

# Chapter 12

## The Task of Structuring Information in Translation

**Bergljot Behrens**

**Abstract** The present chapter compares and evaluates the merits of three recent studies dealing with the cognitive processes of structuring information in translations. The studies differ in taking a syntactic, a functional and a conceptual approach respectively. Correlation between structuring operations in translation and cognitive effort is found to be higher when a conceptual relevance-theoretic approach is taken, yet the results are somewhat inconclusive due to weaknesses in the operationalization of the relevance theoretic concept of procedural information. The syntactic parsing approach would also be improved by a more fine grained analysis. Functional categories as well as reallocation measures are found to be relevant for a more precise understanding of the effort related to structuring operations in translation.

**Keywords** Translation effort • Target text structuring • Re-distribution • Syntactic vs conceptual approach • Information structure

### 12.1 Introduction

Beyond choosing adequate lexical items for a target text, translators have to decide on a proper structure in their translation. Sometimes the structuring involves a pure mapping of the source text syntax into the target sentence string, with slight modifications on account of regular syntactic differences in the relevant language pair, but in most cases (Thunes 1998, 2011)<sup>1</sup> the translators have to or choose to restructure the information given in the source text. It may be assumed that

---

<sup>1</sup>This finding is based on the systematic analysis of a bidirectional English-Norwegian corpus of 68,000 words, including fiction and legal texts comprising about 4500 clause strings: 55.2 % of the data are classified as only pragmatically equivalent to their source strings (Thunes 2011: 257).

B. Behrens (✉)

Department of Literature, Area Studies and European Languages, University of Oslo, Oslo, Norway

e-mail: [bergljot.behrens@ilos.uio.no](mailto:bergljot.behrens@ilos.uio.no)

these restructuring operations are lexically motivated, in that the chosen target word or phrase comes with a different syntactic frame, they may be information structurally motivated in order for the target phrase to get the right focus, or it may be that the translator performs an unpacking of a source phrase only to re-pack the information in a more implicit or a more explicit form, possibly involving a complete redistribution of the information in the source. One assumption in cognitive translation studies is that the more alternatives the translator entertains before selecting her target expression, the more demanding the translation. Campbell (2000) hypothesized that multi-translation data, i.e. translations of the same source text by a number of translators, can be used to draw inferences about the cognitive processes during translation. His Choice Network Analysis (CNA) postulates that the more options and the more complex choices a translator has to consider, the more effortful is the translation of a particular item. Various measures of translation effort have been proposed to test this hypothesis, and different approaches have been suggested to isolate the relevant kinds of unit a translator considers. Among them, three papers (Dragsted (2012) and Carl and Schaeffer (forthcoming), see also Chap. 9) focus on the lexicon and the effect of target text variation on translator behavior. These studies demonstrate a significant correlation between reading times and the number of target lexical options available for a particular source word, indicating that translators entertain target alternatives already during reading the source text. Similarly, studies are beginning to appear that report on the cognitive effort of structuring translation segments (Chap. 10; Alves and Gonçalves 2013). The present paper takes up questions pertaining to the operationalization of structuring mechanisms and their relevance to the measure of cognitive load in translation. This involves two issues: What are the relevant (re-)structuring mechanisms in translation and how do we relate them to translation behavior?

The paper is structured into four parts. After presenting the types of measure used in translation process research on cognitive load (Sect. 12.2) and the assumptions forming the background for the studies to be discussed here (Sect. 12.2.1), the paper assesses three different analyses of structuring operations in translation (Sect. 12.3). Section 12.3.1 takes up in detail the merits and problems with a study in which shallow syntactic annotations form the basis of analysis, Sect. 12.3.2 discusses an alternative annotation system which makes use of a more complex syntactic annotation including functional categories. Section 12.3.3 assesses the approach by which the relevance theoretic notions of procedural and conceptual encodings are operationalized to investigate the cognitive load of structuring information in translation. In the final remarks in Sect. 12.4, an information structural approach to contrastive translation studies is suggested as a way ahead to get at the structuring mechanisms that involve cognitive translation load.

## 12.2 Measures of Cognitive Load in Translation

Previous studies that compare reading a text for comprehension and reading it for translation have shown that the two reading tasks are approached very differently; reading a source text for subsequent translation is slower, the saccades are shorter and the fixations are longer (Jakobsen and Jensen 2008). This indicates very clearly that the purpose of the reading task has an impact on the reader's processing behavior. Jakobsen and Jensen, among others, interpret this to mean that the translator co-activates both source and target language during reading, i.e., some (pre-)translation is going on in the reading process. This implies that reading time during a translation task is a potential measure of the cognitive load of translating. With eye tracking technology, temporal measures of fixations or gaze on particular words or the reading of larger strings can be used as behavioral indicators of translation difficulties, which we shall see below.

Another measure of cognitive effort in translation processes is the temporal logging of pauses taken by the translator during the production of target segments and the number of edits performed on target strings, which is done with keylogging technology. Jakobsen (2011) suggests that the interaction of the two measures should be taken into account for a better understanding of the cognitive operations at play in the process of translation.

The studies reported on below have each measured cognitive effort in different ways, one using reading time measures and key activity duration,<sup>2</sup> the other using edits as a measure of cognitive effort. Both are relevant for answering questions about cognitive translation processes. Source text reading time measures assume that some (pre-)translation is going on already before writing (see the introduction above), indicating co-activation of the source and target languages. Since editing measures relate to operations on the target text, (pre-)translation considerations are not taken into account on this approach; it measures cognitive effort in the production phase only.<sup>3</sup>

### 12.2.1 *Lexical and Structural Translation Options*

Translation options are of various kinds. Dragsted (2012), Carl and Schaeffer (forthcoming) and Chap. 9, studied the correlation between reading times and lexical options in translation. Dragsted's experimental study finds that when the same lexical item is chosen by all her (eight) participants, total reading time on the source text is significantly lower than in cases where each participant opts for a

---

<sup>2</sup>In the present paper I concentrate on the reading time measures only.

<sup>3</sup>This does not mean, of course, that the translator does not go back to reading the source text while editing. The TPR-DB shows that often ST reading and TT writing occur concurrently (see Chap. 9).

different word. This is interpreted as an indication that the subjects actually consider target lexical alternatives in the mind while selecting a final target word, and that the more alternatives are considered, the more effortful is the selection process. Carl and Schaeffer go one step further by weighting such alternatives and apply weighting measures on a larger set of data. The relative weighting of alternatives across a large set of translation data collected on the same set of texts across several languages is quantified and measured in what they call translation entropy: a measure of the effect of an item's relative likelihood to occur (Shannon 1951).<sup>4</sup> If the likelihood of a choice is small, i.e., there are many different translations to choose from, then the entropy is high. The cognitive effort of selecting a translation is deemed high when there are many equally likely alternatives to choose from. On the same account, translation should be facilitated when there are only one or two options, i.e., when the entropy is low. Their hypothesis is confirmed: The correlation between entropy values and reading times was high. High (weighted) variation in the target texts correlates with high source text and target text total reading times, measured in means across participants, text and language combinations per character. The conclusion drawn from the study is that translators activate and entertain several translation options (consciously or sub-consciously) while reading.

The interesting correlations found on the lexical level in the above mentioned studies have triggered questions relating to whether this correlation would carry over into structural choice in translation.

### 12.3 Structural Choice

Structural choice involves choosing an appropriate information structure in the target language, which is not identical with, but includes plain surface syntactic choice. Syntactic choices can be a choice between an active or a passive structure, a choice between an intransitive or a transitive structure, or a choice between a prepositional phrase or a clause, to name a few. To some extent syntactic choices are clearly lexically driven, given that lexical items come with a syntactic frame.<sup>5</sup> A correlation between lexical choice and cognitive effort should therefore find its parallel in syntactic choice, although a weaker correlation would be expected since many lexical alternatives come with the same syntactic frame. Information structural choices also involve focus structure, which may imply redistributions of semantic material into different syntactic slots without a change in the overt syntax of the clause. Target language style conventions also differ (see for example Behrens 2014). The interplay between syntax and focus structure in translation will be considered towards the end of the paper.

---

<sup>4</sup>For a more extensive account of translation entropy, see Chaps. 2, 9 or 10.

<sup>5</sup>This does not imply that syntactic priming cannot also affect lexical choice (see Chap. 10 for the study on syntactic priming).

### 12.3.1 *Syntactic Translation Entropy Studies*

A first attempt to measure the correlation between syntactic variability and translation effort across languages appears in Bangalore et al. (Chap. 10). This study involves data sets comprising translations of the same English source texts into three languages, collected in the TPR-DB (see Chap. 2). The data collection is based on a number of experimental translation process studies by various researchers,<sup>6</sup> and includes behavioral measures of the translators' process performances. In this study, the source and target text segments (sentences) have been manually annotated for the syntactic features valency, voice and clause type. The variants have been weighted according to their relative likelihood to appear (on the basis of the variants resulting from the syntactic annotation of each segment), and entropy values have been computed. High syntactic entropy values were expected to correlate with high total reading times. The correlations turned out positive across the languages, thus indicating that the syntactic variability measured in the studies is a relevant factor in the effort of structuring target text. The positive result was seen when correlated with the translators' source text reading time. The results thus support the hypothesis that translators entertain syntactic translation alternatives also during source text reading. The study furthermore support Hartsuiker et al's hypothesis (2004) that shared syntactic forms across language pairs have a priming effect.

One may ask whether the annotation system chosen is not optimal for teasing out all the relevant structuring alternatives actually entertained by the translators. The relatively small effects relative to the strong effects that were found in the studies on lexical choice mentioned in the introduction, may very well be due to the assumption suggested above that the lexical translation alternatives entertained very often come with the same syntactic frame.

Example (1) illustrates the system. Each data set has between 20 and 32 translations from English, albeit an unequal number of translations for each text in the various language experiments. The examples show but one of the choices for each language.

- (1) a. ST: Only the attention of other hospital staff put a stop to him and the killings.  
(transitive, active, independent: TAI)
- b. DE: Nur die Aufmerksamkeit der anderen Krankenhausmitarbeiter setze ihm und den Morden ein Ende.  
(*Only the attention the-GEN other-GEN hospital staff set him and the murders an end*)  
(transitive, active, independent: TAI)
- c. DA: Det var udelukkende opmærksomhed fra andre hospitalsmedarbejdere, der fik stoppet ham og mordene.

---

<sup>6</sup>The studies from which the data was taken: SG12 for German, KTHJ08 for Danish, and BML12 for Spanish, for a description of these studies, see Chap. 2.

*(It was only attention from other hospital staff that got stopped him and the murders)*

(impersonal active independent: MAI, transitive active dependent: TAD = MAI-TAD)

- d. ES: Solo el hecho de que el personal reparara en ello pudo pararle los pies y detener los asesinatos. (TAD-DAI-TAI)

*(Only the fact that the personnel noticed him could stop his feet and end the murders)*

Valency (transitive(T), intransitive(I), ditransitive(D), impersonal(M)), Voice (active(A), passive(P)) and Clause Type (dependent(D), independent(I)) mark a triplet of syntactic features for each clause. The example shows that some translations retain the structure of the source segment, while others are more expansive, including a combination of clauses.

The annotation system allows us to see the variation in syntactic constellations for each language, as per translator. In Spanish, for example, the source segment in (1) yields several structures, alternating between the TAD-DAI-TAD (as in (1)), a simple active ditransitive (DAI) and an MAD-DAI combination. In Danish, the same segment shows over 10 different options, from a simple TAI structure or a TPI structure, to embedded structures of four clauses of various kinds (MAI-TAD-IAD-TPD or MAI-TAD-TPD-IAD). The syntactic entropy value is computed on the basis of each syntactic form's likelihood to occur, and then correlated with the translator's reading time on the source segment and the target segment.

The merit of the annotation system is that it captures clause-level syntactic features that are applicable across all the languages in the data set, which ensures comparability, and makes it possible to study syntactic variability on a much larger size corpus than we generally find in the translation process literature. This has not been done before. Its weakness is that it may be too general to capture the structural alternatives that correlate with the more demanding tasks, whether language specific or across target languages. For a better understanding of the choices available to a translator at a given point in a text, one would need a more fine-grained framework, although also one general enough to allow for comparison across the languages under study.

Structural choice involves a variety of operations that one would expect the translator to entertain and find difficult to decide on, such as category changes on the phrase level and the morpho-syntactic level as well as other syntactic restructurings and redistributions of information. Such choices may be driven by cross-linguistic differences at various levels, and may even be triggered by information structural and/or functional cues in the source texts that the translator makes use of to infer meanings that are only implicitly expressed in the source.

In the following some examples are looked into in more detail for an evaluation of factors the system can capture and factors that will be overlooked by it.

Phrase level encodings my cause effortful restructuring operations that are not captured by our annotation and thus not reflected in the analysis. Translators introduce a variety of changes, such as shifts in grammatical functions. One example

is the translation of a source text complex compound and its Danish translation:

- (2) a. ST: To make matters worse, escalating prices are racing ahead of salary increases, especially those of nurses and . . . , who have suffered from the government's insistence that those in the public sector have to receive below-inflation salary increases. (TAD)
- b. DA: at de offentlig ansattes lønstigninger skal ligge under inflasjonsraten. (IAD)  
*(that the public-sector employees' salary increases shall lie under the inflation rate)*

The source text has a syntactic structure of four clauses: the main clause follows a context connecting sub-clause, the apposition following the main clause is not registered in our system since it is not a clause, the subsequent relative clause picks up the referents of the apposition as subject, and the final clause of the sentence functions as a complement to a nominalization in the prepositional adjunct: MAD, IAI, IAD, TAD.

The object of the last clause, a complex compound, is unpacked and redistributed into other syntactic functions in the Danish translation: the head of the syntactic object 'salary increases' is made the head of the syntactic subject in the translation, while the modifier is partly recategorized into a verb, and partly encoded in a prepositional phrase. Such unpackings and re-allocations of information are thought to be cognitively demanding. The difference between the source and target structure in this clause is annotated as a change from a transitive to an intransitive structure in our system, which hardly reflects the many restructuring operations that have taken place, also syntactically. Although the changes are indirectly reflected in the annotation from a TAD structure to an IAD structure, and thus count as a variant in the entropy computation, the analysis obscures the many translation operations the translator has coped with.

Another type of change not reflected in the syntactic analysis is metaphorization as a re-categorization procedure.

Consider the Spanish translation in the following segment:

- (3) a. ST: His withdrawal comes in the wake of fighting flaring up again in Darfur and is set to embarrass China, which has sought to halt the negative fallout from having close ties to the Sudanese government.
- b. ES: Su retirada ha coincidido con una nueva intensificación armada en Darfur y sin duda significará para China una mella pública. China a su vez ha realizado un intento de no cortar los estrechos lazos que le unen al gobierno del Sudan.  
*(His withdrawal has coincided with a new military intensification in Darfur and no doubt will signify for China a public dent. China, in turn, has effected an intent not to reduce the close ties that unites it to the Sudanese government)*

The example is a case of irregular, complex re-categorization found in the Spanish dataset P05\_T3, (segment 3). The clausally postmodified nominalization 'fighting flaring up again in Darfur' is translated as a noun phrase 'una nueva

intensificación armada’—(a (new) military intensification)—with the relative clause information placed in the noun and the nominal information placed in the adjective. The metaphor ‘una mella pública’ (lit.: a public dent) is of interest here, considered creative relative to the source ‘embarrass’. Note also the re-categorization of information in this clause; the semantic content of the main verb in the English source is re-categorized into the metaphoric noun phrase. The metaphor furthermore includes information inferred from the next (sub-)clause of the source: the negative fallout implies a negative response from public opinion. The re-categorization operation is irregular, unlike the general re-categorization operations such as nominalization or sententialization, and unlike general expansion or explicitation, viz.:

‘is set to embarrass China’ (TAI) → significará para China una mella publica (TAI)

In comparison, P02, P07, who spend less time on the segment, are closer to the source text formulation, retaining the relative clause structure and the verbal expression of the second conjunct<sup>7</sup>:

(3) c. P02: Su protesta aparece en el momento en el que Darfur está más oprimida y sirve para avergonzar al gobierno chino . . . .

*(His protest come at the momento in which Darfur is more squeezed and serves to embarrass the Chinese government . . . .)*

d. P07: Su rechazo se relaciona con los nuevos combates que han surgido en la región de Darfur y su objetivo es dejar en evidencia a China . . . .

*(His withdrawal relates to the new fights that have risen in the region of Darfur and his objective is to unmask for China . . . .)*

The restructuring operations chosen by P05 are not reflected in our annotation, yet the translator who produced this translation spent twice as long on this segment as the next highest, as can be seen in Table 12.1, showing the target text reading times per token on the five segments in the text:

In sum, then, the triplet annotation system captures all the solutions that affect the number of clauses used in the segments. This means that any restructuring involving

**Table 12.1** Gaze time on the target text, measured per source text token in the Spanish data

Segment	GazeT/TokS			
	P05	P08	P07	P02
1	6766	8942	2553	2847
2	2243	3489	1258	2053
3	<b>4136</b>	1848	1044	1477
4	1780	1719	410	2206
5	976	1076	1132	1328

The measure for the segment discussed above is marked in bold. The measures are computed from the CRITT TPR1.7.1 tables

<sup>7</sup>P09 has misunderstood the segment, so her solution is irrelevant for my purpose here.



the re-categorization of information from a phrase to a clause or a clause to a phrase is captured. However, position changes may affect reading time differently among the languages, since for example an adjective (pre-posed) restructured into a relative clause (post-posed) may affect temporal measures for Spanish less than for German and Danish on account of the fact that adjectival modifiers appear in postnominal position in all unmarked cases in Spanish, while German and Danish translators have to consider the options of a preposed adjective or a post-posed relative clause. This language difference may affect cognitive load, yet is not captured in the entropy analysis (see Jensen et al. 2009; Ruiz et al. 2008).

Our annotation system also captures the syntactic changes of passivization and the transitivity choice. Some preliminary looks at the temporal measures, not presented here, indicate that passivization and the choice of a transitive verb are not the most relevant measures unless the restructuring also includes other syntactic operations. When going through some of the segments of each text in the data, I find that syntactic operations of the following kinds are not captured by the system:

- a) information merging and information splitting within the clause, such as the unpacking of a compound into a noun phrase with a post-posed prepositional phrase, or a reallocation of the information given in an adjective into a verb or vice versa;
- b) explicitations from pronominal form to a repetition or a re-formulation of nouns;
- c) changes in the semantic role of the subject (captured only if the valency of the verb changes);
- d) generalizations involving a simplification of the clause-internal structure (for example dropping modifiers)
- e) sub-clause type: finite and non-finite clauses are not distinguished, nor are adjectival clauses and adverbial clauses kept apart.
- f) sub-clause embedding and cross-over phenomena within the clause are not marked.

In sum, the merit of the system is that it is a relatively simple measure that can be used across languages and that can be carried out within a reasonable time even though it requires manual annotation. As was seen above, it also captures a number of syntactic operations indirectly. However, it seems that some of potentially effortful structuring operations that involve clause-internal reallocation operations may be obscured, which will affect the results of a statistical analysis of cognitive effort in translation. There are also indications that information structural aspects of translation are important for restructuring operations, and should be considered in future work.

### 12.3.2 *An Alternative Annotation System: The CroCo Corpus of Translations*

One very thorough annotation system is found in the CroCo corpus of English and German texts and their respective translations (Hansen-Schirra et al. 2012). CroCo is a product-based corpus of published translations and their sources. It includes annotations of aligned translations at the levels of word and phrase as well as syntactic functions. The alignment links cross-over phenomena at all levels (Alves et al. 2010). Consider one of their examples:

- (4) a. ST: We mapped these three stages to our business strategy, [...]the third stage focusing on the four elements that we could influence or control as mentioned above.
- b. DE: Wir haben unsere Geschäftsstrategie genau auf diese drei Phasen abgestimmt. [...] In der dritten Phase liegt der Schwerpunkt auf der Beeinflussung und Steuerung der bereits angesprochenen vier Faktoren. (Alves et al. 2010: 117)

The CroCo alignment system maps segments that do not find a partner to pair with, such as the modal auxiliary ‘could’ in the English source above. The system also captures low level links which belong to different syntactic functions, such as ‘the third stage’, which appears as the subject of the absolute construction in the English version, but as the complement to a preposition (in der dritten Phase) in the German target. The choice of retaining the noun phrase in the initial position, yet including it in a prepositional phrase, triggers a re-categorization operation that changes the information in the English verb to a subject noun phrase with an informationally weak verb in the German target: ‘focussing’ → ‘(liegt) der Schwerpunkt’. Furthermore, the information in the relative clause is re-categorized to a nominalization. Finally, the interpersonal comment clause, ‘as mentioned before’, is re-categorized to an adverbally modified adjective phrase in the target and placed before the noun: C → Adv + Adj: ‘as mentioned before’ → ‘bereits angesprochener’.

These restructuring operations would be expected to affect translation effort, yet most of the restructuring operations would not be visible in the annotation system of the Bangalore et al. studies discussed in the previous section, according to which the English segment consists of four clauses: the main clause, the absolute clause, the relative clause, and the final comment clause: TAI-TAD-TAD-TPD. The German translation consists of two independent clauses: TAI.TAI. Admittedly, though, the simple triplet system captures a compression of the information, which means that it captures some of the restructurings, although only indirectly.

Cross-over phenomena are clear indications of re-structuring that would be of interest for correlations with measures of cognitive effort and annotations at all levels are needed to capture them.

### 12.3.3 *A Cognitive Measure of Restructuring: Conceptual and Procedural Encodings*

An alternative, and very different approach, is presented in Alves and Gonçalves (2013), who study the translators' consideration of alternatives in terms of the changes or edits translators perform on target text units. They investigate the relative cognitive load according to cognitively based encodings in language. Processing effort is measured relative to the relevance-theoretic distinction between conceptual and procedural encodings, thus disregarding syntactic units in the classical sense. In a relevance theoretic account of communication linguistic material is input to the inferential mechanism which constructs and manipulates conceptual representations. Utterances encode two types of information: conceptual information, which is representational, and procedural information, which is computational in the sense of encoding instructions on how to manipulate the conceptual representations encoded in the lexical entities (Wilson and Sperber 1993: 1). Relevance theory is less concerned with syntactic categories than with the kind of words that encode procedural information. However, closed classes of function words carry procedural information, such as pronouns and other anaphors as well as conjunctions and other connective function adverbials (Allott 2013; Blakemore 1987).

Translation units (TUs) in Alves and Gonçalves' framework are very different entities than the syntactic clause units used in the scheme discussed in the previous sections. TUs are units of fluent target text typing up to a pause in the production of 2.4 s or more. Within the TPR-DB, sequences of coherent typing are referred to as Production Units (PUs), which are defined by 1 s of inter-keystroke pause, (see Chap. 2).

The TUs can be whole clauses or shorter units such as single words or syntactic phrases. A distinction is made between a *micro*-unit, which equals the definition above, and a *macro*-unit. A macro-unit includes all the edits on the micro-unit up to the final version of the translation, i.e. correction and reformulations on the unit that take place right after it has been produced, or only in the revision phase of the translation process, are included in the macro unit. These units may well be more realistic measures of cognitive entities considered for alternative translation solutions than whole segments, although there seems to be more general consensus in the linguistic literature that the clause is a realistic measure.

Although based on a small set of data, comprising eight translators' production of two texts between English and Portuguese (in both directions), the methodological approach taken in this study is interesting as an alternative to the segmental syntactic approach.

Edits on the TUs, indicators of cognitive load, are counted according to types, and according to when they occur: Edits that occur during the production of a translation unit or take place during the production of the next unit both count as edits during the production flow. Edits may occur later, meaning the translator stops in a unit farther away from the unit to be edited, or it happens in the revision phase. Types of edits are more or less complex, ranging from typos (t) and breaks in the completion

**Table 12.2** Edits on procedural and conceptual encodings in Alves and Gonçalves (2013)

Type of edits in A&G (2013)	Overall mean numbers
Typos (t)	46.38
Completions (c)	5.94
Lexical (l)	12.81
Morphosyntactic (m)	17.25
Complex phrasal (p)	6.63
SUM l + p (CE)	19.44
SUM m + p (PE)	23.88

of a word to be typed (c) to lexical edits (l), morphosyntactic edits (m) and complex phrasal structures (p). The edits are then related to whether the unit is a procedural or a lexical encoding or both.

Annotation of procedural and conceptual encodings is not clear cut, certainly. The function of procedural expressions is to activate procedures whose main function is to help the hearer understand an utterance by finding the intended combination of context, explicit content and cognitive effects. In the traditional account of Relevance Theory, procedural encodings do not contribute to the truth conditions of an utterance, but trigger the derivation of implicatures relating to the meaning meant to be conveyed by the speaker. Classical examples of linguistic categories encoding procedural information are discourse connectives and conjunctions, and we may add focus particles and other function words that are conceived of as presupposition triggers in classical semantics. Conceptual encodings, on the other hand, are lexical words such as nouns, verbs, adjectives and adverbs, used to convey concepts that are extendable to propositions, which denote truth conditions. The distinction is still a matter of debate. The parallelism between the truth-conditional vs the non-truth-conditional distinction and the conceptual/procedural distinction is given up on a number of accounts, and there is furthermore an indication that lexical categories also carry procedural information (Wilson 2011). Analyzing translation units according to the distinction is therefore still a challenge. Alves and Gonçalves are well aware of the problem. They solve it by annotating TUs with complex phrasal structure edits (p) as an overlap category, belonging to both conceptual encodings (CE) and procedural encodings (PE). On this measure they find that overall, editing procedures are significantly higher on PEs than on CEs. The overall means in their study is repeated in Table 12.2 for an overview:

### 12.3.4 Conclusion

Syntactic operations as well as procedural encoding operations are likely involved in the cognitive task of structuring information in translation. According to the results of the studies reported on in this paper, procedural encoding seems to be a stronger indicator of higher processing effort than shallow syntactic annotation can bring out.

The few examples that have been provided in the present paper, demonstrate that structuring operations go beyond syntax; they include a redistribution of content within phrases and clauses which is not captured by the syntactic measures alone, and which are not clearly defined as procedural encodings in the literature. As a final note, I would add information structural constraints to procedural information, since they clearly inform the hearer about how to update the message with context. If basic information structural markers can be annotated, they should be included among the procedural encodings.

## 12.4 A Way Ahead

Doherty (2002) has made a thorough study of how focus structural differences in English and German lie at the heart of translation revisions from a draft to an optimal output. She also shows how it interacts with syntax. Her main psycholinguistic assumption is that focus interpretations are first read off from the linguistic form of a sentence before they are integrated with the information of the preceding discourse. A distinction is made between structural focus (sentence focus marked by stress)—and contextual focus (focal marking of updating procedures), both of which affect translation choice. If an analogous translation<sup>8</sup> results in a mismatch between structural and contextual focus, a restructuring of the analogous version will have to take place which involves a paraphrase that secures optimal processing conditions, not least from an information structural perspective (Doherty 2002: 161). It would be reasonable to think that information structural options of this kind are entertained by the translator and alternative redistributions considered to secure an encoding which is optimal for contextual update.

Finally, on the assumption taken up at the beginning of the paper that some translation is already going on during first time reading of the source text, it would be interesting in future work to test potential correlations between procedural encodings and source text reading time. If such correlations are not found, we may conclude that any pre-translation in the source text reading phase on the whole involves lexical translation alternatives in shallow or primed syntactic representations (see also Chap. 9), and that a more fine grained parse is left for the formulation phase only.

---

<sup>8</sup>An analogous translation, in Doherty's view, is one which retains high similarity of form at every level. Grammatically acceptable analogous translations are seen as the starting point for the translator's search for an optimal translation (Doherty 2002: 166).

## References

- Allott, N. (2013). Relevance theory. In A. Capone, F. Lo Piparo, & M. Carapezza (Eds.), *Perspectives on pragmatics and philosophy*. Berlin: Springer. 12 pp.
- Alves, F., & Gonçalves, J. L. (2013). Investigating the conceptual-procedural distinction in the translation process. *Target*, 25(1), 107–124.
- Alves, F., Pagano, A., Neumann, S., Steiner, E., & Hansen-Schirra, S. (2010). Translation units and grammatical shifts. In G. Shreve & E. Angelone (Eds.), *Translation and cognition*. Amsterdam: Benjamins.
- Behrens, B. (2014). Nominalization: A case study of linguistic text conventions in comparable and parallel texts: English and Norwegian. In G. Ebeling, K. Hauge, & D. Santos (Eds.), *Corpus-based studies in contrastive linguistics. Oslo Studies in Language*, 6(1), 143–160.
- Blakemore, D. (1987). *Semantic constraints on relevance*. Oxford: Blackwell.
- Campbell, S. (2000). Choice network analysis in translation research. In M. Olohan (Ed.), *Intercultural faultlines* (pp. 29–42). Manchester: St. Jerome.
- Carl, M., & Schaeffer, M. (forthcoming). Literal translation and processes of post-editing. In *Translation in transition: Between cognition, computing and technology*. Amsterdam: Benjamins.
- Doherty, M. (2002). *Language processing in discourse: A key to felicitous translation*. London: Routledge.
- Dragsted, B. (2012). Indicators of difficulty in translation: Correlating product and process data. *Across Languages and Cultures*, 13(1), 81–98.
- Hansen-Schirra, S., Neumann, S., & Steiner, E. (eds.) (2012). *Cross-linguistic corpora for the study of translations. Insights from the language pair English-German*. W de Gruyter.
- Hartsuiker, R. J., Pickering, M. J., & Veltkamp, E. (2004). Is syntax separate or shared between languages? Cross-linguistic syntactic priming in Spanish-English bilinguals. *Psychological Science*, 15(6), 409–414.
- Jakobsen, A. L. (2011). Tracking translators' keystrokes and eye movements with Translog. In C. Alvstad, A. Hild, & E. Tiselius (Eds.), *Methods and strategies of process research. Integrative approaches in translation studies*. Amsterdam: Benjamins.
- Jakobsen, A. L., & Jensen, K. T. H. (2008). Eye movement behavior across four different types of reading task. In S. Göpferich, I. M. Mees, & A. Lykke Jakobsen (Eds.), *Looking at eyes. Eye-tracking studies of reading and translation processing* (Vol. 36, pp. 103–124). Copenhagen: Samfundslitteratur. special issue of *Copenhagen Studies in Language*.
- Jensen, K. T. H., Sjørup, A. C., & Balling, L. W. (2009). Effects of L1 syntax on L2 translation. In F. Alves, S. Göpferich, & I. M. Mees (Eds.), *Methodology, technology and innovation in translation process research: A tribute to Arnt Lykke Jakobsen* (pp. 319–336). Copenhagen: Samfundslitteratur.
- Ruiz, C., Paredes, N., Macizo, P., & Bajo, M. T. (2008). Activation of lexical and syntactic target language properties in translation. *Acta Psychologica*, 128(3), 490–500.
- Shannon, C. E. (1951). Prediction and entropy of printed English. *The Bell System Technical Journal*, 30(1), 50–64.
- Thunes, M. (1998). Classifying translational correspondences. In S. Johansson & S. Oksefjell (Eds.), *Corpora and cross-linguistic research: Theory, method, and case studies* (pp. 25–51). Amsterdam: Rodopi.
- Thunes, M. (2011). *Complexity in translation*. PhD thesis forthcoming to the University of Bergen, Norway.
- Wilson, D. (2011). The conceptual-procedural distinction: Past, present and future. In V. Escandell-Vidal, M. Leonetti, & A. Ahern (Eds.), *Procedural meaning: Problems and perspectives* (pp. 3–29). Bingley: Emerald Group.
- Wilson, D., & Sperber, D. (1993). Linguistic form and relevance. *Lingua*, 90(1), 1–25.