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According to Holmes ([1972] 2000), the three main subjects of inquiry in descriptive translation studies are product, function and process. Among these, the subject of process was long seen as the most difficult one for researchers, possibly because translation processes are by nature elusive and because existing probe tools were mostly ineffective. Thanks to advances in disciplines like cognitive science, there has been a growing number of studies in process research over the last decade, including *Methodology, Technology and Innovation in Translation Process Research* (Mees, Alves and Göpferich 2009) and *Methods and Strategies of Process Research* (Alvstad, Hild and Tiselius 2011). One of the most recent contributions to the field is the volume under review, which initially came out in 2013 as a special issue of *Target* 25 (1).

As the central aim of process research is to "understand the nature of cognitive processes involved in translating" (Dimitrova 2010, 406), the volume mainly examines cognitive aspects of the translation process. It is comprised of ten chapters. In Chapter 1, Sharon O'Brien briefly illustrates how the domain of cognitive translatology has drawn on many (sub)disciplines such as linguistics, psychology, neuroscience, cognitive science, reading and writing research, and language technology. However, translatology as the importing domain has not fed back adequately to these exporting domains. The author suggests that more collaboration is needed within cognitive translatology as well as with other domains to achieve greater reciprocity.

One important cognitive aspect, cognitive load, is specifically examined in Chapter 2 by Kilian G. Seeber. The author reviews four methods of measuring cognitive load during simultaneous interpreting and concludes that pupillometry, a psycho-physiological method, is the most promising approach because of its limited invasiveness and its high temporal resolution.

In Chapter 3, Hanna Risku and Florian Windhager incorporate sociology into their analysis of translation cognition. Conceptually, they see translation as a contextualized cognitive process situated in a social-cultural environment. Methodologically, they choose to utilize sociology-oriented ethnographic field

studies over traditional laboratory methods. They conclude that sociological approaches can complement and enhance empirical translation process studies in that they describe and help understand the interdependencies and interactions between people and things.

In response to the so-called social turn of translation studies, Juliane House in Chapter 4 insists that translation is primarily a linguistic-cognitive activity. House then proposes neuro-linguistic theory as a tool to describe and explain cognitive process in translation. For example, one important perspective of the neuro-linguistic theory is that overt and covert translation are two different operations, with the former activating the pragmatics of both source and target text while the latter only activates target text pragmatics. House then concludes that such a perspective helps to explain why overt translation is cognitively more difficult than covert translation.

With a similar aim to describe translation strategies/competencies and their development, Susanne Göpferich in Chapter 5 turns to the domain of Dynamic Systems Theory (DST).The author conducts a longitudinal study of 12 undergraduates on their translation competence development and finds that stagnation in their translation competence development is related to their language acquisition. She then turns to DST for an explanation. DST sees competences as dynamic systems, which are made up of sub-competences, and some sub-competences may be precursors of others in developmental process. Therefore, the more complex strategic competence in this study will not develop until less complex sub-competences such as language comprehension ability have reached a certain threshold value.

In Chapter 6, a new framework from journalism is introduced by Maureen Ehrensberger-Dow and Daniel Perrin to reveal translators' cognitive processes. Since journalists and translators are both language professionals, the authors feel it justifiable to apply progression analysis of news writing to the translation process research. Compared to other approaches, which collect data from experiments, progression analysis collects data in a natural workplace setting. Furthermore, it operates on three different levels (situation, performance and conceptualization) and uses multiple methods (keystroke logging, retrospective verbalization, etc.) to triangulate results from different sources. The results obtained via this method reveal how a translator needs to go through reading, revision, research, consultation and problem-solving stages to finish a translation task, and how s/he exploits resources to solve problems at each stage.

Such an introduction of a new perspective from another domain is also suggested by Christina Schäffner and Mark Shuttleworth in Chapter 7, but they further stress the need for reciprocal relationships between research fields. The authors first consider translation from the perspective of metaphor research: how are metaphors found to activate different cognitive domains and cause delay in

the translation process? Then they point out that findings from translation process research can in turn add new dimensions to metaphor studies. For example, translation researchers can use multilingual corpora to verify or falsify hypotheses about cross-linguistic differences in conceptual metaphors.

Another example of reciprocity between translatology and other domains is given by Fabio Alves and José Luiz Gonçalves in Chapter 8. The authors first introduce a distinction between two types of expressions borrowed from relevance theory: procedural expressions (like discourse connectives) and conceptual expressions (like content words). Then they calculate instances of each type from a translation experiment involving eight professional translators. The authors find that instances of procedural expressions significantly outnumber those of conceptual expressions in translation. Moreover, the former cost greater processing effort as measured by distance indicators than the latter. The authors conclude that, on the one hand, such a procedural-conceptual distinction in relevance theory offers insights into the analysis of the translation process; on the other hand, such relevance-based process analysis can also broaden our understanding of processing efforts in other disciplines, and may validate some theoretical claims in relevance theory.

In Chapter 9, Jeremy Munday suggests a case study of translators' archives as an alternative to quantitative approaches to process research. He starts by pointing out that the use of literary archives and manuscripts is an approach which is drastically underexploited in translation studies. Then he conducts a textual analysis of a translator's multiple drafts to reconstruct the translator's actions at different points. He concludes that the translator's shift from lexical revisions to structural revisions indicates his growing awareness of holistic evaluation during the process. Munday's qualitative approach complements the prevalent statistical methods, yet his study seems to be "methodology driven rather than question driven" (Alvstad, Hild and Tiselius 2011, 1), which is regrettably a common phenomenon in process research.

In Chapter 10, by Inger M. Mees, Barbara Dragsted, Inge Gorm Hansen and Arnt Lykke Jakobsen, the interdisciplinary effort involves speech recognition technology and translator training. The authors train 14 MA students to use speech recognition software in oral translation and compare such a modality with sight translation and written translation. They find that the software enables students to cultivate some meta-cognitive awareness (think before translate, think in larger chunks) and to be more sensitive to their pronunciation errors.

In sum, this volume gives a detailed account of translation scholars' interdisciplinary experiences: driven by a particular research problem (cognitive load, translation competence, etc.), they turn to other disciplines for help, test their methods, in some cases make comparisons and choose the most powerful ones;

finally, they summarize the benefits of such a cross-disciplinary interrelationship and point out its future applications and limitations.

Compared to other similar books on translation process, this volume has two striking features. First, it incorporates the newest methodologies from neighboring disciplines, like the use of speech recognition in Chapter 10. Second, it specifies how translation process research, in addition to using input from other domains, can in turn inspire those domains in their development. For example, Chapter 7 points out that empirical data in process research can verify or falsify hypotheses about cross-linguistic differences in conceptual metaphors. Similarly, Chapter 8 explains how translation process analysis can stimulate inquiries in relevance theory.

Therefore, it is safe to say that translation process is no longer merely a research object or a testing field of tools for other disciplines. Rather it is now developing its own paradigms, which can in turn inspire other disciplines. This trend is highly relevant to both researchers and administrators in translation programs, because such programs often risk "being swallowed up by larger disciplinary structures like Faculties of Arts, Departments of Languages or Intercultural Studies" (Munday 2009, 12). The maturity of process studies, and of translation studies at large, will ultimately give the translation process domain an equal status to other domains, and involve it in truly reciprocal interdisciplinary partnerships. This book takes an important step in that direction.

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