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**Introduction**

In the era of globalization and translation industrialization, it is pronounced that “[m]any of the world’s translators work on scientific or technical texts” (Olohan 2016, 2). However, international scholarly publications on literary translation remain springing up like mushrooms while pages devoted to scientific and technical translation (STT) are by their absence.¹ To our delight, there is an ever-growing recognition with this “absence” over the past few years or so. Special issues themed “Translating Science” (2011) and “Sciences in Translation” (2016) were heralded by the international translation studies journals *The Translator* and *Meta* successively. *Scientific and Technical Translation* (Olohan 2016), the latest fundamental work of its kind, came into being.

It is an ingrained misunderstanding that science language is unembellished or metaphorless to convey information objectively. In virtually, metaphor is vital “in stimulating the development of scientific thinking and in forming scientific terminology” (p. 7). Nevertheless, the view has not hitherto been universally acknowledged. Mark Shuttleworth examines scientific metaphor translation by conducting an empirical corpus-based study facilitated by conceptual metaphor theory. Therefore, it goes without saying that his monograph *Studying Scientific Metaphor in Translation: An Inquiry into Cross-lingual Translation Practices*, “one of the first major studies of metaphor in translation that is centered on modern scientific discourse” (p. 2), sheds some new light on STT. Translation studies has been inspired from traditional terminology studies to probe into the intrinsic features of specialized texts and consider science as absolutely neutral, which surely downplays the nature of terminology (Olohan and Salama-Carr 2011, 180). In this connection,

¹. As of July 31st, 2017, there were 3543 hits of literary translation and 178 hits of STT listed in the Benjamins Translation Studies Bibliography (benjamins.com/online/tsb).
his book is of great significance to terminology studies as it proves that the term translation is not merely a linguistic matter “but also involves conceptual reflection” (ibid.).

**Book structure**

Apart from an introduction, the book is composed of seven chapters and two interludes. In the introductory part, the author interestingly opens with the introduction of the Greek and Latin origins of the terms *metaphor* and *translate*, arguing that their etymological notions are correlated. The practice of rendering metaphors also evoked his interest in the topic. All these impel him to take issue with the longstanding bias “that all scientific prose is by necessity dry and functional” (p. 2). It is also the aim of this study to discern the relations between translation studies and metaphor studies by investigating the real-world translation of metaphor in popular science texts. On this basis, the data, methods, theoretical framework and findings of his research are sketched out.

Chapter 1 “Metaphor in scientific thought and writing” begins with two separate approaches to metaphor conforming to the function of scientific language. The author concurs with the second one that metaphor and science are inextricably interwined. The last several centuries witnessed the spurring growth of scientific metaphors to “add clarity” (p. 11) but “the level of metaphoricity varies from” (ibid.) popular science discourses to specialist ones. Nowadays, it is being accepted that metaphor channels scientific thinking and creates new terms. To be specific, “metaphor has been used as a basis for scientific and medical terminology” (p. 14) since the 11th century, and “any interesting descriptive term can be shown etymologically to be a dead metaphor” (Arbib 2012, 277). What’s more, a number of Western European languages especially English contain rich terminology derived from Greek or Latin morphemes. And the metaphoricity of the terms generated in this manner is often implicit. In this regard, a morpheme-by-morpheme comparison to reveal the transparency of scientific terms in his data is briefly made after that. The remainder of the chapter summarizes the features of Olohan’s treatment of scientific writing (2016, 137–188) that are referential.

Chapter 2 “Translating *Scientific American*” delves into the popular science periodical from which the data is drawn. English has acquired its status as a *lingua franca* and “the international language of science” (p. 20) by the advent of the 21st century. However, notwithstanding other languages borrow some terms from English language, they still “have a fully developed scientific terminology” that “is largely independent of the English equivalents” (ibid.). Likewise, the demand for the translation of popular science exceeds that of hard science as the
general English-speaking public worldwide is in a small proportion. As for the high-profile and wide-circulated magazine *Scientific American*, it mainly appeals to non-experts. Among its 14 international editions, French, Italian, German, Polish, Russian and Chinese ones are incorporated. Generally, all share a similar edition structure but none “is a straight cover-to-cover translation” (p. 27). More importantly, the generalizations summarized in this research are prevailing as the institutionally-sponsored international versions are translated collaboratively.

Next fairly lengthy chapter is entitled “Metaphor and Translation”. To date, among various theoretical approaches to metaphor studies, the conceptual metaphor theory envisaged by Lakoff and Johnson (1980) stands out because of “its metalinguistic apparatus” and facilitation of “a multi-parameter analysis of metaphor in text” (p. 30). Whereas, the “interlingual and intercultural variation” (p. 34) highly valued in translation studies is overlooked. The author critically sets up six parameters (existence category, mapping, purpose, conventionality, provenance and richness) derived from metaphor research in line with “textual analysis of metaphor in a translation context” (Dickins 2005, 227). Translation studies has gradually dealt with purely contrastive linguistics and the prescriptive mode, furnishing metaphor studies with extralingual explanations. In what follows, the author reviews seven thought-provoking themes related to the study of metaphor in translation. One of the themes includes Kloepfer’s “Bold Hypothesis” that “the bolder and more creative the metaphor, the easier it is to repeat it in other languages” (Snell-Hornby 1995, 116), which has triggered a debate on the translatability of metaphor. It has to be said that the interplay between six parameters and translation procedures “reserved for a means of rendering a specific textual feature or a solution to a particular problem (e.g. compensation, implicitation, etc.)” (p. 55) will be exploited. In the methodology section, we get to know that the contextualized approach in descriptive translation studies is primarily adopted so as to generalize “what is likely to occur in translation” (p. 63). The number of candidate metaphorical expressions, which are identified on the ground of the “Metaphor Identification Procedure” (Pragglejaz Group 2007), reaches 279 in source articles. Parenthetically, most dead metaphors (idioms, phrase, single lexical items) are excluded as they may drown out other interesting metaphors. In the end, the figures of general translation procedures (retainment, removal, omission and addition) that translators recourse to in translation examples amount to 1,505 and will be exemplified both qualitatively and quantitatively. The comparison between the source text and parallel target texts also enables the monitoring of “translation universals” (p. 68).

Chapters 4 to 6 are the mainstay of the book. In each chapter, a pair of associative parameters are opted to analyze the change of scientific metaphors that occur
in different translations. And all chapter sections are interrelated instead of “carbon copies of each other” (p. 8).

Chapter 4 “Macro-level Metaphors” focuses on existence category and mapping parameters “categorising metaphor semantically on a high level” (p. 70). Existence category originates from the “Great Chain of Being”, a culturally-embedded hierarchical ordering of animate and inanimate objects. Mapping refers to “mental connection made between two unrelated concepts or areas of experience” (p. 31) and “relates directly to a metaphor’s subject matter” (p. 82). Nine existence categories for classifying high-level semantic metaphor according to the mapping level are identified: abstractive transformation, concretisation, dehumanisation, humanisation, humanotypic transformation, personification, plantification, processual transformation and reification. The relative frequencies of metaphorical expressions in these categories across seven languages are presented and exemplified later, revealing that most of them retain their original categories, albeit a large proportion are omitted. In the case of the category concretisation, metaphorical words such as letters, alphabet, and sentence, which serve for explanations, have turned into informal scientific terminology. Two alluring generalisations can be observed from the shifts of categories humanisation and personification: (1) more specific verbs tend to replace stylistically neutral ones; (2) reflexive verbs with passive meanings are gaining popularity (p. 81). In the following part, it is delineated that English metaphorical expressions are categorised into 103 macro-level mappings and three thematic-connected mapping clusters around genetic material, nature, and neurons. Those who are interested in the former two clusters can resort to the two Interludes to strengthen their understanding. Translation procedures of the high-frequency mappings are investigated ultimately, manifesting that “most mappings seem to undergo some degree of reduction” (p. 91). As expected, it fails to support the statement that metaphor is untranslatable to scientific translators.

Chapter 5 “Intuitive Classifications of Metaphor” brings other two informal parameters to the fore. Purpose “for which a metaphorical expression seems to be used” (p. 103) probably influences the procedures that a translator might employ. According to “the scientific subject matter” (p. 106) in his data, Shuttleworth proposes five categories of purpose, and underlines that the exegetical, terminological and theory-constitutive ones are central. In a similar vein, he surveys the number of metaphorical expressions pertaining to different purpose categories in seven languages, and finds out that the renderings of the central categories are preserved favorably. Considering that much popular science terminology “is created on the basis of metaphor” (p. 106) and “little has been written on this important subject so far” (p. 112), he spares a considerable amount of space to this second central category. In general, there are only 18 English-text examples of this category owing to the avoidance of specialist terminology in popular science (Olohan 2016, 188).
and the exclusion of dead metaphors. It is anticipated that translators always attach much importance to the context, instead of treating terms as isolated units, and form secondary terms sometimes. However, the data reveals that many terms are overtly transformed by accepted or conventional equivalents. Subsequently, the renderings of two metaphorical terms wetware and BioBrick are detailedly examined to illustrate the decisions that translators are likely to appeal to. Encountering such unfamiliar terminology, translators can not ignore the “the manner in which the mapping is reflected in collocations and contextual co-referents” (p. 121). On the contrary, contextual heterogeneity is not exclusive to the dealing of metaphorical terminology. Conventionality “relates to the manner and extent to which a particular metaphorical expression is embedded in the language” (p. 8) and falls into five categories (historical, dead, grammaticalised, conventionalised and innovative). Interestingly, there is a slight overlapping between metaphorical expressions in these categories in source and target texts. “Bold hypothesis” has yet received due testing, and the concept “boldness” is reflected in conventionality or rather innovative category to a large degree. The author hereby testifies the credibility of Kloepfer’s hypothesis and finds out that it is tenable within the context of this study.

Chapter 6 “Lakoff and Johnson’s Metaphor Types” concentrates on the provenance and richness parameters. Provenance, “which concerns whether a metaphorical expression is substantially image-schematic in nature” (p. 8), pervades the subjects of two sections in this chapter; richness “indicat[ing] how detailed and ‘rich’ in associations a metaphorical expression is” (ibid.) constitutes a part of section one. Specifically, the mutually interactive categories image schemas, propositional knowledge and richness form the basis for the provenance. The first two refer to “our bodies’ interaction of the world, our knowledge of how it works” (p. 139), and rich images are the “bold” metaphorical expressions that “can evoke a sophisticated complex of associations” (p. 148). It is noteworthy that the ratio of English propositional knowledge-based metaphorical expressions is overwhelming (88.4%). The figures of these categories distributed in the multilingual corpus are demonstrated afterwards as usual, reporting that the originals are stably translated. As stated earlier in Section 3.2.2.5, Al-Harrasi’s (2001, 277–288) classification of the underlying procedures for metaphor translation is conceptual metaphor theory oriented, in which three out of 11 items stress the interaction between image schemas and rich images, but remain to be verified. The author contextualises Al-Harrasi’s approach to prove its validity and suggests that propositional knowledge should be added to make it more generalized. Provenance, occasionally, is an image metaphor, whose “underlying mapping is generally based on [physical] similarities” (p. 33). In line with this, the next part looks at image metaphors and their renderings. It should be borne in mind that rich images and
image metaphors are linked as most English image metaphors are rich images within his data. Regarding the non-rich image samples that are not exchanged into rich ones, there are three in which the terms are “potentially obscure expression[s] for the readers” (p. 171), leading to their sizes increased through translation. Among 21 English-specific image metaphors subordinating to the concretisation and plantification existence categories, 13 are reflected in the mapping NEURONS ARE TREES. And three examples of this particular mapping function as terminology. Though the mappings of some images tend to be more abstract, the overall image metaphors undergo minor modification, indicating that they “produce the fewest problems for translators” (p. 182).

Chapter 7, the closing one, sets out to explore the major findings. The author summarises the mutual interplay between metaphor studies and translation studies, formulates typical changes that metaphorical expressions go through in scientific translation, and puts forward a list of 11 theoretically nuanced procedures on account of “isomorphisms between metaphor parameters and observed behaviours” (p. 189). Indeed, this book is a starting point as many pointcuts can be taken up to push this research forward, which can be seen from the nine potential points listed by Shuttleworth. To speak of, the translation of specific text-based metaphorical terminology is a fertile area that deserves to be further investigated.

Final critical assessment

With the compelling multi-disciplinary, multilingual and multi-dimensional nature, this book not only promotes the utmost understanding of metaphor studies and STT for expected readers, but also provides a perspective for thought-provoking discussions centered on terminological research. Its predominant traits are embodied in the thematic, theoretical and methodological levels respectively. In the first place, this novel work is “one of the first studies on metaphorical terminology in translation” (p. 113). To look back, very few scholars have paid attention to the correlations between scientific terminology and metaphor, let alone the transformation of metaphoricity concealed in coined terms. Mark Shuttleworth uncovers the importance of metaphor to term formation, and thoroughly examines the transition of terminological purpose of metaphorical expressions for scientific translators, which is bound to inject some vigorousness to the promising topic. Second, it is an apparent prejudice that STT subordinates to the pure applied branch of the discipline of translation studies. The author creatively applies the conceptual metaphor theory into popular science translation, which will arouse more relevant theoretical exploration due to its gearing effect. Meanwhile, the most influential metaphor theory by far – conceptual metaphor theory undeniably
bears controversies, for instance, some of its arguments are based on “made-up, idealised examples” (p. 184) and certain topics have not received adequate examination. It is Shuttleworth’s undogmatic treatment and context-oriented testimonies that allows the authentic outcomes to revisit the conceptual metaphor theory to make it more adapted to scientific translation. Another prominent feature rests with the methodological dimension. This research, compared with the poradic studies on scientific metaphor in translation, is corpus-based, in which quantitative and qualitative methods are introduced simultaneously. It is so evident that the “quantitative data collected using the corpus method can intensify the [textual] properties” (Xu and Wang 2016, 254) and advance the reliability of the findings.

There are a few respects that this work can adjust to make itself more appealing. For example, the credibility of the results would be enhanced if the data source is updated. It is admitted that the source data withdrawn from *Scientific American* are articles “appeared between January and May 2004” (p. 64), over ten years away from now. Languages including scientific one are in continual change. An up-to-date research conducted by Hyland and Jiang (2017) explicitly shows that science writers are inclined to use more informal language, which is assumed to boost the degree of metaphoricity in scientific discourse. Besides, supposing that the terms in Index are rearranged in line with their domains into general and specialized ones, the comprehension for audiences who are unversed in these areas will be facilitated to a larger degree. For one thing, the subjects of the vast complicated terms emerged in the book involve “neurobiology, biotechnology, genetics and psychology” (p. 4); for another, the conceptual metaphor theory entails different notions.

In short, the aforementioned underpin that *Studying Scientific Metaphor in Translation: An Inquiry into Cross-lingual Translation Practices* is invaluable to non-professionals, academics and postgraduates who are engaged in rhetoric studies, practical translation and terminology studies.

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