while the effect in the German data set is increasing. The remaining variables display comparable effects (either positive or negative) for both language groups.

Summing up, considering the individual strategy variables, the majority of variables demonstrate similar effects in both language groups. Strategies involving similar mapping but linguistic changes (M1-M2, M1X-M2Y) from source- to target text as well as paraphrasing (M-PP) have a negative effect on production time, while strategies marked by different conceptual mappings but a retention of linguistic items (M1-D1) increase predicted production time.

The M-D strategy is an interesting exception here. For all German groups, the values are negative indicating a decreasing effect on predicted production time, while the effect is positive for all Norwegian groups. Finally, deletion appears to slow down the two least experienced Norwegian 1st year groups (positive values), while all remaining groups, both Norwegian and German (also the two 1st year groups), exhibit negative values for this strategy variable. Considering the specific individual effects of the different participant groups, the effects appear to be directly contrastive. In the Norwegian language group, the least experienced group, the 1st year beginners group, displays a predicted positive effect (increasing production time), while in the German language group the most experienced group, the 3rd year group, exhibits a positive value. All the remaining groups exhibit negative values (decreasing effects), which, in the case of the 1st year end groups and the 2nd year groups is a common effect of the two language groups. Differences apply to the variables *Normalized Frequency* and *Final Character Count*. The former exhibits negative values for all Norwegian groups (decreasing effect) and positive values for all German groups (increasing effect), while the reverse is true for the variable *Final Character Count* . Regarding the remaining variables, similar tendencies can be described for all participant groups in both language groups. Revision increases predicted production time, as does the location of the source text expression at the beginning of a sentence. If, however, the expression is located at the end of a sentence, production time is predicted to be reduced. The duration of the pause preceding the first keystroke of the target text expression has a negligibly increasing effect. The number of keystrokes that are performed to finalize the target text expression (*Total Keystroke Count*) has an increasing effect as well. Finally, the number of user events performed per minute has a decreasing effect on production time. The more user events per minute, the longer the production of the individual metaphorical expressions is predicted to be.

The following section presents the same comparative analyses for the category of conceptual translation strategy types.

4.2.3.2 Conceptual Translation Strategy Types

In the subsequent tables, group effects as well as the effects of individual variables (e.g., strategy types) are compared between the two language groups considering the categorization of strategies on the level of conceptual mappings.

Table 50 presents the comparison of the two language groups in general, that is, no specific participant group is considered. Regarding the different strategy variables, both language groups exhibit the same types of effect on predicted production time. Compared to the reference strategy M-M (retention of the conceptual mapping in the target text), a change of conceptual mapping from source- to target text is predicted to cause both groups to spend more time on the translation of the specific expressions (positive, increasing effect).

*Table 50: Comparison multiple regression analysis TS_CONC – model 4-NOR-GER**

		Norwegian		German	
Model		Unstandardized B	Sig.	Unstandardized B	Sig.
4	(Constant)	54074.782	.680	7019.910	.705
	TS_CONC_M_D	56983.137	.069	5648.418	.277
	TS_CONC_M_PP	-9285.073	.762	-4905.938	.406
	TS_CONC_DEL	5425.211	.931	1732.756	.832
	Normalized_ Frequency	-1285.087	.152	90.479	.673
	Revision	116513.322	.001	4902.294	.310
	Sentence_Initial	5124.370	.864	8537.595	.174
	Sentence_Final	-900.387	.980	-10095.674	.201
	Preceding_Pause_ Duration	.608	.069	.827	.000
	Total_Keystroke_ Count	463.956	.488	429.423	.000
	Final_Character_ Count	1627.666	.872	-141.258	.623
	Total_Task_Time	.004	.832	.002	.535
	User_Events_Per_ Minute	-853.653	.433	-126.528	.156

*Dependent variable: *Total_Production_Time*

It has been highlighted previously that the individual effect of the M-D strategy type in the comparison of the analyses of the linguistic strategy types exhibits opposing effects in all models (Norwegian increasing, German decreasing). However, the sum of linguistic strategy types included in the respective conceptual strategy type M-D (M-D, M1-D1, MX-DY) reveals a concurrent positive effect in both language groups. A comparable positive effect can be observed for the omission of parts of an expression or even the complete expression (DEL). Selecting strategy types of deletion is predicted to increase production time in both language groups. Paraphrasing into non-metaphorical language (M-PP), on the other hand, has a negative effect on predicted production time causing both groups to spend less time on the translations (negative, decreasing effect). Effect differences are thus restricted to size (effects are generally larger for the Norwegian group), and not to effect direction (increasing or decreasing). For example, paraphrasing is predicted to decrease production time by 9 seconds in the Norwegian subset, while the respective value is only close to 5 seconds in the German analysis. The only variable in this model that sets the two groups apart is *Normalized Frequency*. The Norwegian group exhibits a negative effect, while the German group exhibits a very small positive effect. However, none of the effects of the variables discussed so far are statistically significant. Only *Revision* (Norwegian group), *Preceding Pause Duration,* and *Total Keystroke Count* (German group) display significance values below .05.

The first individual participant groups, the beginners groups, are compared in Table 51. As established previously, the groups themselves differ in their effects on predicted production time. While the Norwegian group exhibits a substantial increasing effect (44684.470 *ms*), the German group accounts for a negative effect (-1111.668 *ms*). The strategy variables display the same effects as discussed in the previous model (M-D and DEL positive effect, M-PP negative effect), which are similar for both the Norwegian and the German participant group. Effect sizes however differ, at times considerably. Besides the group variable itself and *Normalized Frequency* (see previous model), the variables *Final Character Count* and *Sentence Final* display opposing effects. While the variables exerts a positive increasing effect for the Norwegian beginners group (e.g., the longer the final target text expression, the longer production time is predicted to be), the opposite effect is revealed for the German group (e.g., the longer the final target text expression, the shorter production time is predicted to be). The same differences have been described in the respective comparative analysis of the linguistic strategy types.

*Table 51: Comparison multiple regression analysis TS_CONC – model 5.1-NOR-GER**

		Norwegian		German	
Model		Unstandardized B	Sig.	Unstandardized B	Sig.
5.1	(Constant)	87940.450	.503	7583.966	.685
	TS_CONC_M_D	54926.579	.077	5545.131	.288
	TS_CONC_M_PP	-7654.145	.802	-4901.062	.407
	TS_CONC_DEL	10731.457	.863	1831.556	.823
	Normalized_ Frequency	-1297.249	.145	91.492	.670
	Revision	112805.148	.001	4766.775	.327
	Sentence_Initial	4009.262	.892	8578.165	.172
	Sentence_Final	1929.493	.957	-10182.637	.198
	Preceding_Pause_ Duration	.667	.045	.826	.000
	Total_Keystroke_ Count	569.911	.392	430.285	.000
	Final_Character_ Count	1553.330	.877	-143.188	.619
	Total_Task_Time	-.003	.886	.002	.555
	User_Events_Per_ Minute	-1270.785	.249	-124.336	.166
	Participant_Group_ 1stYear_Beg	44684.470	.057	-1111.668	.781

*Dependent variable: *Total_Production_Time*

In Table 52, the analyses of the two 1st year end groups are compared. Both groups exhibit a negative effect on predicted production time, with differing effect sizes however (Norwegian -34 *s*, German -2 *s*). The individual strategy variables follow the same effect type patterns (increasing, decreasing) as discussed in the previous two models (M-D, DEL increasing, M-PP decreasing).

*Table 52: Comparison multiple regression analysis TS_CONC – model 5.2-NOR-GER**

Model		Norwegian Unstandardized B	Norwegian Sig.	German Unstandardized B	German Sig.
5.2	(Constant)	55114.600	.673	7246.899	.696
	TS_CONC_M_D	59429.722	.058	5582.337	.284
	TS_CONC_M_PP	-7624.416	.803	-4846.019	.412
	TS_CONC_DEL	23162.681	.717	1740.949	.831
	Normalized_ Frequency	-1257.955	.160	89.709	.676
	Revision	116200.118	.001	4982.099	.303
	Sentence_Initial	3742.720	.900	8535.436	.174
	Sentence_Final	-2758.444	.939	-10111.592	.201
	Preceding_Pause_ Duration	.562	.093	.827	.000
	Total_Keystroke_ Count	483.700	.468	432.188	.000
	Final_Character_ Count	1222.473	.904	-145.684	.613
	Total_Task_Time	.008	.708	.002	.528
	User_Events_Per_ Minute	-879.055	.418	-124.896	.163
	Participant_Group_ 1stYear_End	-33803.173	.155	-1949.194	.642

*Dependent variable: *Total_Production_Time*

The same applies to the opposing effects discussed for the beginners groups in the previous model (*Normalized Frequency, Final Character Count*). The variable *Sentence Final* exhibits also the same effect type (decreasing) in both language groups. General differences between the two language groups in this model are largely restricted to effect sizes.

Both 2nd year groups exert a predicted negative effect on production time (Table 53).

*Table 53: Comparison multiple regression analysis TS_CONC – model 5.3-NOR-GER**

		Norwegian		German	
Model		Unstandardized B	Sig.	Unstandardized B	Sig.
5.3	(Constant)	64059.488	.642	6526.057	.726
	TS_CONC_M_D	55943.869	.078	5975.652	.255
	TS_CONC_M_PP	-9975.239	.747	-4994.657	.398
	TS_CONC_DEL	3844.492	.952	1799.456	.826
	Normalized_ Frequency	-1284.787	.154	89.306	.678
	Revision	115673.081	.001	5069.131	.296
	Sentence_Initial	4914.708	.870	8589.378	.172
	Sentence_Final	-441.559	.990	-10078.645	.203
	Preceding_Pause_ Duration	.623	.067	.824	.000
	Total_Keystroke_ Count	486.345	.473	425.618	.000
	Final_Character_ Count	1720.501	.866	137.534	.633
	Total_Task_Time	.004	.856	.002	.501
	User_Events_Per_ Minute	-964.963	.416	-123.584	.168
	Participant_Group_ 2ndYear	-7365.593	.809	-2358.313	.633

*Dependent variable: *Total_Production_Time*

The same effect types apply as for the previous three analyses (M-D, DEL increasing, M-PP decreasing). The only opposing effect in this model concerns the variable *Normalized Frequency* (Norwegian decreasing, German increasing). Effect sizes however differ for the majority of variables.

Finally, in Table 54 the analyses of the two most advanced groups, the 3rd year groups, are compared. These two groups differ in their predicted effect on production time. The Norwegian group decreases production time, while the German group exhibits an in increasing effect. For the first and only time in the analyses in this section, an opposing effect concerning one of the strategy variables can be observed. The paraphrasing strategy, which exhibits a predicted negative effect on production time for all previously analyzed participant groups of both language groups, does display a predicted positive effect for the German participant group.

*Table 54: Comparison multiple regression analysis TS_CONC – model 5.4-NOR-GER**

		Norwegian		German	
Model		Unstandardized B	Sig.	Unstandardized B	Sig.
5.4	(Constant)	58868.854	.656	3423.835	.855
	TS_CONC_M_D	57275.997	.068	5721.770	.270
	TS_CONC_M_PP	-8238.960	.790	4921.246	.403
	TS_CONC_DEL	2955.888	.963	2478.071	.762
	Normalized_ Frequency	-1299.482	.149	90.595	.672
	Revision	117034.054	.001	4849.460	.314
	Sentence_Initial	5697.065	.849	8889.768	.156
	Sentence_Final	177.749	.996	-10581.897	.180
	Preceding_Pause_ Duration	.617	.066	.818	.000
	Total_Keystroke_ Count	447.792	.505	432.986	.000
	Final_Character_ Count	1598.238	.875	-156.163	.587
	Total_Task_Time	.002	.925	.002	.507
	User_Events_Per_ Minute	-769.411	.488	-101.611	.265
	Participant_Group_ 3rdYear	-12903.380	.681	6141.258	.191

*Dependent variable: *Total_Production_Time*

Thus, only for this specific group does the selection of this strategy appear to result in a predicted increase of production time values. Furthermore, for this specific group, all strategy variables, also paraphrasing, display a predicted positive effect. The German 3rd year group appears to set itself apart from the respective Norwegian participant group. Compared to the retention of the conceptual mapping (M-M), the selection of any conceptual strategy type (change of conceptual mapping, paraphrasing, deletion) is predicted to cause the German 3rd year group to slow down during the translation process. In addition to the opposing variables discussed previously (*Normalized Frequency*, *Final Character Count*), the variable *Sentence Final* exhibits opposing predicted effects as well (see also the respective 1st year beginners group). In other words, when the source text expression is located at the end of a sentence, a condition which is assumed to reduce production time (*cf*. Sjørup 2013; previous analyses), production time is increased for this particular participant group. The German group, on the other hand, follows the predicted pattern.

In summary, with regard to the different conceptual strategy variables, a change to a different conceptual mapping (a different metaphor, M-D) causes increased production time values (slowing down translation), while paraphrasing (M-PP) causes decreased production time values (speeding up translation) compared to the reference strategy M-M, which is the retention of the conceptual mapping in the target text expression. Interestingly, deletion of parts of an expression or even the complete expression (DEL) causes all groups to slow down (positive effects). The only exception from this pattern is to be observed in the analysis of the German 3rd year group, which exhibits a predicted positive effect also for the paraphrasing strategy. As discussed in the comparative analyses of the linguistic translation strategy types, the individual participant groups exhibit opposing effects on predicted production time for the least advanced groups (1st year beginners groups) and the most advanced groups (3rd year groups). The effect of the Norwegian beginners group is positive while it is negative for the 3rd year group. The effect pattern is reversed in the analyses of the German groups. The measurement of *Normalized Frequency* is the only variable which consistently displays opposing predicted effects for both language groups throughout all models. The predicted effect is negative (decreasing) when translated by any of the Norwegian participant groups, while it is positive (increasing) when translated by any of the German groups. Statistical significance is only established consistently for the variables *Revision* (Norwegian group), *Preceding Pause Duration,* and *Final Character Count* (German group). The remaining variables exhibit comparable predicted effect types (positive, negative) for the two language groups, and are not statistically significant.

5. Discussion

This chapter aims to bring together the results of the analyses presented in Chapter 4 (analysis 1 and analysis 2), the theoretical assumption of production time as an indicator of cognitive effort, the theory of metaphor in translation, as well as the development of professional translation competence. The structure of the chapter follows the order of the research questions presented in Chapter 1. The first section, 5.1, discusses the results of the empirical analyses in relation to research questions 1 and 2:

1. Which metaphor translation strategies do the different subject groups select?

1a. Are there differences or similarities between the groups according to their advancement in the study program (1st, 2nd, 3rd year)?

1b. Are there differences or similarities between the two different L1 groups (Norwegian, German)?

2. What is the relationship between production time and translation strategy?

2a. Do these results vary across the subject groups according to their advancement in the training program?

2b. Do these results vary across the subject groups according to the target language (Norwegian, German)?

Section 5.2 reviews the results in the light of research question 3:

3. What do the measurements of production time in relation to specific metaphor translation strategies disclose about cognitive effort invested during the translation process?

Finally, Section 5.3 discusses the focal point of the study, translation competence development (research question 4):

4. Does the distribution of cognitive effort change over time indicating some form of translation competence development?

The discussion will draw on theoretical and empirical considerations presented in Chapter 2. More specifically, the discussion will focus on previous research by Jensen (2005) and Sjørup (2013) presented in Section *2.5.3*.

5.1 Empirical findings

Considering the quantitative use of the different types of translation strategy (analysis 1, Section *4.1*; research questions 1, 1a and 1b) in both the linguistic and the conceptual category, clear tendencies are visible. In the linguistic category, all participant groups in both language groups resort to the word-to-word strategy type (M-M) most often, indicating that translations which do not involve any linguistic or semantic changes from source- to target text expressions dominate their translations. However, this is closely followed by the substitution of the source text metaphor for a different metaphor in the target text (M-D). Thus, the students do not appear to shy away from translations involving substantial linguistic (as well as conceptual) changes from source- to target text expressions. So much so, that the M1-M2 strategy, which retains the source text metaphor in the target text with a varying extend of linguistic changes is selected less than the M-D strategy. Paraphrasing into non-metaphorical language (M-PP) and strategy types involving complete or partial deletion of metaphorical expressions in the target text (DEL, M-M/DEL) are relegated to the lower end of the list, that is, these strategies are selected less or rather seldom by all participants irrespective of their affiliation to a specific participant group (or language group). Thus, metaphorical strategy types appear to be selected more often than non-metaphorical types.

The same tendencies can be observed for the strategy types representing the conceptual strategy category. Similar conceptual mappings between source- and target text expression are selected most often, followed by a different conceptual mapping. In general, metaphorical strategy types, that is strategies resulting in the same or a different metaphor (conceptual mapping) in the target text (M-M, M-D), are selected more often by all participant groups than non-metaphorical strategies (paraphrasing, deletion and non-translation).

Interestingly, these findings differ to some extent from both Jensen's (2005) and Sjørup's (2013) findings. While, comparable to the present analyses, the word-to-word strategy is the prevailing translation strategy in both Jensen's and Sjørup's analyses, the respective participant group in Jensen's data set, the non-professionals, select the deletion strategy almost as much as the strategy M-M (M-M = 43%, DEL = 41%). Sjørup did not include the strategy type deletion into her empirical framework. In her data, on the other hand, the non-metaphorical paraphrasing strategy (M-P) is represented more often than the metaphorical strategy involving a linguistic and conceptual shift (M-D). Thus, it can be concluded that non-metaphorical translation strategies (deletion and paraphrasing) appear to be more prominent in the two Danish studies than in the present study.

Although Jensen acknowledges the distinct prevalence of the word-to-word strategy on all levels of professionalism (non-professionals, young professionals and experts), she hypothesizes that experienced translators (professional translators) opt for metaphorical translation solutions (M-M, M-D),while less experienced translators resort to non-metaphorical strategies, mainly deletion but also paraphrasing (2005, pp. 183-184). The present data cannot corroborate this claim. On the contrary, all participant groups, even the 1st year beginners groups, select metaphorical solutions more often than non-metaphorical solutions. There are, however, differences between the groups regarding how much more or less specific strategy types are selected. For example, the German 1st year end group selects the conceptual M-D strategy in 25% of the cases and the deletion strategy in 9% of the cases, whereas the 2nd year group selects the same strategies in 29% and 6% of the cases respectively. Thus, it may be concluded that the latter group resorts to metaphorical translation strategy types in more of the cases than to non-metaphorical types, whereas the difference between strategy types is smaller in the case of the former group. However, clear tendencies (towards metaphorical strategies, away from non-metaphorical strategies) cannot be identified in the data according to advancement in the study program in either language group. In other words, the data do not show that participants select more and more metaphorical strategy types and less and less non-metaphorical strategy types, the longer they have been studying (and practicing) translation. In this specific instance for example, the German 3rd year group exhibits values just below the level of the 2nd year group (M-D 28%). Changes are more diffuse and fluctuant in the Norwegian data set.

Comparing the two language groups (Norwegian, German), similar general tendencies are disclosed regarding the selection of translation strategy types, both on the linguistic and the conceptual level: metaphorical strategy types precede the selection of non-metaphorical types. It is thus concluded that this finding, which differs from previous research, persists in both data sets. It may be assumed that some form of macro strategy is at work here, which leads the participants (of all groups) to maintain non-literal language in the target text. A systematic pattern of change or similarity amongst the individual participant groups of each language group cannot be established across the language groups. In other words, development in terms of the quantitative selection of specific strategy types cannot be established on a general basis. This may be influenced by the small number of participants, a condition of the study which strengthens the effect of individuality and weakens the potential of generalizability.

The dominating selection of strategy types which pertain to conceptual (and linguistic) similarity between source- and target expression may also be influenced by the relative closeness of source- and target languages. Van den Broeck (1981) refers back to Even-Zohar's general laws of translatability (1971), which postulate that, amongst other things, translatability is high if there's contact between source- and target culture, and if there is a general parallel cultural development. Al-Hasnawi (2007) claims that conceptual differences between cultures hamper translation, especially "when translating between two distant cultures" (Chapter 2, no pagination). The farther apart two cultures are, the more different these two cultures may conceptualize reality. In the present case, it is argued that source- and target cultures are rather close. The English, Norwegian, and German cultures are Western European cultures, which exhibit similar cultural developments (e.g., political system, social characteristics) over centuries, and have been, and are, in constant (close) contact. The same applies to the Danish culture represented in Jensen's study. A study involving different, remote cultures may very well yield different results (e.g., the selection of different strategy types).

In conclusion, an exclusively product-oriented analysis as conducted by Jensen, as well as in the first part of this study, appears to be insufficient and inconclusive to answer inquiries into the distribution of cognitive effort and the development of translation competence from a cognitive perspective. The operationalization of the measurement of cognitive effort (production time) is assumed to overcome such insufficiencies.

Production time as investigated by Sjørup (2013), and in analysis 2 of this study (Section *4.2*; research questions 2, 2a and 2b), aims to provide further (or extended) insight into the subject. Based on her analysis, Sjørup claims that there is a correlation between the number of times a specific strategy is selected by the translator and production time values attributed to this strategy type. Strategies which are used less are marked by longer production time values, whereas strategies which are used more often are marked by smaller production time values. Sjørup suggests that translators opt for strategies which require less production time as opposed to strategies which require longer production time. In general, the present analysis cannot unambiguously corroborate this conclusion. The quantitative order of selection, how often a specific strategy type is selected, does not follow any particular discernible pattern regarding production time. Linguistic strategy types which are chosen more often by the participants are not marked by larger (or the largest) decreasing effects on production time than strategies which are chosen less or infrequently. In other words, the participants of the present study do not opt for strategy types which are characterized by small production time values.

Looking at the different strategy types from the point of view of linguistic features (linguistic translation strategy types), two different types of observations evidence this conclusion: 1) Strategy types that cause increased production time (e.g., M-D) are selected more often than strategy types which exhibit a decreasing effect (e.g., M-PP). For example, the M-D strategy is chosen more often by the Norwegian participants than the M1-M2 strategy, although the former displays a large positive value (increasing effect), while the latter is predicted to decrease production time (*cf.* Table 22). 2) Strategy types which are chosen often display decreasing effects, less so, however, than lesser used strategy types exhibiting the same effect type. For example, the M-D strategy is chosen more often by all German participants than the M1-M2 strategy. The former displays a negative effect of about 2.4 seconds, while the latter exhibits a negative effect of 9 seconds. However, certain patterns pertaining to production time are detectable in the analyses of the linguistic translation strategies. Strategy types which pertain to linguistic changes exclusively (e.g., M1-M2, M-M-DEL, M1X-M2Y) exhibit decreasing effects. Strategy types which include a linguistic change as well as a change of conceptual mapping from source- to target text, on the other hand, exhibit increasing or small decreasing effects (e.g., M-D, M1-D1). Regarding the order of selection, however, concurrent development cannot be established between the type of strategy and larger or smaller effects on production time. Thus, from the present analyses, it can be concluded that production time does not appear to determine the selection of specific strategy types. The participants of the present study do not exhibit a general behavioral pattern, as suggested by Sjørup, which reflects the selection of strategy types which are marked by decreasing production time effects above strategies marked by increasing production time effects. On the contrary, considering the results of analysis 1 of both language groups, the type of strategy (metaphorical, non-metaphorical) appears to play a more important role than production time effects.

Considering the category of conceptual translation strategy types, the tendencies discussed above become even clearer. The order of selection of strategy types regarding similarity or differences of conceptual mappings (metaphorical solutions), as well as non-metaphorical translation solutions in source- and target texts is not determined by predicted increasing (longer production time values) or decreasing effects (smaller production time values) on production time. All participant groups resort most often to strategy types which do not pertain to changes of the conceptual mappings (M-M), but retain the source text mapping in the target text expression. A change of conceptual mappings, on the other hand, that is the complete replacement of the source text metaphor with a different metaphor in the target text (M-D), exhibits an increasing effect (prolonged production time values). However, the strategy is preferred to other, non-metaphorical strategies, which do exhibit smaller effects (M-PP, NT) indicating smaller production time values. In other words, strategy selection is not determined by production time effects (smaller or larger production time values). On this level of analysis (conceptual translation strategy types), the previous conclusion is substantiated. Metaphorical translation solutions (same or different conceptual mapping in target text) are opted for more often than non-metaphorical solutions, even if this involves spending more time on the translation of the specific expressions.

Differences between individual participant groups regarding the production time effects and effect sizes of the different strategy types are absent (effect type) or negligibly small (effect size). Effect types (increasing, decreasing) are largely based on strategy type (metaphorical, non-metaphorical) and effect sizes rarely change considerably. Observed differences which are of interest are bound to specific participant groups (individual group effects) and cannot be established for other groups. For example, the Norwegian 1st year groups (beginners and end) select the deletion strategy more often than the comparable 2nd and 3rd year groups. The effect is positive for the two former groups (increasing) and negative for the two latter groups (decreasing). Similar developments cannot be established for the respective German participant groups. Thus, the effect is confined to these groups and may be conditioned by other factors than the ones considered in this study.

Across the two language groups, the majority of strategy variables demonstrate similar effects. On the linguistic level of analysis, an interesting difference is observable: For all German groups, the effect is negative, while it is positive for all Norwegian groups. This difference does, however, disappear on the conceptual level of analysis, where the collective effect of strategy types pertaining to a conceptual change of metaphor between source- and target text is negative for all participant groups in both language groups.

Regarding the additional variables in the analyses of production time, certain tendencies can be described. The measurement of metaphor conventionality exerts a negative effect on predicted production time in the analysis of the Norwegian data set, while the same effect is positive in the German data set. Thus, the more conventionalized an expression is in English, the faster it is translated by the Norwegian participants, while the German participants translate slower and slower the more conventionalized a source text expression is. This difference is rather interesting. Since, however, the study focuses on the actual translation behavior of the participants, and not, for example, on linguistic and conceptual similarities/differences between source- and target languages, it is not possible to make any statements or claims as to the reasons for this consistent difference between the two language groups. It also needs to be pointed out that none of the correlations between production time and *Normalized Frequency* are statistically significant.

Considering the remaining additional variables, particular tendencies can be identified. Revision causes increased production time effects in all analyses, which is not surprising given that additional changes to target text expressions are expected to prolong production time. Source text expressions located at the beginning of a linguistic unit (sentence) cause increased production time, while a location at the end of a sentence causes production time to be reduced. This corroborates Sjørup's claim that it is "likely that participants would engage in more planning and deliberation activities when initiating production of a sentence" (2013, p. 129). It can be assumed that pauses (as markers of such planning and deliberation activities) preceding the physical production of a target text expression (first keystroke), which are included in the measurement of production time, are longer for source text expression located at the beginning of a sentence than for source text expressions located at the end of a sentence. Thus, production time is predicted to increase for the one variable, and decrease for the other. Since this correlation is established for professional translators (Sjørup) and different levels of experience of translation students (present study), it can be assumed that this is a sign of general translation behavior and not linked to a certain degree of translation competence. There may of course be differences regarding the size of the effect with regard to different levels of experience. This requires further investigation, however. In general, due to the nature of the analyses, no specific effects could be established for the additional variables to one or several of the individual strategy variables. If effects were present (e.g., effect type change for linguistic strategy variable M1-M2 from positive to negative in Norwegian model 3, Table 65, Appendix N) they were singular effects (restricted to one model) or could not be attributed to a specific variable in a block of variables added to the model simultaneously. In other words, it could not be established whether, for example, revision results in longer production time for certain translation strategy types than others. Such investigations need to be the object of subsequent studies.

Finally, considering the effects of the individual groups on production time (including all variables), no clear tendencies can be established. Translation does not get faster or slower, the more advanced the students become. For example, the negative effect size increases from the 1st year beginners group to the 2nd year group in the German data set. It may thus be assumed that the German students indeed become faster in translating the more advanced they are in the study program. However, the 3rd year group exhibits a positive effect, which indicates that they are the slowest, although most advanced, participants in the German part of the study. This appears to corroborate earlier theoretical considerations within translation competence development by, for example, Pamela Gerloff (1988), who states that "translation gets neither 'easier' nor faster as one becomes more knowledgeable in the language and more practiced in translation" (p. 145). However, the Norwegian data set exhibits a different development, where the 1st year beginners group is the fastest while the 1st year end group is the slowest. The effect is thus not established in both data sets. Due to the low number of observations, a generalizable statement is neither feasible nor aimed at.

In conclusion, neither Jensen's nor Sjørup's findings and conclusions can be corroborated by the present study. Non-professional translation behavior (student translation behavior) is not marked by choosing non-metaphorical translation strategy types over metaphorical strategy types, or strategy types which do not require accessing the conceptual level over strategy types which do (Jensen, 2005). Furthermore, production time length is not a decisive factor for the participants of this study when translating metaphorical expressions. Strategy types characterized by decreasing production time effects (shorter production time) are not chosen more often than strategy types characterized by increasing production time effects (longer production time). In the following, the empirical findings discussed in this section will be related to the investigation of cognitive effort in translation answering research question 3: What do the measurements of production time in relation to specific metaphor translation strategy types disclose about cognitive effort invested during the translation process?

5.2 Cognitive effort

Mandelblit (1996) argues that metaphor translation is dependent on linguistic and conceptual relations between source- and target culture. She distinguishes between translation under the same mapping conditions (conceptual similarity, SMC) and different mapping conditions (conceptual dissimilarity, DMC), and claims that the latter requires a shift from the linguistic to the conceptual level of a metaphorical expression, and a shift between source language conceptualization and target language conceptualization, during the translation process (1996, p. 486; cognitive translation hypothesis). A distinction based on conceptual similarity or differences between source- and target expression, and its implication for translation process, provides a useful tool to analyze and discuss the results presented in the first section of this chapter. Tirkkonen-Condit agrees with Mandelblit and suggests that a "literal rendition may be the first that comes to mind […]. The effort it takes to get rid of the literal rendering may be exactly the thing that causes delay in instances of domain conflict" (2002, p. 115). Thus, Tirkkonen-Condit relates increased translation time in metaphor translation due to a conceptual mismatch between source- and target language to cognitive effort, more precisely to increased cognitive effort. Whether or not this effort is indeed related to the rejection of a 'literal rendition' has not been the aim of the present study. It does, however, provide the basis for the interpretation of the results of the empirical investigation of production time as indicator of cognitive effort. Linguistic and conceptual similarity or difference between source- and target text expression is assumed to involve different levels of cognitive effort which is expressed in production time length: translations involving differences lead to increased cognitive effort as evidenced by longer production times, while similarities reduce cognitive effort as evidenced by shorter production times.

With respect to the selection of particular translation strategy types, Jensen (2005) argues that a change of metaphor (M-D) and paraphrasing (M-PP) require accessing the conceptual level of a metaphor, and thus elevated cognitive effort, while a similar metaphor (M-M) and deletion (DEL) do not require such a shift and are thus classified as less effortful. This is partly in line with the argumentation presented by Mandelblit and Tirkkonen-Condit. An expression translated by selecting the M-M strategy falls presumably under Mandelblit's SMC category, and is thus marked by reduced cognitive effort. it needs to be pointed out here that Mandelblit's classification refers to the actual mapping conditions between two languages, while the identification of strategy types in the present study is based on actual translation behavior. This means that, for example, the M-M strategy type has been chosen by a participant even though the translation may not conform to the target language norm. In other words, the translation may be faulty, or follow a specific macro strategy like foreignization. The present data set was not subjected to qualitative evaluation. The same assumption applies, however. Translations operating under similar mapping conditions are assumed to result in reduced cognitive effort.

The deletion strategy, on the other hand, is not as easily categorized under these assumptions. Jensen appears to consider deletion as a fast way out of a translation problem, which does not require much time or effort. A change of metaphor and paraphrasing, on the other hand, fall under Mandelblit's DMC category. They are assumed to require increased cognitive effort. Jensen bases her assumptions on a distinction between non-professional and professional translation behavior. She claims that non-professional translators (less advanced translators) do not exceed the linguistic surface level of the metaphor (word-to-word translations, deletions) and only infrequently attempt to replace the metaphor in the source text with a different metaphor in the target text (M-D), or rephrase into non-metaphorical language (M-P). In other words, less experienced translators rarely engage in shifts from the linguistic to the conceptual level of a metaphor, which increases the amount of cognitive effort needed to complete the translation. They resort to strategy types which imply cognitive relief (reduced cognitive effort). However, while all participant groups in the present study rely mostly on translations on a word-to-word basis (M-M strategy), they also resort to the M-D strategy (and paraphrasing) more often than deletion. In fact, choosing another metaphor for the target text expression is the strategy selected most often after the M-M strategy. Jensen's conclusion can thus not be corroborated in the present study. If a change of metaphor (or paraphrasing) is indeed a sign of advanced translation behavior, because it is an indicator of cognitively accessing the conceptual level of the source text metaphor (cognitively effortful), then all participants of this study (also the very beginners) exhibit these characteristics, and could thus be classified as advanced translators. This does not refute the hypothesis that these strategy types (or any other strategy types) require accessing the conceptual dimension of a metaphor and are thus more effortful than others. This rather indicates that a distinction between inexperienced and experienced translation behavior cannot be made based on a clear-cut distinction between the selection of less- and more effortful strategy types. Specifically, if such a distinction between less- and more effortful strategy types is based on theoretical considerations alone. Whether or not specific translation strategies require more or less effort cannot be established from a quantitative analysis alone. Jensen presents a compelling argument for increasing cognitive effort when referring to the distinction between and accessing of the linguistic and conceptual level, but such an analysis cannot empirically corroborate such claims. Furthermore, Jensen's claim regarding the relation between the selection of cognitively more and less effortful strategies and the level of translation competence cannot be supported by the findings of this study.

Sjørup (2013) takes up Mandelblit's approach and investigates metaphor translation by operationalizing the concept of cognitive effort. Production time is taken as indicator of cognitive effort: longer production time indicates increased cognitive effort, while shorter production time is a marker of reduced cognitive effort. Mandelblit reports that shorter production time pertains to metaphor translations which operate under the same mapping conditions in source- and target text (SMC), while longer production time is characteristic of metaphor translations that are subjected to different mapping conditions in the source- and target text (DMC). Sjørup describes tendencies similar to Mandelblit, using specific translation strategies. Strategies which require a shift of conceptual mapping from source- to target text expression (M-D) are marked by longer production time values than strategies which do not require such a shift (M-M). Thus, indicated by production time values, strategies which do not require a change of conceptual mapping (M-M) require less cognitive effort than strategies which require such a change (M-D).

These particular conclusions can be drawn from the results of the present analyses as well. Taking production time effects as an indicator, strategy types that pertain to similar conceptual mappings in source- and target text expression are marked by decreasing effects (e.g., M1-M2, M1X-M2Y; smaller production time values), while strategies including a conceptual change are marked by increasing effects on predicted production time (e.g., M-D, M1-D1; larger production time values). Thus, the former are indicators of reduced (or low) cognitive effort and the latter indicators of elevated (or high) cognitive effort. In addition, strategy types which are classified as non-metaphorical translation solutions, paraphrasing and deletion, show clear tendencies: paraphrasing does not require increased cognitive effort (negative effect, short production time), while deletion does (positive effect, long production time).

Mandelblit proposes that elevated cognitive effort is caused by a shift from the linguistic to the conceptual level, which is required when the conceptual mapping undergoes a change from the source- to the target text expression. This is the same type of argumentation which underlies Jensen's study. From the analyses, it appears as if the present study corroborates this hypothesis: longer production time values, and thus elevated cognitive effort is found when strategy types are selected that require a conceptual change between source- and target text expression (accessing the conceptual level of a metaphorical expression). However, paraphrasing is marked by a negative effect (smaller production time values). Sjørup reports similar results. The paraphrasing strategy exhibits the second smallest production time values after the M-M strategy in her study. Jensen refers to paraphrasing as associative processing (2005, p. 204), which entails accessing the conceptual level. This, in turn, would lead to increased cognitive effort as indicated by longer production time values. However, in the present study, this does not seem to be the case for the paraphrasing strategy. On the contrary, this strategy is marked by one of the largest decreasing effects, indicating that it requires the least time to translate, and thus the least amount of cognitive effort. Thus, it appears as if paraphrasing does not require the translator to shift from the linguistic to the conceptual level of the expression, since production time for target text expressions which are classified as paraphrases is short. Although, from a theoretical point of view, paraphrasing is expected to require accessing the conceptual level, and thus causing temporal delays, which indicates increased cognitive effort, the empirical analyses do not corroborate this. Paraphrasing is therefore considered a low cognitive effort strategy type.

The opposite can be observed for the deletion strategy. The empirical analyses of the conceptual translation strategy types reveal continuous increasing effects indicating increased cognitive effort. The data sets contain values for the deletion strategy type because these values (e.g., *Total Production Time*, *Total Keystroke Count*) evidence translation attempts at the specific expressions. For example, a word-to-word translation may have come to mind first, before other solutions were considered and/or a final decision was taken to omit the expression from the final target text segment. This cannot be traced in the data set in detail, because interim solutions in terms of strategy types have not been recorded.[26] Based on product analyses, only the strategy that led to the final version of the target text expression is registered. However, it can be assumed that the decision to delete the expression from the target text has been made after other solutions have been evaluated and discarded (evidenced by, for example, keystroke counts), a process which can be assumed to require accessing the conceptual level of the source text expression as well. Thus, the deletion strategy accounts for the theoretical considerations discussed above. Increased production time effects indicate increased cognitive effort, which may be due to a shift from the linguistic to the conceptual level. This does not necessarily refute Jensen's findings and assumption that deletion is chosen because it represents "a problem-solving strategy with minimum cognitive effort" (2005, p. 205). Compared to the values of the M-D strategy, deletion requires less time and thus less cognitive effort. It does, however, require more time and effort than paraphrasing and word-to-word translations.

As a conclusion from her results, Sjørup claims "that the translator will choose the path of least resistance, i.e., a direct transfer translation strategy" (2013, p. 208), which included reduced cognitive effort. Since her subjects are classified as professional translators, this claim suggests that a selection of cognitively less demanding strategies is not dependent on the degree of professionalism (less- or more experience), but on the very fact that it requires less cognitive resources. However, although the present study corroborates Sjørup's findings in terms of production time in relation to specific translation strategy types, and thus cognitive effort, it does suggest that the participants of this study do not opt for

[26] This may however be traced in the TRANSLOG files. Such an investigation may be subject of another study.

the cognitively less demanding strategy types. Paraphrasing, which is marked by a decreasing effect, and thus smaller production values and less cognitive effort, is chosen less often than cognitively more demanding strategy types like the word-to-word strategy (M-M) or even the most demanding strategy types which involve a change of metaphor (M-D). This indicates that a classification of translation behavior according to a scale from cognitively less to more demanding translation operations may not be feasible. The effect cannot be replicated in translators with little translation experience like the participants of this study. They do not necessarily opt for cognitively relieving strategy types. As suggested previously, a form of macro strategy appears to be at work which leads the participants to pursue the use of non-literal language in the target text, even if this means that the cognitive resources invested into the translation of a specific expression are substantial (increased).

Summing up, metaphor translation processes operate under the same mapping conditions (SMC), if conceptual similarity between the source- and the target text exist. Strategies are marked by smaller production time values and lead in a direct manner to the target text expression (e.g., M-M, M1-M2 etc.). Access to the conceptual level is not assumed, and the input of cognitive effort is therefore low. If, on the other hand, metaphor translation processes operate under different mapping conditions (DMC), strategies are marked by increased production time values (M-D, deletion). The translator is required to access the conceptual level of the source text metaphor in order to produce a translation solution (e.g., different metaphor, omitting the expression from the target text). Cognitive effort, the application of cognitive resources to translate the expression, is elevated (deletion) or high (M-D). The case of paraphrasing is somehow special. Jensen assumes that paraphrasing requires access to the conceptual level of a metaphor, since only a sufficient level of comprehension of the source text metaphor can facilitate a meaningful translation into non-metaphorical language. However, according to the analyses in this study, as well as Sjørup's findings, paraphrasing is a strategy which can be classified as low cognitive effort strategy (largest decreasing effect). From the analysis performed in this study, it is not possible to make any claims about the reasons for this apparent contradiction between theoretical consideration and empirical observation. It is however feasible to propose a hypothesis. It may be possible that paraphrasing is a marker of automatized translation behavior. Göpferich refers to "language-pair-specific-(standard) transfer operations (or shifts) which frequently lead to acceptable target-language equivalents" (2009, p. 21) as part of the translation routine activation sub-competence in her competence model. Paraphrases may be instances of such standard transfer operations, which translators have stored in their repertoire as a result of practice and experience. Specific expressions are known to have no immediate translation counterparts in the target language, and non-metaphorical translation solutions are found, selected multiply during translation processes and have thus been converted into automatized translation operations. Their selection does therefore not require accessing the conceptual level of the metaphorical expression, as indicated by small production time values, although the translation operates under different mapping conditions (DMC, Mandelblit). Such a hypothesis is, however, in need of thorough theoretical consideration and empirical testing.

5.3 Translation Competence Development

Göpferich (2013) attributes the change in translation behavior from a novice stage to an advanced stage to two factors: 1) (cognitive) restructuring and the adaptation of existing knowledge to the specific task of translation and 2) a change or reallocation of cognitive capacity. The latter has been the focus of the present study. She proposes that the allocation of cognitive capacity to different tasks changes over time with increasing training and experience, and is determined by a distinction between "a routine mode of translation, assumed to involve low cognitive effort, and a creative and cognitively more demanding mode of translation" (p. 67). In other words, Göpferich distinguishes between cognitively effortless and effortful translation activities, and suggests that the distribution of cognitive resources between such tasks changes over time with increasing translation experience. Jensen (2005) finds that less experienced translators (non-professional, young-professionals) resort most often to metaphor translation strategies which are associated with a low amount of cognitive effort while advanced translators increasingly resort to strategies which indicate an elevated amount of cognitive effort. The present study has empirically established cognitive effort (less effortful, more effortful) for specific translation strategies, and presented theoretical as well as empirical arguments for the underlying conceptual phenomena that are considered influential to the amount of cognitive effort required by specific translation strategy types (i.e., conceptual similarities and differences between source- and target text). This section discusses the findings in the light of translation competence development and the distribution of cognitive resources as suggested by Göpferich and Jensen.

It has previously been established that all participant groups resort most often to metaphorical translation strategy types which do not require a conceptual change between source- and target text expression (but may include various changes on the linguistic level). Thus, participants select metaphorical translation strategy types which are close to the source text and require a small amount of cognitive effort. However, thereafter strategy types are selected which require such a conceptual change, and thus an increased amount of cognitive effort. Non-metaphorical translation strategy types (M-PP, DEL) are selected infrequently by the participants of this study, and their opposite relation to production time and cognitive effort has been discussed previously. As a result, Jensen's hypothesis cannot be corroborated by the present study. Student translation behavior (which is classified as non-professional translation behavior) does not appear to be determined by the selection of cognitively less demanding strategies. Strategy types which are associated with reduced cognitive effort (i.e., paraphrasing) are selected less often than strategy types which require increased cognitive effort (i.e., M-D). Thus, based on the results of this study, it is argued that cognitive demand it is not decisive during the translation process, and can therefore not unambiguously be employed to describe and define different stages (or levels) of translation competence. It is however possible to evaluate whether there are differences between the individual participant groups, which may indicate a change in the distribution of cognitive resources over the three-year training period (e.g., an increase in selection of cognitively more demanding strategy types).

In general, changes regarding the selection of the different strategy types from group to group are minor and do not necessarily follow discernible patterns. In other words, the selection of specific strategy types does not increase or decrease consistently from group to group. For example, the Norwegian 2nd year group selects more instances of M-M strategy types (59%) than both 1st year groups (48%) and the respective 3rd year group (50%) (*cf.* Table 9). Thus, it can be concluded that, with regard to the selection of specific metaphor translation strategy types, changes between the different groups within a language group, and thus between the different levels of experience, are rather insubstantial and fluctuating. Two possible explanations for this apparent lack of observable change are offered here: 1) the aforementioned effect of the size of the data sets underlying the different analyses in this study, and 2) a three-year training period may simply be too short a time frame to observe substantial changes or development. However, there are differences noticeable which will be used here to describe what may be perceived as general tendencies. Yet, these tendencies need to be treated which caution, since they are based on a small number of observations and insignificant differences.

Interestingly, different tendencies can be observed across the two language groups. In the Norwegian language group, the selection of strategy types related to similar conceptual mappings (reduced cognitive effort) increases, although only slightly. The 2nd and 3rd year groups select this strategy type more often than the two 1st year groups. The selection of strategies pertaining to different mappings (increased cognitive effort), on the other hand, decreases (employed most often by the 1st year beginners group). For the most part, the selection of paraphrasing increases slightly, while deletion remains stable. Overall, the Norwegian participants exhibit a slight tendency to move away from cognitively demanding strategy types (M-D), towards less demanding strategy types (M-M, M-PP). The German language group, on the other hand, exhibits a different tendency. While strategies pertaining to similar conceptual mappings decrease ever so slightly, strategies related to conceptual changes increase. So does paraphrasing. The selection of deletion is marginally reduced. A clear tendency away from strategy types referring to reduced cognitive effort and towards strategy types of increased cognitive effort is not discernible. However, changes are minor for both language groups, indicating that development, irrespective in which direction, is rather insubstantial. Further investigations including a larger number of participants and observations are necessary to determine whether developmental differences between the two language groups can be corroborated, persist, increase, or decrease. From the data collected, it is not possible to state whether these different tendencies are related to differences between the two language groups (e.g., training, exposure to metaphor translation theory, language differences) or due to the nature of the specific data sets in this study (low number of observations, high impact of individuality).

5.4 Summary

The present study finds that metaphorical translation strategy types (M-M, M-D) are selected more often than non-metaphorical strategy types (M-PP, DEL). It is argued that it is not the demand of cognitive effort (less or more cognitive effort) that is decisive for the selection of specific translation strategy types during the translation process, but a form of macro strategy which gears the translator towards the retention of non-literal language in the target text (same or different conceptual mapping). This argumentation is supported by the findings of the analysis of production time, which shows that strategy types which are marked by a production time increase, and thus increased cognitive effort, are selected more often than strategy types which are associated with decreasing production time, and thus decreasing cognitive effort.

Differences between the individual participant groups, which may indicate a redistribution of cognitive resources, and thus some form of competence development, are rather insubstantial. Tendencies are described, which differ between the two language groups (Norwegian, German), but the small number of observations increases the impact of the individual translator in the data set, and decreases generalizability of the findings and hypotheses. It is thus neither possible to corroborate or refute the hypothesis that the allocation of cognitive resources to cognitively less or more demanding translation tasks changes over time with increasing translation experience and increasing translation competence.

6. Conclusion

This final chapter intends to glance back at the previous five chapters and reflect upon the study both from the viewpoint of its merits as well as its shortcomings. Section 6.1 discusses the contributions of the study and considers its limitations. The two are presented in an interwoven manner, that is, contributions and limitations are presented collectively for different topics (e.g., contributions and limitations of the application of Conceptual Metaphor Theory). Section 6.2 outlines a way forward by suggesting potential further avenues of research.

6.1 Contributions and limitations of the study

The study at hand set out to investigate the distribution of cognitive effort in metaphor translation as an indicator of translation competence development. Susanne Göpferich (2013) proposes that the development of translation competence is closely related to the allocation of cognitive resources, and that with advancing translation competence cognitive resources are distributed differently, and to different translation tasks. Based on Kahneman's model of cognitive capacity (1973), cognitive resources are assumed limited and different tasks demand different amounts of cognitive capacity. Task difficulty (demand) and the resulting distribution of cognitive capacity (the allocation of cognitive effort to the task) are related to task familiarity and experience. Thus, the distribution of cognitive effort is expected to be different between less- and more experienced translators. However, the conditions for cognitive demand with specific translation tasks (task difficulty) have been investigated by only a few studies, and, to my knowledge, not in relation to the development of professional translation competence. This thesis sought to shed light on the theoretical assumption of cognitive demand (effortful and effortless translation tasks) from the perspective of a redistribution of cognitive resources as an indicator of advancing translation competence.

Since the beginning of the 1980s, metaphor has assumed a distinct position within cognitive linguistic research as a feature of not only literary language, but everyday language use (Lakoff & Johnson, 1980/2003) with culture-overlapping and culture-specific implications. Within translation studies, normative approaches to metaphor translation focusing on specific translation strategies dominated the field for several decades (e.g., Newmark, 1983). With the advancement of translation process studies, theoretical and empirical approaches to metaphor translation emerged. The focus, however, remains on translation strategies as empirical evidence of metaphor translation. With its focus on both the linguistic as well as cognitive dimension of metaphor, Conceptual Metaphor Theory (CMT) provides a theoretical foundation for the investigation of cognitive translation process also from the point of view of competence and competence development. For the present study, the empirical implementation of a cognitive view of metaphor provided a solid and fruitful foundation for the investigation. The implementation of methodological procedures from metaphor studies (metaphor identification procedure, MIP) intended to strengthen the definitional delineation of the linguistic phenomenon metaphor in the text. Thus, the identification of metaphorical expressions in the English source text is considered theoretically sound, as well as comprehensible for the reader. Specifically the latter point has been considered missing in previous research on metaphor in translation.

It needs to be pointed out, however, that the implementation of CMT into the study, and its subsequent methodological application has its weaknesses. For example, the decision to apply a metaphor typology along the lines of a conventionality continuum and its implementation as frequency measurement may be perceived rather artificial. It has been acknowledged that such an approach does not claim empirical representativeness for the English language or replicability for other sets of data. However, for the sole purpose of identifying areas of interest to perform analyses, the frequency approach constitutes a suitable tool.

Astrid Jensen (2005) investigated the selection of a number of specific metaphor translation strategy types by three different groups of participants at three different levels of competence (novices, young professionals and experts), and finds that less experienced translators appear to resort to cognitively less demanding strategies which do not (or only to a small extent) require access to the conceptual dimension of the metaphor, while more experienced translators more often resort to strategy types which are marked by an increased demand for cognitive capacity since the translation requires accessing the conceptual dimension of the metaphor. However, Jensen does not implement an empirically measurable definition of cognitive effort in her study. Annette C. Sjørup (2013) operationalizes cognitive effort by measuring production time in metaphor translation. Supported by technological development in translation process studies (eye-tracking, keylogging), Sjørup finds that translation strategy types which require access to the conceptual dimension of the metaphor indeed require increased cognitive effort as evidenced by increased production time measurements. However, Sjørup, who investigated a group of professional translators, claims that translators resort mostly to cognitively less demanding strategy types, because "the translator will choose the path of least resistance, i.e. a direct transfer translation strategy"(2013, p. 208). Thus, from the conclusions of these two studies, the relationship between translation strategy type and cognitive effort appears to be resolved (increased cognitive effort when conceptual access is required), while the relationship to competence and competence development remains unclear.

The present study aimed at shedding light on the latter question by building a bridge between the two studies. Translation competence development was investigated (Jensen) by measuring cognitive effort as indicated by production time values (Sjørup) for different types of metaphor translation strategy types by three different participants groups (students) at three different levels of experience (1st, 2nd and 3rd year of their studies) in two language groups (mother tongue Norwegian, German). In addition, the study intended to further explore whether Göpferich's proposition (2013) that professional development may be investigated via the allocation of cognitive resources is feasible, and to contribute to the advancement of the theoretical and methodological approaches to the empirical study of metaphor translation.

The analysis of the data in this study is twofold in the sense that types of metaphor translation strategies and their quantitative distribution among the different participant groups were established (analysis 1), before production time effects for the different strategy types were calculated and analyzed (analysis 2). The analysis of types of translation strategy revealed that all groups, irrespective of level of experience (i.e., advancement in the study program), more often resort to strategies which do not included a change of conceptual mapping than any other type of strategy. This is in line with both

Jensen's and Sjørup's findings. However, thereafter, both the Norwegian and the German participant groups selected a change of conceptual mapping more often than any of the remaining strategy types. Thus, the participants of this study behaved like the experienced participants of Jensen's study (professional translators), but unlike Sjørup's professional participants, who preferred paraphrasing to a change in conceptual mapping. The findings of this study suggest that the retention of a metaphor, the same or a different metaphor, in the target text appears to be more important than the selection of strategy types which are synonymous with less cognitive demand (cognitive relief). It is hypothesized that some form of macro strategy may be at play which governs the translation process in the sense that the retention of non-literal language use (metaphorical language use) is aimed at. Differences between the different groups according to their level of experience are rather minor, indicating that there is only minor development concerning the selection of specific strategy types. Between the different language groups, on the other hand, it appears as if the Norwegian participant groups steer towards the selection of strategy types marked by the retention of the conceptual mapping, while the German language groups exhibit a slight tendency towards strategy types pertaining to different conceptual mapping strategies. From the data in this study, it cannot be concluded why the two language groups appear to differ in this respect.

The analysis of production time effects corroborates Sjørup's findings that strategy types associated with similar conceptual mappings exhibit smaller production time values than strategy types which are associated with different conceptual mappings. Thus, cognitive effort is reduced for strategies which do not require a change of conceptual mapping, and thus access to the conceptual dimension of the metaphor, and increased for strategy types which do require a change of conceptual mapping and thus presumably access to the conceptual dimension of the metaphor. All groups at all levels select cognitively less demanding metaphorical strategy types more often than cognitively more demanding metaphorical strategy types. The (non-metaphorical) paraphrasing strategy is marked by the largest reductive effect on production time, indicating the shortest production time, and thus the least cognitive demand during the translation task. Sjørup refers to similar results regarding the paraphrasing strategy: production time values are shorter for this strategy type than for the types involving conceptual changes. This appears to refute Jensen's hypothesis that paraphrasing requires access to the conceptual level of the metaphor and is a sign of actively coping with the metaphor, and thus a sign of advancing translation competence. It is suggested that paraphrasing may be a sign of automatized transfer operations, and therefore a sign of advancing translation competence (*cf.* Göpferich's translation routine activation competence, 2009, p. 21).

One translation strategy type, the deletion strategy has been employed in Jensen's product-based study, but not in Sjørup's process-based study. At first glance, this appears to be logical. How would it be possible to measure production time for expressions that do not surface in the final target text version, because they have been deleted? However, this is a rather product-based approach to translation, which does not take into consideration that the final target text version is the result of a process which can be described as multifaceted and not necessarily traceable in detail in a translated text. Therefore, deletion was incorporated in the present study yielding rather surprising results. Deletion is not, as assumed by Jensen, a short and easy way out of a translation problem, requiring low cognitive effort, but, according to the production time effects analyzed in this study, requires increased cognitive effort (e.g., multiple translation attempts). The delineation between product- and process-based investigations of translation has thus been clearly exemplified, and the study has added deletion to the investigation of production time as an indicator of cognitive effort.

Regarding the development of translation competence, general differences between the individual participant groups in each language are not determined by production time effect types (increasing or decreasing), or effect sizes for the individual translation strategy types. Differences are minor, which indicates that development in terms of redistribution of cognitive resources is rather insignificant over the period of a three-year training program. The only sign of development is the aforementioned selection of the paraphrasing strategy by the more advanced groups. However, considering that effect sizes are calculated for each group individually, overall group effects incorporating all variables analyzed differ to certain degrees. In the Norwegian language group, the 1st year beginners group translates the slowest, while the same participants during the second round of experiments at the end of their 1st year translate the fastest. This may be explained by some sort of effect of memory, that is, they may have remembered the text and (parts of) their translation solutions. If this group is removed from the analyses, production time values decrease with increasing level of experience (from 1st to 2nd, to 3rd year students). However, the same development is not observed in the German language group. Production time effect sizes decrease slightly from the 1st year groups to the 2nd year group, but increase substantially for the 3rd year group. Thus, the latter group, the most advanced group, translated the slowest. Considering the different developments in both language groups, it is not possible to make general statements or formulate hypotheses about the evolution of production time as indicator of cognitive effort, and thus, a redistribution of cognitive resources, according to increasing translation experience in this study. Additional studies, reproducing the effects for different participants and different language pairs are necessary in order to explore this development further. This applies also to the interesting finding that the German participants exhibit substantially smaller effect size values than the Norwegian participants, which indicates that the Norwegian participants on average translate more slowly than the German participants do.

In conclusion, all participant groups resort to one form of cognitively less demanding translation processes the most. However, thereafter, more demanding processes are engaged in more often than other forms of less demanding solutions. Thus, it is hypothesized that it is not the allocation of cognitive resources, but a (consciously or subconsciously strategic) match of non-literal language between source- and target language that guides the translation processes of the participants in this study. From a developmental point of view, change is insubstantial. A conclusive redistribution of cognitive resources as measured by the selection of specific strategy types and their respective production time values cannot be established. A three-year undergraduate training period does not appear to cause major changes or substantial development from a cognitive perspective. Göpferich remarks 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" (2009, p. 26). The present study cannot corroborate this assumption. Improvements are not detectable after a longer period exceeding three semesters of translation-specific training. However, Göpferich refers to an improvement over such an extended period of time in specific individuals. The present study is based on a contrastive investigation of different individuals at specific points during that extended period of time (cross-sectional research design), and lacks thus a certain degree of comparability, which leads to a lack of generalizability of the findings. However, the external circumstances that accompanied this study did not allow for a longitudinal investigation as, for example, called for and executed by Göpferich and her colleagues in the TransComp project. Göpferich's assumption can thus not be refuted either. Improvement (i.e., competence development) may be detectable in an equivalent study, if the subjects were investigated over a three-year period.

The lack of generalizability of results is also conditioned by the low number of participants, and thus the low number of observations that form the basis of the analyses performed in this study. For several reasons, it proved difficult to recruit a sufficient number of participants to conduct the experiments. It is therefore acknowledged that the findings of this study are very much restricted to the population investigated during the project, and may or may not be, replicable in other studies. This does, however, not influence the methodological contributions of the study (e.g., MIP), which are independent of the number of participants and observations.

Apart from the relationship between a low number of observations and theoretical generalizability of the results just discussed, the question remains whether translation and professional translation behavior are determined by individuality to such a degree that a quest for generalizability may be considered pointless. Such a discussion is not necessarily unique to translation studies, and has assumed its place within translation studies for a long time (see for example the discussion on "Shared Ground in Translation Studies" in *Target* between 2000 and 2002). With the technological advancement of methodological tools (e.g., keylogging, eye-tracking), and the possibilities these tools offer to collect vast amounts of data and store them in shared databases like the CRITT database, the discipline appears to focus heavily on generalizability and may be at the verge of forgetting where this data comes from (individual translators) and what this means in relation to the interpretation of the data. The present study does not claim to go against the tide. On the contrary, it joins a general quest for generalizable traits of professional translation competence and its development, because such research is important and fruitful for the advancement of the discipline of translation studies. It is, however, necessary to acknowledge the relationship between the collected data, its origin and its meaning for the theoretical interpretation and consideration of the data (for an in-depth discussion of the topic see Hegrenæs, 2016).

In addition to the research aims and results discussed thus far, the study pursued two underlying aims. Firstly, the study intended to explore whether Göpferich's proposition (2013) that professional development may be investigated via the allocation of cognitive resources is feasible. Conclusive arguments for or against the proposition cannot be made based on the results of this study. As established previously, a reallocation of cognitive resource could not be established inconclusively for the different participant groups related to their level of experience. Insubstantial tendencies are detectable, for example the selection of the paraphrasing strategy as a cognitive relief strategy by the more advanced groups. However, for the reasons explained above, this study was not designed as a means of investigating this hypothesis: this study references Göpferich's work only as an interpretive framework. A study investigating a larger spectrum of experience, including participants with different, more advanced degrees of experience, would be better suited to corroborate or disprove Göpferich's hypothesis.

Secondly, the study aimed to contribute to the further development of the theoretical and methodological approaches to the empirical study of metaphor translation taken by, for example, Jensen (2005) and Sjørup (2013). It was decided to implement the cognitive linguistic theory of conceptual metaphors (Lakoff&Johnson, 1980/2003), and its respective theoretical implications, that is the differentiation between the linguistic and the conceptual dimensions of metaphor. Strategy types were established for both dimensions (categories). In the linguistic category, it was possible to describe in detail different linguistic solutions (translation strategy types) selected by the participants. Some of these are selected rather rarely by the participants, and are thus, in line with the findings in general, not claimed to be representative for a general group of respective participants. However, such a detailed descriptive approach helped to paint a clearer picture of the translation behavior of the participants involved, even though some strategy types did not have a noteworthy impact, and thus did not receive much attention in the discussion of the findings (e.g., image-schematic changes). The additional categorization of the linguistic strategy types into associated conceptual strategy types supported the cognitive process-oriented research approach of the study. It became clear that investigating purely linguistic changes would present a different or more partial and fragmentary picture of the translation process. Production time effects did not necessarily increase when linguistic changes of different sorts were selected (e.g., partial deletions, image-schematic changes). It cannot be inconclusively assumed that linguistic changes of any sort require accessing the conceptual dimension of the metaphor, unless these linguistic changes also pertain to conceptual changes in the target text (i.e., a different metaphor). On the other hand, such a two-fold analysis (linguistic as well as conceptual strategy category) proved to be repetitive at times. In a number of cases, the analyses of the conceptual strategy types merely repeated the findings of the analyses of the linguistic strategy types. However, in other cases, especially during the analyses of production time effects, the analyses of the linguistic strategy types suggested, for example, a negative effect, but collapsing all respective strategy types into one conceptual type, revealed that these strategy types indeed exhibited a positive effect on production time, and thus increased cognitive effort. In this respect, the study contributes to the investigation of cognitive effort in metaphor translation by providing a clearer picture of the translation process, but also by acknowledging the methodological approach of investigating cognitive-conceptual phenomena via linguistic output. It is, however, considered necessary to investigate further the individual linguistic strategy types, especially the types that did not yield any noteworthy results, like image-schematic changes, to explore in more detail their characteristics in relation to cognitive effort.

The application of blockwise hierarchical regression analysis appears to be a promising methodological tool for the investigation not only of metaphor translation processes and translation competence development, but also for empirical translation studies in general. The statistical method has its limits, for example the limitation of variables that can be entered into the model, but this applies to the majority of statistical methods. On the other hand, it is possible to analyze in detail changes to models following the introduction of several, additional variables, as well as the possibility of acknowledging and incorporating variables based on previous research. Although statistical significance could not be established for the majority of correlations in this study (see also previous discussion on the size of the data sets), the method is perceived as a suitable methodological tool.

Finally, following from the research design, some of the data collected during the experiments did not yield any usable information. The scratch paper was hardly used by any of the participants, which in itself is an interesting observation indicating that they do not take notes during their translation sessions, or have not yet implemented a working routine which includes notetaking. Information regarding their course portfolio, which could provide additional insights into the familiarity with the topic of metaphor in translation, and thus have explanatory power for the results of the analyses, was insufficient. The majority of students could not or did not provide the necessary information. Lastly, the translation brief was never intended to serve as a basis for data collection. It was rather meant to facilitate the translation process by creating an artificial context or translation situation, and to increase comparability between the translation products of all participants (translation under the same assumptions). It became evident that only a few students actually were familiar with the concept and intention of a translation brief. It is unclear what kind of impact the translation brief has had on the findings of this study.

6.2 Avenues for further research

In summary, the study answered the specific research questions formulated at the very start of the project. However, if anything, the researcher is left with additional, new, or extended questions. In many aspects, the study is an explorative study. The following paragraphs aim to outline some of these questions and to propose further steps towards finding answers to these questions and thus further the study of metaphor in translation and its application to translation competence and competence development research.

Replicability is of course aimed at. Studies with different participant groups but with the same division of levels of experience (1st, 2nd, and 3rd year students) are necessary to enhance generalizability of the results. Studies including different language combinations would contribute to this aim as well. Such studies are also called for with respective to the theoretical assumptions related to cognitive and cultural dimensions of metaphor addressed in this study. Linguistic and cultural closeness and/or distance as theoretically acknowledge by similar and different mapping conditions (Mandelblit, 1996) can be exploited more with respective to the analysis of specific translation strategy types, and consequentially production time effects as indicators of cognitive effort.

Considering the basic methodological approach of this study, a cross-sectional approach, the downsides of such an approach are acknowledged here. Studies incorporating a longitudinal approach following the same subjects over an extended period of time are necessary to corroborate or refute the findings of this study. Such an approach would also enhance the reliability of the results. This entails also the extension of levels of experience beyond the three-year basic training program. Participants at increased levels of training (e.g., master's level) as well as levels of practice (different levels of practical experience, e.g., 5 years, 10 years, 15 years etc.) should be included in further studies. Some form of theoretical foundation for the selection of different levels of experience should be established.

Continuing with the methodological dimension, different aspects of the translation process may be explored. For example, the collection of eye-tracking material and screen-recordings could give a more specific insight into the translation process related to specific types of translation strategies. Retrospective interviews could shed light on the presumed differentiation between accessing and not accessing the conceptual level of the metaphor during the translation. It would be interesting to investigate whether such an access is linked to conscious or subconscious processes.

Finally, considering the specific results of this study, two main hypotheses present themselves for further research. Firstly, the claim that some form of macro strategy appears to govern the translation process towards the selection of non-literal (metaphorical) translation strategy types requires further investigation. Secondly, the specific hypothesis that paraphrasing is a sign of automatized translation behavior, and thus of Göpferich's translation routine activation subcompetence (and advanced translation behavior) is in need of further exploration.

The study appears to have generated more questions than answers. However, answering some questions and asking new ones is the driving force of research in general and, in this case, research on translation competence and competence development in particular. It is hoped that the avenues for further research outlined here are merely a bone of contention (to use a metaphor) for the further exploration of metaphor in translation and translation competence (development) research.

Appendices

Appendix A: Questionnaire Norwegian participant group

Dear participant,

Since I am investigating competence development in this study, it is important for me to know more about your language background. I would appreciate if you would take some time to answer the following questions. Your answers are going to be confidential. It will not be possible to trace the information back to you. For this purpose, please create a gender neutral (not indicating your sex) user name.

User name:____

1. Did you grow up speaking English at home?

   ☐ Yes ☐ No

2. Before starting your current studies, how many years of English classes have you taken in total starting with elementary school (grunnskole) up to high school (videregående skole) and university?

   ____

3. Have you spent a period/periods longer than three months abroad using English as your main language (e.g. as an exchange student or au pair)?

   ☐ Yes ☐ No ☞ (Skip to 6)

4. If so, how long (in months for each period)?

   ____

5. Where did you spent this period/these periods?

   ____

6. Which grade (karakter) did you receive in English on your high school diploma?

   ____

7. Apart from English classes or other foreign language classes, have you had any experience in translating before you started your studies? Please ☑ one or more alternatives.

- ☐ limited experience in a professional (paid) setting (0-10 assignments)
- ☐ some experience in a professional (paid) setting (10+ assignments)
- ☐ limited experience in a non-professional setting (0-10 assignments)
- ☐ some experience in a non-professional setting (10+ assignments)
- ☐ none

Thank you for your participation in this study!

Appendix B: Questionnaire German participant group

Dear participant,

Since I am investigating competence development in this study, it is important for me to know more about your language background. I would appreciate if you would take some time to answer the following questions. Your answers are going to be confidential. It will not be possible to trace the information back to you. For this purpose, please create a gender neutral (not indicating your sex) user name.

User name:____

1. Did you grow up speaking English at home?

   ☐ Yes ☐ No

2. Before starting your current studies, how many years of English classes have you taken in total starting with elementary school (Grundschule) up to high school (Gymnasium) and university?

   ____

   ____

3. Have you spent a period/periods longer than three months abroad using English as your main language (e.g. as an exchange student or au pair)?

   ☐ Yes ☐ No ☞ (Skip to 6)

4. If so, how long (in months for each period)?

   ____

   ____

5. Where did you spent this period/these periods?

   ____

   ____

6. Which grade (Note) did you receive in English on your high school diploma?

____

____

7. Apart from English classes or other foreign language classes, have you had any experience in translating before you started your studies? Please ☑ one or more alternatives.

- ☐ limited experience in a professional (paid) setting (0-10 assignments)
- ☐ some experience in a professional (paid) setting (10+ assignments)
- ☐ limited experience in a non-professional setting (0-10 assignments)
- ☐ some experience in a non-professional setting (10+ assignments)
- ☐ none

Thank you for your participation in this study!

Appendix C: Informal information sheet – Norwegian

Hei.

Mitt navn er Claudia Förster Hegrenæs og jeg tar en doktorgrad (PhD) ved Norges Handelshøyskole (NHH) i Bergen. Jeg er opprinnelig tysk, men har bodd i Norge i 8 år.

Dette er nå andre året av PhD studiene mine og prosjektet mitt dreier seg om å undersøke oversettelseskompetanse og hvordan den bygges opp eller utvikler seg. Hvis dere ønsker å delta, får dere først et lite spørreskjema med 7 enkle spørsmål angående språkbakgrunnen deres og erfaringer innenfor oversettelse. Dere blir deretter bedt om å oversette en tekst på 308 ord fra engelsk til norsk i et enkelt skriveprogram. Teksten er en tekst fra avisen *Newsweek*. Skriveprogrammet tar opp alle tastetrykk og museklikk dere foretar under hele oversettelsesprosessen og gir meg inntrykk av hvordan dere jobber dere gjennom teksten. Jeg er ikke interessert i skrivefeil, grammatiske feil eller lignende. Dette eksperimentet dreier seg altså ikke om å finne ut hva dere kan eller ikke kan, eller hva dere gjør feil. Etter at dere er ferdige med oversettelsen, gir programmet meg muligheten til å spille av en slags video av oversettelsen deres. Under avspillingen vil jeg gjerne snakke med dere og høre hva dere tenkte på mens dere oversatte.

Prosjektet er meldt inn og godkjent av personvernombudet for forskning (NSD). Alle dataene deres anonymiseres og kan aldri spores tilbake til dere. Jeg kommer til å skrive og publisere artikler i anerkjente tidsskrifter der jeg bruker data fra disse eksperimentene, men hverken navn eller andre persondata av spesifikke deltagere brukes.

Vennligst send en epost til **Claudia.Hegrenaes@nhh.no** eller ring meg om dere kunne tenke dere å delta eller har flere spørsmål ang. prosjektet.

På forhånd tusen takk for at dere er interesserte og vil delta.

Med vennlig hilsen

Claudia Förster Hegrenæs
Ph.D. student
Institutt for fagspråk og interkulturell kommunikasjon

Norges Handelshøyskole
+47 55 95 93 56 / +47 46 69 34 34

Appendix D: Informal information sheet – German

Hallo.

Mein Name ist Claudia Förster Hegrenæs und ich bin Doktorand an der Wirtschaftsuniversität in Bergen/Norwegen. Ich bin deutsch, lebe aber seit 7 Jahren in Norwegen.

In meinem Forschungsprojekt geht es um Translationskompetenz, wie diese aufgebaut ist und wie sie sich entwickelt. Wenn ihr an meiner Studie teilnehmt, werdet ihr zunächst gebeten einen kurzen Fragebogen mit 7 Fragen bezüglich eurer Sprachkenntnisse und Erfahrung mit Übersetzungen auszufüllen. Danach übersetzt ihr (in einem einfachen Schreibprogramm) einen kurzen Text (308 Wörter) aus dem Englischen ins Deutsche. Dieser Text stammt aus der Onlineausgabe der Zeitung *Newsweek* vom Januar 2014. Das Schreibprogramm registriert automatisch jeden Tastendruck und Mausklick während ihr übersetzt, und ermöglicht es mir dadurch zu sehen, wie ihr den Text bearbeitet. Ich schaue **nicht** nach Schreib- oder Grammatikfehlern. In diesem Experiment geht es also **nicht** darum herauszufinden, was ihr könnt oder was ihr noch nicht könnt.

Das Schreibprogramm ermöglicht es mir auch euch anschließend eine Aufzeichnung eurer Übersetzung vorzuspielen. Während des Abspielens möchte ich mich gerne mit euch unterhalten und hören, was euch beim Übersetzen des Textes durch den Kopf ging. Alle Teilnehmer bitte ich am Ende des Studienjahres (Juni/Juli 2015) noch einmal an einem vergleichbaren Experiment teilzunehmen.

Mein Forschungsprojekt ist beim Norwegischen Datenschutzbeauftragten für Forschung, Norsk samfunnsvitenskapelig datatjeneste AS, registriert. Sämtliche Daten, die im Laufe der Experimente von euch eingesammelt werden, werden anonymisiert und können nicht zu euch zurückverfolgt werden. Auf der Basis dieser Daten werde ich Artikel schreiben und in anerkannten Fachzeitschriften publizieren. Weder Namen, noch Herkunft noch andere personenbezogene Daten von einzelnen Teilnehmern werden veröffentlicht.

Im Voraus vielen Dank für euer Interesse teilzunehmen.

Mit freundlichen Grüßen

Claudia Förster Hegrenæs

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Appendix E: Translation brief – Norwegian

Teksten er fra den digitale utgaven av det amerikanske nyhetsmagasinet *Newsweek*.

Oversett teksten fra engelsk til norsk. Denne teksten skal brukes i et vedlegg/ekstrabilag til en norsk avis i en artikkelserie om den globale økonomiske situasjonen.

Appendix F: Translation brief – German

Der Text ist der online Ausgabe des amerikanischen Nachrichtenmagazins *Newsweek* entnommen. Bitte übersetzen Sie den Text vom Englischen ins Deutsche. Ihre deutsche Übersetzung soll in einer Beilage/Extrabeilage einer deutschen Tageszeitung unter dem Thema „Die globale wirtschaftliche Situation“ erscheinen.

Appendix G: Experiment text (unabridged)

What's in Store for Wall Street and the Markets in 2014

Remember 2013? The Dow banged to a record high, even against a rising Greek chorus of investors warning of the possibility of another flash crash. (To be sure, there was a computer glitch in April that shut down the Chicago Board Options Exchange for half a day, but otherwise the Cassandras were disappointed.)

The shutdown of the federal government for two weeks in October churned markets as part of a long series of self-imposed wounds inflicted by the bifurcated Congress, which fought with itself over the fiscal cliff, the debt ceiling, sequestration, you name it.

The implications of cyber-terrorism came out in full force as the markets swooned on a false report from a hacked Associated Press Twitter account saying the White House was under bomb attack and President Barack Obama had been injured.

Twitter itself fared better, staging a perfectly executed IPO that paved the way for similar launches by other successful tech-sector darlings, like Snapchat, Spotify, Dropbox and Pinterest.

Virtual currencies such as Bitcoin barreled into the public consciousness in 2013, with Fed chief Ben Bernanke surprising the market by declaring they "may have long-term promise," even as Bitcoin spiked and crashed and spiked again on waves of frenetic buying and selling.

To the surprise of most people, who had become used to America being dependent on Middle Eastern oil sources, in 2013 the U.S. became the biggest producer of oil and gas on the planet, surging ahead of Saudi Arabia and Russia and causing energy prices to slump.

So what lies ahead for 2014? A sneak look into Wall Street's crystal ball:

1. Fill her up! Energy prices will be uncharacteristically stable: Due to advances in drilling technology, the U.S. is the new Saudi Arabia. This is probably the best news of the past year for the regular-Joe consumer and will continue to deliver good news and increased prosperity throughout the New Year. Why? Because unlike almost every other silver bullet that's supposed to fire up the economy, this one actually works. The advent of dropping energy prices puts money back in the pockets of ordinary Americans and consumers the world over, giving them cash to spend and thereby stoke other parts of the economy. As well as the obvious benefits, such as boosting global car sales, lower energy prices are set to cut costs across all sectors. "The unexpected rise of U.S. oil production and technological advances have significantly transformed the way we live today and will continue to do so in the future," says Deutsche Bank in its outlook for 2014.

2. Cold turkey, here we come! The U.S. will wean itself off its monetary stimulus addiction: But, like beating heroin, this is not going to be easy. The cold, hard truth is that, more than five years after the financial crisis, the U.S. economy, along with those in many other countries, remains steeped in the business of what economists call "recession avoidance." Without continuing monetary stimulus measures -- known as quantitative easing, or QE -- there is a fear the economy will not continue its slow and sluggish recovery. The new Federal Reserve chief, Janet Yellen, will ease off the gas pedal – but if she "tapers" too hard or too fast, the stock market's spate of frothy gains will falter and send a chill through the rest of the economy. Fasten your seatbelts, it could be a bumpy ride.

3. Home Sweet Home! Home prices will drop in the U.S. and rise in the U.K. "Tapering" by the Fed will result in higher borrowing costs for home buyers, which could slow down the pace of sales and price gains for the nation's housing market, which saw upticks throughout 2013. At the other end of the housing spectrum, the U.K., which suffers a chronic shortage of high-end housing in its burgeoning capital, is forecasting double-digit gains in its home prices in the New Year, with home sales growth projected in all parts of the country after a surprise surge in buying this year.

4. Isn't it rich? 'Wealth Effect' to reign supreme. Consumer spending has perked up, with holiday shoppers contributing to an uptick in the economy in

2013 – MasterCard SpendingPulse reported a respectable 3.5 percent leap in this year's holiday sales. But the big, more dubious spending and growth gains are coming from the "wealth effect" provided by the world's top earners, who are enjoying sharp increases in stock and housing prices – fueled by the Fed's monetary stimulus measures. This kind of growth is less durable than growth across a broader demographic because it can turn on a dime if stock or housing prices dip. In the New Year, economists will be looking for more durable growth in the form of sustained increases in salaries and jobs that promise to prop up the blue collar and middle class and will underpin sustained growth in the long term.

5. Back to work! Jobs are poised to grow – finally, if tentatively: With the divided Congress at last appearing to back away from its wonkier skirmishes, from fiscal cliffs to financial reform, many economists see 2014 as the year of a jobs renaissance. The budget deal and a break in warring on Capitol Hill would allow businesses to overcome what has been a key confidence hurdle – serious and deliberately disruptive financial uncertainty – and get ready to invest in the future, which will create new jobs. Judging by the robust economic data closing out the year, this trend may have already begun as companies are already stepping up hiring.

6. Breaking Down Barriers. Trade agreements could spark international growth. Looking for creative ways to incite further growth domestically, many countries, including the U.S., are favoring trade agreements that will lower barriers, costs and roadblocks to cross-border investments and partnerships. Among the pacts in play are the Trans-Atlantic Trade and Investment Partnership between the U.S. and European Union, and the Trans-Pacific Partnership, which has been beefed up to include a dozen countries, including the U.S., Japan and South Korea. "With steep domestic challenges, policy-makers seek to create growth via the international stage," says Morgan Stanley's outlook for 2014. "The improved cooperation leads to more solid pick-up in trade and more sustainable growth in the global economy."

In brief, the Wall Street crystal ball reveals that though the deep wounds and the hard times of the financial crisis have yet to fully heal, 2014 is shaping up to be a year that could make big strides in restoring the world to prosperity.

Appendix H: Experiment text (abridged)

What's in Store for Wall Street and the Markets in 2014

Remember 2013? The Dow banged to a record high, even against a rising chorus of investors warning of the possibility of another flash crash.

The shutdown of the federal government for two weeks in October churned the markets as part of a long series of wounds inflicted by Congress.

The implications of cyber-terrorism came out in full force as the markets swooned on a false report from a hacked Twitter account saying the White House was under bomb attack and President Barack Obama had been injured.

So what lies ahead for 2014?

Fill up! Due to advances in technology, the U.S. is the new Saudi Arabia. This is probably the best news of the past year and will continue to deliver good news throughout the new year. Unlike almost every other silver bullet that's supposed to fire up the economy, this one actually works. The advent of dropping energy prices puts money back in the pockets of ordinary Americans giving them cash to spend. As well as the obvious benefits, such as boosting global car sales, lower energy prices are set to cut costs across all sectors. "The unexpected rise of U.S. oil production and technology advances have significantly transformed the way we live today and will continue to do so in the future," says Deutsche Bank in its outlook for 2014.

Home Sweet Home! Home prices will drop in the U.S. and rise in the U.K. Federal interference will result in higher borrowing costs for home buyers, which could slow down sales and price gains for the nation's housing market.

Though the deep wounds and the hard times of the financial crisis have yet to fully heal, 2014 is shaping up to be a year that could make big strides in restoring the world to prosperity.

Appendix I: MIP – Rater panel guidelines

1. Text

Name: "What's in Store for Wall Street and the Markets in 2014"

Source: Newsweek

http://www.newsweek.com/whats-store-wall-street-and-markets-2014-225195

(11.03.2014 09:02)

Mode: written

Genre: newspaper article

Date of publication: 12/27/13 at 3:42 PM

Length of text: 1093 (unabridged); **310** (abridged)

Readership: About Newsweek: Newsweek has been a staple of American media for over 80 years, bringing high-quality journalism to millions of readers around the globe. Newsweek publishes print editions in Japanese, Korean, Polish, Spanish, Arabic, and Turkish, as well as an English language international edition, but is a primarily digital property available across platforms and devices. Newsweek provides in-depth analysis, news and opinion about international issues, technology, business, culture and politics.

'A present day audience was assumed. Contemporary meanings are thus identical with present-day meanings' (Pragglejaz Group 2007: 15)

The readership/present- day audience is assumed to be a general audience. Newsweek covers a wide range of topics from the U.S., the world, business, tech&science, culture and sports and is thus assumed not to be genre specific.

What's in Store for Wall Street and the Markets in 2014 (abridged)

Remember 2013? The Dow banged to a record high, even against a rising chorus of investors warning of the possibility of another flash crash.

The shutdown of the federal government for two weeks in October churned the markets as part of a long series of wounds inflicted by Congress.

The implications of cyber-terrorism came out in full force as the markets swooned on a false report from a hacked Twitter account saying the White House was under bomb attack and President Barack Obama had been injured.

So what lies ahead for 2014?

Fill up! Due to advances in technology, the U.S. is the new Saudi Arabia. This is probably the best news of the past year and will continue to deliver good news throughout the new year. Unlike almost every other silver bullet that's supposed to fire up the economy, this one actually works. The advent of dropping energy prices puts money back in the pockets of ordinary Americans giving them cash to spend. As well as the obvious benefits, such as boosting global car sales, lower energy prices are set to cut costs across all sectors. "The unexpected rise of U.S. oil production and technology advances have significantly transformed the way we live today and will continue to do so in the future," says Deutsche Bank in its outlook for 2014.

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Though the deep wounds and the hard times of the financial crisis have yet to fully heal, 2014 is shaping up to be a year that could make big strides in restoring the world to prosperity.

2. Analysis

MIP:

1. Read the entire text-discourse to establish a general understanding of the meaning.
2. Determine the linguistic units in the text-discourse
3. (a) For each linguistic unit in the text, establish its meaning in context, that is, how it applies to an entity, relation, or attribute in the situation evoked by the text (contextual meaning). Take into account what comes before and after the linguistic unit.

   (b) For each linguistic unit, determine if it has a more basic contemporary meaning in other contexts than the one in the given context. For our purposes basic meanings tend to be

   - More concrete [what they evoke is easier to imagine, see, hear, feel, smell, and taste];
   - Relate to bodily action;
   - More precise (as opposed to vague);
   - Historically older;

   Basic meanings are not necessarily the most frequent meanings of the linguistic unit.

   (c) If the linguistic unit has a more basic current-contemporary meaning in other contexts than the given context, decide whether the contextual meaning contrasts with the basic meaning but can be understood in comparison with it.
4. If yes, mark the linguistic unit as metaphorical.

Pragglejaz group. (2007). MIP: A method for identifying metaphorically used words in discourse. Metaphor and Symbol **22**(1): 1-39.

For reasons of clarity and understanding, the text has been divided into lines according to the screen display in *Translog II* (data collection software). Linguistic units to be analyzed are at the word level. Hence, there is more space between the words in the text display on pages 3 and 4 in case you want to make notes or mark the different units/words.

Regarding compound nouns the following is suggested:

"(a) When a compound noun is spelt as one word, such as underpass, and can be found as such in the dictionary we treat it as one linguistic unit designating one referent in the discourse.
(b) When a compound noun is spelt as two hyphenated words and can be found as such in the dictionary, such as pitter-patter, we similarly treat it as one linguistic unit. However, if we are dealing with a novel formation unknown to the dictionary, the compound noun is analyzed as two separate units, even though it may have one POS tag in the corpus. Our reason for this practice is that the language user is forced to parse the compound into its two component parts in order to establish the relation between the two related concepts and referents. This also applies to hyphenated compound nouns created through a productive morphological rule but that are not listed as a conventionalized compound in the dictionary (such as under-five)" (Krennmayr, T. 2011. Metaphor in newspapers. Utrecht, LOT. p. 49)

For phrasal verbs, Krennmayr suggests that "phrasal verbs function as linguistic units designating one action, process, state or relation in the referential dimension of the discourse. In that respect, they are similar to polywords. You should therefore treat all phrasal verbs as single linguistic units: their individual parts do not require independent analysis for potential metaphorical meaning" (2011: 46).

Please use the following three online dictionaries.

MDO = Macmillan Dictionary Online (http://www.macmillandictionary.com/dictionary/american/)
LDO = Longman Dictionary Online (ldoceonline.com)
OEDO = Oxford English Dictionary Online (oed.com)

Please, record all linguistic units that you identify as metaphorical (not the literal ones) in the following table. An example of the recording format is given in the first row. The abbreviations **BM** and **CM** stand for *basic meaning* and *contextual meaning* respectively. I also recorded the source of reference for the basic meanings (ex. **MDO** for Macmillan Dictionary Online).

Line	Linguistic Unit	Meaning
1 EXAMPLE	*in*	BM: where someone or something is; place reference (MDO) CM: time reference for the year 2014

Appendix J: Correlation analysis TS_LEX/Participant Group – NOR

Table 55: Correlation analysis TS_LEX/Participant Group - NOR

Correlations

		Participant_Group=Norwegian_1stYear_Beg	Participant_Group=Norwegian_1stYear_End	Participant_Group=Norwegian_2ndYear	Participant_Group=Norwegian_3rdYear
Translation_Strategy_linguistic=M-M		,003	-,048	,081	-,031
		,936	,221	,039	,421
		658	658	658	658
Translation_Strategy_linguistic=M1-M2		-,037	,034	-,008	,011
		,349	,383	,831	,776
		658	658	658	658
Translation_Strategy_linguistic=M-D		,059	-,012	-,030	-,021
		,132	,750	,444	,588
		658	658	658	658
Translation_Strategy_linguistic=M1-D1		,025	-,004	-,044	,021
		,516	,914	,257	,592
		658	658	658	658
Translation_Strategy_linguistic=M-PP		-,018	,031	-,051	,037
		,637	,424	,193	,347
		658	658	658	658
Translation_Strategy_linguistic=DEL		-,025	,055	-,025	-,008
		,516	,157	,516	,846
		658	658	658	658
Translation_Strategy_linguistic=M-M/Del		-,055	-,017	,082	-,003
		,156	,671	,035	,938
		658	658	658	658
Translation_Strategy_linguistic=MX-MY		,062	-,025	-,020	-,020
		,114	,527	,602	,602
		658	658	658	658
Translation_Strategy_linguistic=M1X-M2Y		-,009	-,039	,010	,043
		,822	,312	,805	,266
		658	658	658	658
Translation_Strategy_linguistic=MX-DY		-,017	,012	,002	,002
		,672	,751	,953	,953
		658	658	658	658
Translation_Strategy_linguistic=NT		-,017	-,017	,040	-,003
		,671	,671	,310	,938
		658	658	658	658

Table 56: Crosstabulation TS_LEX/Participant Group - NOR

			Translation_Strategy_linguistic											
			M-M	M-D	M1-M2	M-PP	M1-D1	DEL	M1X-M2Y	M-M/DEL	MX_DY	NT	MX_MY	**Total**
Participant_Group	Norwegian_1stYear_Beg	Count	59.0	52.0	29.0	23.0	12.0	7.0	2.0	0.0	2.0	1.0	1.0	188.0
		Expected Count	58.6	44.6	33.1	24.9	10.3	8.6	2.3	1.4	2.6	1.4	0.3	188.0
		Adjusted Residual	0.1	0.3	-0.9	-0.5	0.7	-0.7	-0.2	-1.4	-0.4	-0.4	1.6	1.0
	Norwegian_1stYear_End	Count	52.0	43.0	37.0	28.0	10.0	12.0	1.0	1.0	3.0	1.0	0.0	188.0
		Expected Count	58.6	44.6	33.1	24.9	10.3	8.6	2.3	1.4	2.6	1.4	0.3	188.0
		Adjusted Residual	-1.2	0.2	0.9	0.8	-0.1	1.4	-1.0	-0.4	0.3	-0.4	-0.6	1.0
	Norwegian_2ndYear	Count	54.0	30.0	24.0	14.0	5.0	5.0	2.0	3.0	2.0	2.0	0.0	141.0
		Expected Count	43.9	33.4	24.9	18.6	7.7	6.4	1.7	1.1	1.9	1.1	0.2	141.0
		Adjusted Residual	2.1	0.2	-0.2	-1.3	-1.1	-0.7	0.2	2.1	0.1	1.0	-0.5	1.0
	Norwegian_3rdYear	Count	40.0	31.0	26.0	22.0	9.0	6.0	3.0	1.0	2.0	1.0	0.0	141.0
		Expected Count	43.9	33.4	24.9	18.6	7.7	6.4	1.7	1.1	1.9	1.1	0.2	141.0
		Adjusted Residual	-0.8	0.2	0.3	0.9	0.5	-0.2	1.1	-0.1	0.1	-0.1	-0.5	1.0
Total		Count	205	156	116	87	36	30	8	5	9	5	1	658
		Expected Count	205	156	116	87	36	30	8	5	9	5	1	658

Appendix K: Correlation Analysis TS_CONC/Participant Group – NOR

Table 57: Correlation analysis TS_CONC/Participant group-NOR

Correlations

		Participant_Group=Norwegian_1stYear_Beg	Participant_Group=Norwegian_1stYear_End	Participant_Group=Norwegian_2ndYear	Participant_Group=Norwegian_3rdYear
Translation_Strategy_conceptual=M-M		-,032	-,032	,083	-,013
		,417	,417	,033	,735
		658	658	658	658
Translation_Strategy_conceptual=M-D		,063	-,010	-,049	-,009
		,109	,789	,211	,825
		658	658	658	658
Translation_Strategy_conceptual=M-PP		-,018	,031	-,051	,037
		,637	,424	,193	,347
		658	658	658	658
Translation_Strategy_conceptual=DEL		-,025	,055	-,025	-,008
		,516	,157	,516	,846
		658	658	658	658
Translation_Strategy_conceptual=NT		-,017	-,017	,040	-,003
		,671	,671	,310	,938
		658	658	658	658

Table 58: Crosstabulation TS_CONC/Participant Group-NOR

			Translation_Strategy_conceptual					Total
			M-M	M-D	M-PP	DEL	NT	
Participant_Group	Norwegian_1stYear_Beg	Count	91	66	23	7	1	188
		Expected Count	95.7	57.4	24.9	8.6	1.4	188
		Adjusted Residual	-.8	1.6	-.5	-.7	-.4	
	Norwegian_1stYear_End	Count	91	56	28	12	1	188
		Expected Count	95.7	57.4	24.9	8.6	1.4	188
		Adjusted Residual	-.8	-.3	.8	1.4	-.4	
	Norwegian_2ndYear	Count	83	37	14	5	2	141
		Expected Count	71.8	43.1	18.6	6.4	1.1	141
		Adjusted Residual	2.1	-1.3	-1.3	-.7	1.0	
	Norwegian_3rdYear	Count	70	42	22	6	1	141
		Expected Count	71.8	43.1	18.6	6.4	1.1	141
		Adjusted Residual	-.3	-.2	.9	-.2	-.1	
Total		Count	335	201	87	30	5	658
		Expected Count	335	201	87	30	5	658

Appendix L: Correlation Analysis TS_LEX/Participant Group – GER

Table 59: Correlation Analysis TS_LEX/Participant Group – GER

Correlations

		Participant_Group=German_1stYear_Beg	Participant_Group=German_1stYear_End	Participant_Group=German_2ndYear	Participant_Group=German_3rdYear
Translation_Strategy_linguistic=M-M		-,020	-,015	,038	,005
		,512	,615	,203	,876
		1128	1128	1128	1128
Translation_Strategy_linguistic=M1-M2		,025	,000	-,032	,000
		,401	1,000	,288	1,000
		1128	1128	1128	1128
Translation_Strategy_linguistic=M-D		-,009	,011	-,006	,004
		,751	,711	,841	,890
		1128	1128	1128	1128
Translation_Strategy_linguistic=M1-D1		-,022	-,044	,059	,020
		,460	,144	,047	,503
		1128	1128	1128	1128
Translation_Strategy_linguistic=M-PP		-,009	,031	-,038	,010
		,774	,300	,202	,732
		1128	1128	1128	1128
Translation_Strategy_linguistic=DEL		,037	,036	-,025	-,061
		,212	,221	,402	,040
		1128	1128	1128	1128
Translation_Strategy_linguistic=M-M/DEL		,057	-,019	,014	-,058
		,057	,522	,631	,053
		1128	1128	1128	1128
Translation_Strategy_linguistic=MX-MY		,015	,019	-,019	-,022
		,617	,517	,527	,468
		1128	1128	1128	1128
Translation_Strategy_linguistic=M1X-M2Y		,052	-,020	-,033	-,008
		,083	,500	,272	,801
		1128	1128	1128	1128
Translation_Strategy_linguistic=MX-DY		-,007	-,019	,008	,021
		,822	,522	,777	,474
		1128	1128	1128	1128
Translation_Strategy_linguistic=NT		-,034	-,023	,015	,052
		,252	,433	,605	,083
		1128	1128	1128	1128
Translation_Strategy_linguistic=M-M/NT		-,037	-,011	,027	,031
		,213	,712	,368	,302
		1128	1128	1128	1128

Table 60: Crosstabulation TS_LEX/Participant Group – GER

			Translation Strategy (linguistic)											
			M-M	M-D	M1-M2	M-PP	M1-D1	DEL	M1X-M2Y	MX_DY	M-M/DEL	NT	MX_MY	**Total**
Participant_Group	Norwegian_1stYear_Beg	Count	101.0	72.0	69.0	58.0	18.0	35.0	4.0	3.0	8.0	4.0	1.0	376.0
		Expected Count	105.7	74.0	64.0	59.7	20.7	29.7	2.0	3.3	4.7	6.3	0.7	376.0
		Adjusted Residual	-0.7	-0.3	0.8	-0.3	-0.7	1.2	1.7	-0.2	1.9	-1.1	0.5	
	Norwegian_1stYear_End	Count	89.0	67.0	56.0	58.0	13.0	31.0	1.0	2.0	3.0	4.0	1.0	329.0
		Expected Count	92.5	64.8	56.0	52.2	18.1	26.0	1.8	2.9	4.1	5.5	0.6	329.0
		Adjusted Residual	-0.5	0.4	0.0	1.0	-1.5	1.2	-0.7	-0.6	-0.6	-0.8	0.6	
	Norwegian_2ndYear	Count	60.0	36.0	27.0	24.0	16.0	12.0	0.0	2.0	3.0	4.0	0.0	188.0
		Expected Count	52.8	37.0	32.0	29.8	10.3	14.8	1.0	1.7	2.3	3.2	0.3	188.0
		Adjusted Residual	1.3	-0.2	-1.1	-1.3	2.0	-0.8	-1.1	0.3	0.5	0.5	-0.6	
	Norwegian_3rdYear	Count	67.0	47.0	40.0	39.0	15.0	11.0	1.0	3.0	0.0	7.0	0.0	235.0
		Expected Count	66.0	46.3	40.0	37.3	12.9	18.5	1.3	2.1	2.9	4.0	0.4	235.0
		Adjusted Residual	0.2	0.1	0.0	0.3	0.7	-2.1	-0.3	0.7	-1.9	1.7	-0.7	
Total		Count	317.0	222.0	192.0	179.0	62.0	89.0	6.0	10.0	14.0	19.0	2.0	1128.0
		Expected Count	317.0	222.0	192.0	179.0	62.0	89.0	6.0	10.0	14.0	19.0	2.0	1128.0

Appendix M: Correlation analysis TS_CONC/Participant Group – GER

Table 61: Correlation analysis TS_CONC/Participant Group-GER

Correlations

		Participant_Group=German_1stYear_Beg	Participant_Group=German_1stYear_End	Participant_Group=German_2ndYear	Participant_Group=German_3rdYear
Translation_Strategy_conceptual=M-M		,014	-,022	,013	-,004
		,643	,468	,651	,888
		1128	1128	1128	1128
Translation_Strategy_conceptual=M-D		-,021	-,017	,027	,019
		,472	,576	,363	,532
		1128	1128	1128	1128
Translation_Strategy_conceptual=M-PP		-,009	,031	-,038	,010
		,774	,300	,202	,732
		1128	1128	1128	1128
Translation_Strategy_conceptual=DEL		,037	,036	-,025	-,061
		,212	,221	,402	,040
		1128	1128	1128	1128
Translation_Strategy_conceptual=NT		-,034	-,023	,015	,052
		,252	,433	,605	,083
		1128	1128	1128	1128

Table 62: Crosstabulation TS_CONC/Participant Group – GER

			Translation Strategy (conceptual)					Total
			M-M	M-D	M-PP	DEL	NT	
Participant Group	1stYear_Beg	Count	186	93	58	35	4	376
		Expected Count	182.3	98.0	59.7	29.7	6.3	376.0
		Adjusted Residual	.5	-.7	-.3	1.2	-1.1	
	1stYear_End	Count	154	82	58	31	4	329
		Expected Count	159.5	85.8	52.2	26.0	5.5	329.0
		Adjusted Residual	-.7	-.6	1.0	1.2	-0.8	
	2ndYear	Count	94	54	24	12	4	188
		Expected Count	91.2	49.0	29.8	14.8	3.2	188.0
		Adjusted Residual	.5	.9	-1.3	-.8	.5	
	3rdYear	Count	113	65	39	11	7	235
		Expected Count	114.0	61.3	37.3	18.5	4.0	235.0
		Adjusted Residual	-.1	.6	.3	-2.1	1.7	
Total		Count	547	294	1798	89	19	1128
		Expected Count	547.0	294.0	179.0	89.0	19.0	1128.0

Appendix N: Multiple regression analysis TS_LEX models 1 – 3 – NOR

*Table 63: Multiple regression analysis TS_LEX – model 1-NOR**

Model		Unstandardized B	Sig.
1	(Constant)	26225.790	.143
	TS_LEX_M_D	83652.710	.012
	TS_LEX_M1_M2	15546.135	.585
	TS_LEX_M_PP	10150.388	.751
	TS_LEX_M1_D1	225576.543	.007
	TS_LEX_DEL	-17824.190	.785
	TS_LEX_M1X_M2Y	-8667.790	.905

*Dependent variable: *Total_Production_Time*

*Table 64: Multiple regression analysis TS_LEX – model 2-NOR**

Model		Unstandardized B	Sig.
2	(Constant)	37085.573	.097
	TS_LEX_M_D	79973.719	.017
	TS_LEX_M1_M2	10408.306	.722
	TS_LEX_M_PP	6526.074	.840
	TS_LEX_M1_D1	214876.645	.011
	TS_LEX_DEL	-17261.809	.792
	TS_LEX_M1X_M2Y	-19290.943	.794
	Normalized_Frequency	-639.539	.414

*Dependent variable: *Total_Production_Time*

*Table 65: Multiple regression analysis TS_LEX – model 3-NOR**

Model		Unstandardized B	Sig.
3	(Constant)	43130.197	.056
	TS_LEX_M_D	41508.284	.213
	TS_LEX_M1_M2	-23748.496	.416
	TS_LEX_M_PP	-13210.174	.685
	TS_LEX_M1_D1	172663.929	.036
	TS_LEX_DEL	-2100.095	.973
	TS_LEX_M1X_M2Y	-25160.818	.722
	Normalized_Frequency	-1111.836	.219
	Revision	130143.685	.000
	Sentence_Initial	12405.013	.681
	Sentence_Final	-21285.187	.545

*Dependent variable: *Total_Production_Time*

Appendix O: Multiple regression analysis TS_CONC models 1 – 3 – NOR

*Table 66: Multiple regression analysis TS_CONC – model 1-NOR**

Model		Unstandardized B	Sig.
1	(Constant)	31765.170	.021
	TS_CONC_M_D	96173.973	.001
	TS_CONC_M_PP	4389.485	.881
	TS_CONC_DEL	-23363.570	.716

*Dependent variable: *Total_Production_Time*

*Table 67: Multiple regression analysis TS_CONC – model 2-NOR**

Model		Unstandardized B	Sig.
2	(Constant)	42268.277	.013
	TS_CONC_M_D	93754.091	.002
	TS_CONC_M_PP	2650.529	.928
	TS_CONC_DEL	-19786.075	.758
	Normalized_Frequency	-788.388	.294

*Dependent variable: *Total_Production_Time*

*Table 68: Multiple regression analysis TS_CONC – model 3-NOR**

Model		Unstandardized B	Sig.
3	(Constant)	33447.914	.065
	TS_CONC_M_D	67480.593	.026
	TS_CONC_M_PP	-1843.222	.951
	TS_CONC_DEL	3316.089	.958
	Normalized_Frequency	-1189.076	.175
	Revision	126470.637	.000
	Sentence_Initial	9400.558	.751
	Sentence_Final	-11875.854	.732

Appendix P: Multiple regression analysis TS_LEX models 1 – 3 – GER

*Table 69: Multiple regression analysis TS_LEX – model 1-GER**

Model		Unstandardized B	Sig.
1	(Constant)	29887.246	.000
	TS_LEX_M_D	10674.754	.196
	TS_LEX_M1_M2	-7909.509	.229
	TS_LEX_M_PP	-13327.290	.080
	TS_LEX_DEL	-20685.199	.037
	TS_LEX_M1_D1	14132.698	.178
	TS_LEX_NT	59642.040	.000
	TS_LEX_M_M_DEL	-7945.746	.778
	TS_LEX_M1X_M2Y	24588.754	.535
	TS_LEX_MX_MY	63790.754	.108

*Dependent variable: *Total_Production_Time*

*Table 70: Multiple regression analysis TS_LEX – model 2-GER**

Model		Unstandardized B	Sig.
2	(Constant)	30889.057	.000
	TS_LEX_M_D	11928.459	.158
	TS_LEX_M1_M2	-7548.353	.253
	TS_LEX_M_PP	-11934.800	.128
	TS_LEX_DEL	-18393.779	.077
	TS_LEX_M1_D1	13209.569	.212
	TS_LEX_NT	63784.918	.000
	TS_LEX_M_M_DEL	-8897.412	.753
	TS_LEX_M1X_M2Y	23637.088	.552
	TS_LEX_MX_MY	52822.825	.114
	Normalized_Frequency	-135.529	.473

*Dependent variable: *Total_Production_Time*

*Table 71: Multiple regression analysis TS_LEX – model 3-GER**

Model		Unstandardized B	Sig.
3	(Constant)	25776.341	.000
	TS_LEX_M_D	5990.266	.477
	TS_LEX_M1_M2	-10657.075	.097
	TS_LEX_M_PP	-11486.600	.148
	TS_LEX_DEL	-8638.604	.398
	TS_LEX_M1_D1	10591.084	.296
	TS_LEX_NT	29946.456	.048
	TS_LEX_M_M_DEL	-11509.158	.669
	TS_LEX_M1X_M2Y	13312.721	.726
	TS_LEX_MX_MY	67927.541	.073
	Normalized_Frequency	-103.525	.682
	Revision	15425.243	.005
	Sentence_Initial	28921.868	.000
	Sentence_Final	-11701.584	.240

*Dependent variable: *Total_Production_Time*

Appendix Q: Multiple regression analysis TS_CONC models 1 – 3 – GER

*Table 72: Multiple regression analysis TS_CONC – model 1-GER**

Model		Unstandardized B	Sig.
1	(Constant)	26127.027	.000
	TS_CONC_M_D	16411.992	.010
	TS_CONC_M_PP	-9567.070	.149
	TS_CONC_DEL	-17343.254	.054
	TS_CONC_NT	63402.259	.000

*Dependent variable: *Total_Production_Time*

*Table 73: Multiple regression analysis TS_CONC – model 2-GER**

Model		Unstandardized B	Sig.
2	(Constant)	27636.975	.000
	TS_CONC_M_D	16895.079	.008
	TS_CONC_M_PP	-7987.210	.242
	TS_CONC_DEL	-14793.572	.114
	TS_CONC_NT	68531.454	.000
	Normalized_Frequency	-174.898	.332

*Dependent variable: *Total_Production_Time*

*Table 74: Multiple regression analysis TS_CONC – model 3-GER**

Model		Unstandardized B	Sig.
3	(Constant)	21208.268	.000
	TS_CONC_M_D	13445.116	.035
	TS_CONC_M_PP	-6486.511	.370
	TS_CONC_DEL	-3677.251	.692
	TS_CONC_NT	37733.568	.024
	Normalized_Frequency	-109.425	.665
	Revision	15795.688	.003
	Sentence_Initial	25714.117	.001
	Sentence_Final	-13316.282	.172

*Dependent variable: *Total_Production_Time*

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