

MEDICAL ENGLISH TRANSLATION INTO ITALIAN. THE CASE OF NETTER'S WORK

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Abstract

Of the various specialized languages, that of the medical sciences undergoes, perhaps, the fastest changes. Medical innovations, whether new drugs or devices, therapies or advanced technologies, are quickly shared at a global level. For this reason, there is constant activity of medical translation. The latter is generally associated with the concept of terminological accuracy. However, if lexical precision is a fundamental feature in medical discourse, a good translation is also the result of compliance with the stylistic and syntactical rules that are typical of the language of medicine in the target language (TL). This paper investigates the linguistic characteristics of a 151,121-word corpus of medical English texts included in *The Netter Collection of Medical Illustrations*, and compares it to the corresponding 157,016-word corpus of Italian translations. Netter's texts were chosen for two reasons. They have been fundamental reference tools for medical specialists for about thirty years worldwide; the texts of the Italian version are produced by doctor-translators, and therefore they stand out for terminological accuracy, content precision, and obedience to the lexical, syntactic and stylistic conventions of Italian medical discourse. The anatomy, physiology, traumatology – including sports-related injuries – and metabolic disorders of the musculoskeletal system are the topics selected for investigation. In this respect, the analysis of the main linguistic features that emerge from comparison of source and target texts is intended to offer both a contribution to research on medical translation and useful suggestions for EMP (English for Medical Purposes) teaching, with particular reference to courses for Italian sports sciences undergraduates.

1. Introduction

Frank Netter was an American surgeon and one of the most influential physicians of the twentieth century. He became famous for his extraordinarily realistic hand-made illustrations contained in the 13-book *Netter Collection of Medical Illustrations*, one of the most famous medical texts ever published. It has been translated into 16 languages, including Italian, and is used as a highly valuable and authoritative reference text for medical and health-care students worldwide. The largest volume of the collection, Volume 8, concerns the musculoskeletal apparatus, which is the object of study in the present paper. The reason for this choice lies mainly in my research and teaching ac-

tivity in scientific English in the sports sciences study course at the University of Palermo. Although the latter encompasses several different disciplines, including law-related subjects and psychological studies, the predominant component of the syllabus is represented by the bio-medical area. The main goal of sports sciences courses is to educate learners to become kinesiologists and sports rehabilitation experts. Therefore, the curriculum is primarily based on acquisition of knowledge related to the anatomy of the human body and to its main biochemical and physio-pathological processes, as well as on knowledge of disorders affecting the musculoskeletal system and their treatment from a kinesiological perspective. As in most scientific curricula, the teaching activity in Italian sports sciences courses is characterized by frequent consultation of specialized literature in English. A correct understanding of English is crucial as it provides learners with the latest outcomes of research: it may describe a phenomenon, a new procedure, or a process. Consultation of scientific literature in English largely contributes to enriching students' specialized knowledge, thus allowing them to be successful at tests and at the final degree exams. With regard to the latter in particular, the majority of the dissertations discussed by sports sciences students at the end of both the three-year and the "laurea magistrale" (five-year MA) courses belong to the bio-medical field. As a consequence, they are widely based on the study and in-depth analysis of scientific material in English. Moreover, starting from the 2016-2017 academic year, an increasing number of triennial courses of Italian Universities (e.g. Bologna, Forlì, Milan, Palermo, Venice) have abolished the traditional written dissertation in the three-year courses and have introduced a final exam – assessed as a mark out of 30 according to the same procedure as that used for the other curricular subjects – within a project of simplification of the bureaucratic procedures in first-cycle degree curricula. As for the sports sciences course in particular, the University of Palermo was one of the first to join the project. The final exam – as set up by the study course board – consists in the presentation and discussion of a scientific English text among those recommended during classes for a thorough study of the topics dealt with during the course. The texts are translated into Italian by the students themselves and discussed in their language (optionally in English), with the presentation being enriched with personal reflections and analytical comments. Five graduation sessions have taken place to date in the sports sciences course in Palermo starting from the 2019 summer session, and the number of candidates was 30 per session on average. It was observed that more than one third of all the students did not show a correct use of specialized Italian, either in terms of terminological accuracy or in terms of appropriate style. The linguistic choices proved to be rather 'unnatural', mainly as a result of too many literal translations that did not observe the characteristics of medical discourse in the Italian language. The present study was inspired by the need to help such students. It provides a description of some of the linguistic aspects concerning medical translation from English into Italian. For this purpose, a corpus of English texts drawn from *The Netter Collection of Medical Illustrations* is analysed and compared with respect to their Italian translations included in *Atlante di Anatomia, Fisiopatologia e Clinica*. The peculiarity of the Italian texts lies in the fact that they were not translated by professional translators but by doctor-translators. Thus, it was thought that those texts might represent an important example of terminological precision, content accuracy, and syntactical and stylistic correctness.

It must be pointed out that even though this study was prompted by the needs of the sports sciences students of the University of Palermo, the results attained can be extended to all Italian undergraduates whose syllabuses include healthcare-based subjects – as well as to any scholar concerned with medical translation.

The important role that translation plays in language teaching and learning has been reconsidered over the last ten years (Cook 2010; Calis and Dikilitas 2012; González Davies 2019). Calis and Dikilitas (2012: 5080) state that “translation is favoured by learners as it promotes different aspects of learning.” González Davies (2019: 447) claims that “translation should have a place as a natural skill in language learning to cope with our plurilingual contemporary world.” In this respect Cook (2010: 43), who emphasizes the importance of translation in the maintenance of linguistic and cultural identities, says that “translation relates languages to each other, rather than leaving them to operate in separate compartments, and is thus very much in tune with globalization. Indeed it is, and always has been, a major catalyst of global communication.” In advocating its use in language teaching, Cook (*ibid.*: 155) highlights that “translation develops both language awareness and use, it is pedagogically effective and educationally desirable, and it answers student needs in the contemporary globalized and multicultural world.”

2. Theoretical background and previous research on specialized and medical translation

The study of specialized translation in the medical field has attained increasing importance within Translation Studies parallel to the rapid advances of medical sciences and technologies. Medical translation and specialized translation in general have been broadly investigated from a terminological perspective (Salager 1983; Felber 1984; Cimino 1998; Zethsen 2004; Deléger, Merkel and Zweigenbaum 2009; Thelen 2015). One of the reasons is that correct use of medical terminology “is one of the core conditions for successful communication in monolingual and multilingual healthcare communities” (Montalt, Zethsen and Karwacka 2018: 29). Another reason more than likely lies in the explanation provided by Byrne (2006: 3) with regard to technical translation, that is, that “terminology is, perhaps, the most immediately noticeable aspect and indeed it gives a technical text the ‘fuel’ it needs to convey the information.” The predominant role given to terminology as a feature of medical discourse as compared to general language has led to several misconceptions about medical translation and, more in general, about specialized translation. One of these is that style has little or no importance. Byrne (*ibid.*) writes:

Style doesn't matter in technical translation. This is, perhaps, one of the more irritating misconceptions for technical translators because it is completely unfounded and implies that technical translators do not have the same linguistic and writing skills as other types of translator. Perhaps the problem stems from differing opinions of the nature of style and the popular belief that it relates exclusively to literature. If we look at style from a literary point of view, then it does not have any place in technical translation. But if we regard style as the way we write things, the words we choose and the *way* we construct sentences, then style is equally, if not more, important in technical translation than in other areas because it is there for a reason, not simply for artistic or entertainment

reasons. [...]. In many cases, the importance or even existence of style in technical texts goes completely unacknowledged, due largely to the belief that because technical language is functional, it must be “plain” and stripped of any form of style or linguistic identity. In reality, however, technical translation is a highly complex endeavour and style is one of its most important facets. [...].

Byrne (*ibid.*: 6-7) also discusses another misconception, strictly connected to the previous one, i.e. that technical translation is all about conveying specialized information:

This is not entirely true; of course, the main concern for technical translators is to make sure that information is conveyed accurately but they are also responsible for ensuring that the information is presented in the correct form, that it is complete and that the information can be used correctly and effectively. [...].

However, research on medical translation also includes studies on its morpho-syntactic aspects (Gotti 1991; Magris 1992; Viezzi 1992). In order to identify the levels of diversification and specificity of specialized discourse as compared to general language, Gotti (1991) treats lexical, syntactic and textual characteristics of specialized languages, with medical communication occupying a major role. Magris (1992) carries out a comparative study of English, German, and Italian medical texts, and though mainly focusing on lexical features, she also focuses attention on morpho-syntactic characteristics and textual patterns. Viezzi (1992) concentrates on the translation of medical English into Italian and compares some texts in English to their corresponding Italian translations in order to find analogies and differences regarding syntactical, stylistic and terminological aspects.

Research has also focused attention on who should engage in medical translation and on the specific competences that a translator of medical texts is required to have. Montalt and González Davies (2014: 36) state:

There is still no agreement on which elements are needed to draw the complete map of translation competence, but in the specific case of medical translators, special attention should be paid to the competencies grouped [...] under the following labels: language and writing; communication and culture; medical notions; transference; information resources; professional practice; and attitude.

They also maintain (*ibid.*: 35) that

what matters [...] is not whether the medical translator has a degree in Medicine or Translation, but whether s/he has the translation skills required to be an efficient mediator. So, it is important to concentrate on those skills, regardless of the educational background.

Magris (1992: 79) maintains that a good translation is the result of cooperation between professional translators and medical specialists. Viezzi (1992) stresses the importance of knowledge of the subject which is at the basis of the text to be translated as a guarantee of correctness and precision for the quality of the product. He compares and contrasts English texts translated by Italian physicians not only because terminological accuracy is ensured but also because the stylistic and syntactical conventions that are typical of texts produced in the medical field in the Italian language are respected.

In this regard, with reference to specialized translation in general Musacchio (2006: 175) states:

The question remains whether we can use insights from translation research (House, Laviosa-Braithwaite, Baker) to produce naturally sounding translations especially in technical and scientific domains where the main preoccupation is the transfer of content, not form as in literary writing. In short, if translations are arguably setting new standards, it could also be argued that they fall somewhat short of quality requirements where they deviate from the standards set by target language originals.

The role of the recipient in the validity or acceptability of a translated text has always been central to Translation Studies (Bassnett 1981; Bassnett and Lefevere 1998; Lefevere 1992; Nida and Taber 1969; Venuti 1994 [2008]).

Ulrich (2011) discusses the importance of recipient-oriented adaptation and manipulation of the source text (ST), and deals with the concept, first introduced by Stetting (1989), of “transediting.” Ulrych (*ibid.*: 90) makes specific reference to journal article publishing, and outlines the profile of the transeditor, who is a language expert having translational, editing, and writing skills, and “a sufficiently developed knowledge of the subject to be able to rewrite the paper in accordance with the expectations of the recipient audience.”

A certain degree of discontent emerges from Translation Studies towards the opinion, which is still deeply held by some scholars, that technical translation and creativity are two opposing concepts. In this respect, Popescu and Cohen Vida (2015: 1198) write:

If freedom and creativity are compatible terms, creativity and technical translation are two concepts that seem to be mutually exclusive, creativity would be the defining characteristic of literary translation while respect to fierce constraints, including terminological ones would define the technical translation.

This is in line with what has been observed by Postolea (2016: 52), who states that specialized translation is still a neglected area within Translation Studies in that it is considered as a mechanical and tedious job, an activity commonly “deemed easier”, “restricted” and not intellectually rewarding. Popescu and Cohen Vida (2015: 1201) add:

The professional world has increasingly need of professional creative translators, who are able to improve the original text, to correct its structure and the information it contains, so as to produce a text that might be better than the original one.

Postolea (2016: 58) also points out two aspects of specialized texts, i.e. the fact that they are not mere lists of specialized terminology but also “vast lexical and terminological networks”, and the interdisciplinary nature of specialized discourse, as “texts that are strictly confined to a single terminological field are the exception, not the rule.” In the specific case of the medical domain, terminology encompasses several specialized fields of knowledge, including biochemistry, physics, statistics, mathematics and biology.

3. Corpus and methodology

This study used a corpus of English medical texts drawn from the *Netter Collection of Medical Illustrations*, and their respective Italian translations contained in *Atlante di Anatomia, Fisiopatologia e Clinica*. The selection of the texts took into account the main basic bio-medical subjects in the three-year sports sciences degree courses, namely anatomy, physiology, traumatology – with particular reference to sports injuries – and metabolic disorders. The choice of the topics to be investigated was made according to the ministerial syllabuses established for the above-mentioned subjects. In this respect, the study focused attention on Sections I, II and IV of Volume 8, Part I, “Musculoskeletal System, Anatomy, Physiology, and Metabolic Disorders” (1994), and Section IV of Volume 8, Part III, “Musculoskeletal System – Trauma, Evaluation, and Management” (1993), as well as on their corresponding Italian versions, respectively, Sections I, II and IV of Volume 8, Part I, “Anatomia, Fisiologia e Turbe Metaboliche” (1994), and Section IV of Volume 8, Part III, “Apparato Muscolo-Scheletrico – Traumatologia, Valutazione Clinica e Trattamento” (1994). Two physicians carried out the translations in both subvolumes investigated, and their work was supervised by a third physician. Extensive manual reading of the texts was carried out and analysis also made use of WordSmith concordancing 5.0 software where necessary.

4. Results

Comparison of the source texts (STs) and target texts (TTs) revealed analogies and differences mostly depending on the type of topic dealt with. Greater compliance with the structure and the sequence of the syntagmatic units of the ST discourse prevails in the anatomical description of the musculoskeletal system and of its physiological aspects. Two examples, respectively taken from the anatomy and physiology sections, are reported below:

1a. The muscle action potential is propagated from the region of the neuromuscular junction along the entire length of the muscle fiber. The electric impulse of muscle is similar to that of most nerve fibers. The sarcolemma contains voltage-dependent sodium channels that open in response to an injection of depolarizing (positive) current into the muscle fiber (*Sarcoplasmic Reticulum and Initiation of Muscle Contraction*, Vol. 8, Part I, Sec. III, p. 155).

1b. Il potenziale d'azione muscolare è propagato dalla regione della giunzione neuro-muscolare per tutta la lunghezza della fibra muscolare. L'impulso elettrico del muscolo è del tutto simile a quello della maggior parte delle fibre nervose. Il sarcolemma contiene canali del sodio a dipendenza di voltaggio, che si aprono in risposta all'immissione di una corrente depolarizzante (positiva) nella fibra muscolare (*Reticolo sarcoplasmatico e inizio della contrazione muscolare*, Vol. 8, Parte I, Sez. III, p. 155)¹.

¹ It seems right to underline that “è propagato dalla regione” (first line in this extract) sounds unnatural in Italian and would find a better wording as “si propaga dalla regione”.

2a. The cervical *vertebral bodies* are smaller than those of the other movable vertebrae and increase in size from above downward; they are broader in the transverse diameter than anteroposteriorly. The superior body surfaces are concave from side to side and slightly convex from front to back. [...] The *vertebral foramina* are comparatively large in order to accommodate the cervical enlargement of the spinal cord; they are bounded by the bodies, pedicles, and laminae of the vertebrae. The *pedicles* project posterolaterally from the bodies and are grooved by superior and inferior vertebral notches, almost equal in depth, which form the intervertebral foramina by connecting with similar notches on adjacent vertebrae (*Vertebral Column and Pelvis*, Vol. 8, Part I, Sec. I, p. 11)².

2b. I *corpi vertebrali* delle vertebre cervicali sono più piccoli di quelli delle altre vertebre mobili e aumentano in dimensione procedendo dall'alto verso il basso; il loro diametro trasverso è maggiore di quello antero-posteriore. Le facce superiori dei corpi vertebrali sono concave in senso trasversale e leggermente convesse dall'avanti all'indietro. [...] I fori vertebrali sono relativamente ampi, in modo da adattarsi al rigonfiamento cervicale del midollo spinale; essi sono circondati dai corpi vertebrali, dai peduncoli e dalle lamine delle vertebre. I peduncoli si proiettano in direzione postero-laterale dai corpi vertebrali e sono incavati dalle incisure vertebrali superiori e inferiori, circa uguali come profondità, che determinano la formazione dei fori intervertebrali connettendosi con le incisure similari delle vertebre adiacenti (*Colonna vertebrale e pelvi*, Vol. 8, Parte I, Sez. I, p. 11).

Extracts 1b and 2b show a high level of adherence to the STs as regards both the syntactic patterns displayed and the lexicon used. Extract 1b, in particular, shows a basically literal translation. The almost complete adherence to the ST regarding discourse patterns, terminology and syntactical structures was possible thanks to the linguistic characteristics of the ST which were suited for word-for-word translation while not making the TT sound 'unnatural'. By contrast, in extract 2b it can be noticed that a few – albeit minor – adjustments were necessary to adapt the English text to the lexical and discourse norms of the Italian language. Let us consider, for instance, the second sentence (in 2b). A word-for-word translation (“essi sono più ampi nel diametro trasverso che anteroposteriormente”) would have proved to be too artificial; to comply with the ‘spontaneous’ way of conveying the concept in Italian, the translator used a paraphrase, where “il loro diametro trasverso” (lit., their transverse diameter) became the subject, whereas it is an adverbial of location in the ST (“in the transverse diameter”), and “è maggiore” (lit., is greater) became the predicate that translates “broader”, which in turn is used in the ST to qualify the cervical vertebral bodies (represented by the anaphoric reference “they”). Moreover, adaptation was made for the noun phrases “from side to side”/ “in senso trasversale” and “cervical enlargement” / “rigonfiamento cervicale”, as well as for the adverb “posterolaterally”, translated “in direzione postero-laterale.” Moreover, extract 2b exhibits a repetition of “vertebrali” (vertebral) next to “corpi” (bodies) at every occurrence, unlike the ST, where the adjective only appears at its first occurrence. In the Italian translation, the use of “corpi” (bodies) without the adjective would have sounded ‘unnatural’, as well as the other previously mentioned Italian translations of terms and phrases if these had not been the result of a process of adaptation to the Italian lexical conventions of use. Nevertheless, it can be stated that

² All cases of underlining in the extracts in this study are mine.

no major changes can be identified in extract 2b considered as a whole and that there is still an overall high degree of obedience to the structure and sequence of the lexical units of the ST. By contrast, interventions of adjustment in the search for equivalence in the TTs become increasingly marked as the discourse progressively moves away from the mere morpho-physiological description of the human body and proceeds towards exposition of other topics such as diseases, disorders, injuries, and corresponding treatments and therapies. The first clearly distinctive feature that emerges from a comparison of the two languages concerns sentence structure and length. More precisely, the majority of the English sentences show a higher degree of syntactic conciseness, and therefore shorter sentences, and a greater quantity of content words in comparison with their Italian translations. Conversely, the Italian translations reveal more complex syntactic structures, longer sentences and a greater quantity of grammar words. The following extract may serve as an illustrating example:

3a. Sprains occur frequently in sports activities as well as in daily activities. In addition, a previously sprained ankle is at significant risk for reinjury (*Rehabilitation after Sports Injury*, Vol. 8, Part III, Sec. IV, p. 207).

3b. Le distorsioni della tibio-tarsica sono un evento di riscontro assai frequente sia nelle attività sportive sia in quelle della vita quotidiana. La caviglia che ha già subito un insulto di tipo distorsivo inoltre è più esposta a nuovi traumi (*Riabilitazione dopo lesioni traumatiche da attività sportiva*, Vol. 8, Parte III, Sez. IV, p. 207).

As can be seen, in the English extract there is greater syntactic conciseness as compared to its Italian translation due to the preference for premodification rather than for relative clauses. “A previously sprained ankle” was preferred to a possible “an ankle which has previously been sprained.” Premodification gives the sentence syntactic compression and allows for what Gotti (2003: 79) defines as “an easier flow of information”. By contrast, the Italian translation shows greater superficial extension of sentences due to the use of postmodification including a relative clause (“la caviglia che ha già subito un insulto di tipo distorsivo”), and greater use of grammatical items, especially prepositions and articles. Moreover, while the Italian text uses an anatomical term which serves as an explicitation of the precise joint (most frequently) affected by a sprain, i.e. the tibio-tarsal, the English text deploys a more general term that denotes the anatomical region including that joint. In this respect, in some cases the English texts make use of terms taken from everyday language, whereas the equivalents used in the translated versions are drawn from specialized lexicon:

4a. After total knee replacement, pain is usually a significant limiting factor in the initial rehabilitation program (*Rehabilitation after Joint Replacement*, Vol. 8, Part III, Sec. IV, p. 211).

4b. Dopo un intervento di artroprotesi del ginocchio, il dolore costituisce spesso un importante fattore limitante nelle prime fasi del programma di riabilitazione (*Riabilitazione dopo artroprotesi*, Vol. 8, Parte III, Sez. IV, p. 211).

5a. During ambulation, the patient is evaluated for limb length discrepancy (*Total Hip Replacement*, Vol. 8, Part III, Sec. IV, p. 210).

5b. Durante la deambulazione vengono valutate le eventuali dismetrie degli arti (*Artroprotesi dell'anca*, Vol. 8, Parte III, Sez. IV, p. 210).

As can be seen, in extract 4a the word “replacement” is used, while in the Italian translation the strictly medical term “artroprotesi” is adopted. Similarly, to denote a medical condition in which there is a difference in the length of the bone segments of the legs, the locution “limb length discrepancy” is used in extract 5a (despite its lack of conciseness) and not the more specialized term *dysmetria*, which, in addition, would have also been more concise. By contrast, in extract 5b the term used is “dismetrie degli arti” and not a literal paraphrase, “discrepanza della lunghezza degli arti.” Moreover, it can also be noted that in the Italian translations there is an element which is not included in the original text, namely the adjective “eventuali”, which was considered appropriate to add to convey the concept that limb dysmetria is likely but not necessarily certain to occur after hip replacement operations. In the Italian texts investigated in this study, another term belonging to the specialized medical lexicon was found, namely “astenia”, whose corresponding English denomination is taken from common language. “Astenia” was used to translate “weakness” in the original texts. “Weakness” is never translated as *debolezza* – except when what is referred to is not a symptom but a condition of fragility. In other words, in the English texts there is no terminological difference between the use of *weakness* as “a subjective evidence of disease/physical disturbance” (*Merriam-Webster* 2020) and *weakness* meant as “the quality or state of being easily broken” (*Merriam-Webster* 2020), e.g. of organs or tissues, and therefore as *objective* evidence. Let us consider the following extracts:

6a. Most patients are asymptomatic or have only mild systemic manifestations such as weakness, polyuria, nocturia, constipation, or hypertension (*Primary Hyperparathyroidism*, Vol. 8, Part I, Sec. IV, p. 197).

6b. La maggior parte dei pazienti è asintomatica o presenta unicamente sintomi sistemici di lieve entità, quali astenia, poliuria, nicturia, stipsi o ipertensione (*Ipertiroidismo primario*, Vol. 8, Parte I, Sez. IV, p. 197).

7a. Osteoporosis results when bone mass falls below normal for body size, age, sex, and race. It is characterized by structural weakness in the bones, primarily due to enlarged medullary (marrow) and osteonal spaces and reduced cortical thickness (*Osteoporosis*, Vol. 8, Part I, Sec. IV, p. 216).

7b. Si ha osteoporosi quando la massa ossea scende al di sotto dei valori normali per taglia corporea, età, sesso e razza. L'anomalia è caratterizzata da debolezza strutturale delle ossa, primariamente dovuta ad espansione degli spazi midollari ed osteonici e a riduzione dello spessore corticale (*Osteoporosi*, Vol. 8, Parte I, Sez. IV, p. 216).

As can be seen, in extract 6a “weakness” is used in the sense of symptom, and therefore it was translated as “astenia” in the Italian version; by contrast, in extract 7a “weakness” refers to a condition of fragility of a part of the human body, and more specifically to bone brittleness (due to osteoporosis), and therefore “debolezza” was used as the correct Italian equivalent. In one case, finding an equivalent for “weakness” took

into account its meaning and value in relation to the other components of the sentence, as in the following excerpt:

8a. The rehabilitation program is individualized, based on the patient's residual strengths and weaknesses (*Rehabilitation after Stroke*, Vol. 8, Parte III, Sec. IV, p. 202).

8b. Il programma di riabilitazione deve essere personalizzato, in rapporto alle condizioni e alle capacità residue del paziente (*Riabilitazione dopo ictus*, Vol. 8, Parte III, Sez. IV, p. 202).

The greater superficial extension of the target sentences as compared to the source ones in the texts examined was not only due to postmodification and to an extensive use of grammar words but first and foremost to the pervasive addition of extra elements. Some of the most significant examples are reported below:

9a. Protective measures must be developed [...] (*Musculoskeletal Effects of Weightlessness (Spaceflights)*, Vol. 8, Part I, Sec. III, p. 186).

9b. È necessario provvedere allo sviluppo di misure di profilassi [...] (*Effetti dell'assenza di peso (viaggi aerospaziali) sull'apparato muscolo-scheletrico*), Vol. 8, Part I, Sez. III, p. 186).

10a. Decubitus ulcers are common, expensive, and preventable complications (*Rehabilitation*, Vol. 8, Part III, Sec. IV, p. 195).

10b. La comparsa di piaghe da decubito in un paziente costretto a letto rappresenta un'evenienza frequente, prevenibile e costosa (*Riabilitazione*, Vol. 8, Parte III, Sez. IV, p. 195).

11a. The elderly person with proprioception problems [...] (*Osteoporosis*, Vol. 8, Part I, Sec. IV, p. 226).

11b. I soggetti anziani che presentano alterazioni della sensibilità propriocettiva [...] (*Osteoporosi*, Vol. 8, Parte I, Sez. IV, p. 226).

12a. The diagnosis is made by a careful history and by observing the patient's response to withdrawal of calcium (*Differential Diagnosis of Hypercalcemic States*, Vol. 8, Part I, Sec. IV, p. 198).

12b. La diagnosi si formula con un'attenta anamnesi e con l'osservazione della risposta del paziente dopo avere posto fine all'assunzione del calcio (*Diagnosi differenziale degli stati ipercalcemici*, Vol. 8, Parte I, Sez. IV, p. 198).

13a. Sensory deprivation leads to confusion and disorientation, which contribute to anxiety and depression (*Rehabilitation*, Vol. 8, Part III, Sec. IV, p. 195).

13b. La deprivazione sensoriale è causa di confusione e di disorientamento, che a loro volta favoriscono la comparsa di sindromi ansiose e depressive (*Riabilitazione*, Vol. 8, Parte III, Sez. IV, p. 195).

14a. The diagnosis of osteomalacia will be expedited if the physician is familiar with the causes and has a high index of suspicion (*Comparison of Osteoporosis and Osteomalacia*, Vol. 8, Part I, Sec. IV, p. 228).

14b. La diagnosi di osteomalacia sarà più agevole quando il medico sia a conoscenza delle sue cause e abbia fondati motivi di sospettarne la presenza (*Confronto fra osteoporosi e osteomalacia*, Vol. 8, parte I, Sez. IV, p. 228).

What can be noticed in the Italian extracts above is the inclusion of additional elements as compared to the sentences in the original texts. This seems to be mainly due to stylistic reasons rather than to meaning-related motivations as the concepts to be conveyed would have proved equally effective if the translators had opted for more rigorous compliance with the structural patterns of the SL texts. Possible sentences like “si devono sviluppare misure preventive”, “l’anziano con problemi propriocettivi”, “la risposta del paziente alla sospensione del calcio”, and “contribuiscono all’ansia e alla depressione” would not have provided less information and would not have proved less clear or ‘natural-sounding’ than the sentences actually used, respectively, in extracts 9b, 11b, 12b and 13b. In extract 10b, “un paziente costretto a letto” (a patient obliged to lie in bed) is pleonastic in relation to “piaghe da decubito” (decubitus ulcers), as the term “decubitus” refers to the position that the patient assumes when in bed. By contrast, in extract 14b, the presence of extra elements does not seem to have been only due to merely stylistic reasons but also to communicative needs related to how the concepts included in the ST could be conveyed into Italian clearly and effectively. A faithful translation of extract 12a would have proved unnatural; if “familiar with the causes” and, even more, “high index of suspicion” had been translated word-for-word (i.e. “familiare con le cause” e “alto indice di sospetto”), the result would not have complied with the actual use that is made in Italian to express the concepts included in the STs. Information was not always conveyed through sentence length extension. Reduction of phrasal elements was identified in the TTs as compared to the STs due to the omission, in the former, of elements considered unnecessary or too redundant for a specialized text:

15a. An evaluation should be performed by a physiatrist – a physician trained in all aspects of acute and chronic rehabilitative care (*Rehabilitation after Care*, Vol. 8, Part III, Sec. IV, p. 200).

15b. Diviene utile la valutazione di un fisiatra esperto in tutti gli aspetti della terapia riabilitativa acuta e cronica (*Riabilitazione dopo ictus*, Vol. 8, Parte III, Sez. IV, p. 200).

16a. Extensive preoperative planning is necessary to identify the extent of the bone bridge. After resection of the bone bridge, Silastic or autogenous fat is packed into the defect to prevent the bridge from reforming. If this surgical procedure is effective in maintaining an open growth plate, longitudinal growth resumes, reducing the risk of further angular deformity. Alternatively, an osteotomy can be performed to correct a residual deformity when the child reaches skeletal maturity (*Complications of Fractures*, Vol. 8, Part III, Sec. III, p. 149).

16b. Per valutare esattamente l’estensione del ponte osseo è necessario un attento studio pre-operatorio; dopo la sua resezione, l’applicazione locale di tessuto adiposo autologo o di Silastic evita la recidiva. Quando l’intervento ha successo, la crescita longitudinale riprende, riducendo così il rischio di comparsa di deviazioni angolari. In alternativa, una volta

raggiunta la maturità scheletrica, è possibile eseguire un'osteotomia correttiva (*Complicanze delle fratture*, Vol. 8, Parte III, Sez. III, p. 149).

In extract 15b, “physician” contained in extract 15a was not translated as the concept it refers to is included in that of “physiatrist”, while the information in extract 16b has undergone a process of reformulation as compared to that in extract 16a. The concept included in the clause “to prevent the bridge from reforming” was conveyed in the shorter form “evita la recidiva” (avoids relapse). Later, “to correct a residual deformity” was not translated but the concept of “correction” (in the specific case, of deformity due to bone fractures) was preserved and positioned next to “osteotomy” in an attributive position. Moreover, “bone bridge” is repeated twice in the ST, whereas in the TT the use of the possessive adjective (“sua”/its) was preferred to lexical repetition. With regard to the latter aspect, lexical repetition is constantly sought in the STs; by contrast, the Italian translations show a preference for expressive variety. Let us consider the following extract, a part of which was examined earlier regarding sentence length:

17a. Ankle sprains occur frequently in sports activities as well as in daily activities. In addition, a previously sprained ankle is at significant risk for reinjury. Ankle sprains usually occur in persons less than 35 years of age, most commonly in teenagers 15 to 19 years of age (*Rehabilitation after Sports Injury*, Vol. 8, Part III, Sec. IV, p. 207).

17b. Le distorsioni della tibio-tarsica sono un evento di riscontro assai frequente sia nelle attività sportive sia in quelle della vita quotidiana. La caviglia che ha già subito un insulto di tipo distorsivo inoltre è più esposta a nuovi traumi. Questo tipo di lesione colpisce prevalentemente soggetti di età inferiore a 35 anni: si tratta per lo più di giovani fra i 15 e i 19 anni (*Riabilitazione dopo lesioni traumatiche da attività sportiva*, Vol. 8, Part III, Sez. IV, p. 207).

In extract 17a, what immediately stands out is the lexical repetition of “ankle sprains”, which is repeated twice in the same form (“ankle sprains”), and with the variation “sprained ankle” in the second occurrence. By contrast, in the Italian translation lexical repetition is completely avoided³. Three different phrases are used to refer to the ankle sprain, namely, 1) the name of the joint affected by the injury (“le distorsioni della tibio-tarsica”/tibio-tarsal sprains), 2) a periphrasis including a relative clause (“la caviglia che ha subito un insulto di tipo distorsivo”/the ankle that has undergone a damage to a joint), where “insulto” (damage) was preferred to “distorsione”, and 3) a sentence where a partial definition of it is deployed (“questo tipo di lesione”/this type of injury).

Another type of intervention which was identified in the TTs (18 cases) concerns a change in the information / word order displayed in the discourse. Three examples are reported below:

18a. A person who has intellectual and physical dysfunction but is still capable of following commands and participating in therapy is a candidate for rehabilitation (*Rehabilitation After Stroke*, Vol. 8, Part III, Sec. IV, p. 200).

³ “In English science, cohesion is often created by reiteration. In Italian, reiteration by means of repetition is avoided for stylistic reasons unless non-repetition is a source of ambiguity” (Musacchio 2004: 99).

18b. Sono candidati alla terapia riabilitativa tutti i soggetti che, pur presentando alterazioni intellettive e fisiche, siano però capaci di eseguire comandi e di cooperare alla terapia stessa (*Riabilitazione dopo ictus*, Vol. 8, Parte III, Sez. IV, p. 200).

19a. Lifelong periodic evaluation is essential (*Marfan's Syndrome*, Vol. 8, Part I, Sec. IV, p. 232).

19b. Essenziali sono i controlli per tutta la durata della vita (*Sindrome di Marfan*, Vol. 8, Parte I, Sez. IV, p. 232).

20a. A daily program of active spinal extension exercises should be started (*Osteoporosis*, Vol. 8, Part III, Sec. IV, p. 226).

20b. Deve essere intrapreso un programma giornaliero di esercizi di estensione vertebrale attiva (*Osteoporosi*, Vol. 8, Parte III, Sez. IV, p. 226).

In all three above-mentioned cases, the variation in the order of the phrasal elements, consisting in collocating the predicate nominative before the subject, does not have any particular effect on the transmission of the message but basically serves a stylistic function. However, in one case the change in the sequence of the information segments gives more emphasis to an aspect of the message that is considered important:

20a. After surgery, the patient can begin gentle active and passive range-of-motion exercises if the fixation is secure (*Injury to Femur*, Vol. 8, Part III, Sec. I, p. 91).

20b. Dopo l'intervento, se la sintesi è solida, il paziente può iniziare con cautela una serie di esercizi di mobilizzazione attiva o passiva (*Fratture del Femore*, Vol. 8, Parte III, Sez. I, p. 91).

The position of the information “se la sintesi è solida” (if the fixation is secure) at the beginning of the sentence in extract 20b focuses attention on the condition in which it is necessary to allow the patient to undertake physical exercise after surgery, whereas in extract 20a priority is given to the exercises themselves.

Another type of intervention that did not exclusively aim at fulfilling stylistic needs but also allowed the translator to draw attention to a given feature of the topic treated is clarification, in the TTs, of concepts that remain implicit in the STs. Two examples are reported below:

21a. Spontaneous neurologic recovery is usually complete 3 to 6 months after the stroke. [...] The patient's medical condition is monitored closely, and the primary care physician is usually encouraged to continue follow-up of the patient (*Comprehensive Rehabilitation*, Vol. 8, Part III, Sec. IV, p. 201).

21b. Il recupero neurologico spontaneo è da considerare completato dopo un periodo di 3-6 mesi dall'ictus. [...] La stretta sorveglianza delle condizioni mediche ha grande importanza; a questo proposito è utile che il curante venga sensibilizzato a far eseguire controlli clinici ripetuti nel tempo (*Riabilitazione intellettuale*, Vol. 8, Parte III, Sez. IV, p. 201).

22a. Emphasis is on range-of-motion exercises and transfers. At strength, confidence, and skill regained, the patient gradually assumes responsibility for these activities (*Comprehensive Rehabilitation*, Vol. 8, Part III, Sec. IV, p. 201).

22b. Rivestono particolare importanza gli esercizi di mobilitazione articolare e gli spostamenti. Quando si ottiene il recupero della forza, della fiducia e della abilità, il paziente viene portato ad assumere gradualmente l'iniziativa per lo svolgimento delle attività sopra elencate (*Riabilitazione intellettuale*, Vol. 8, Parte III, Sez. IV, p. 201-202).

The translation in extract 21b can be considered a clarification of the sentence in extract 21a and, at the same time, its most obvious inference. If a patient's condition is monitored "closely", it means that the monitoring of his/her condition is very important. The translator makes explicit a feature of the topic which is implicit in the source text and by doing so s/he highlights what s/he wants to foreground. In extract 22b, the clarificatory function is far more incisive and 'sophisticated' than in extract 21b as the translator makes an element explicit, identified in the use of the passive "viene portato" / is guided, which is not of immediate inference – at least on the target reader's part. More precisely, while in extract 22a attention is on *the patient*, who progressively learns to perform some rehabilitation exercises after a stroke, in extract 22b the focus has been shifted towards the patient *being guided* (presumably by the physiotherapist) into taking the initiative to carry out the exercises – because s/he is not yet autonomous. Here, the translator chooses to emphasize the fact that a stroke patient is not able to perform activities unless *supported* by an expert (usually a physical therapist), at least at an early stage of the rehabilitation schedule. Given the basically instructive vocation of the texts analysed, the translator prefers to make explicit and highlight information of the topic which remains unstated in the original text and whose transmission s/he does not want to take for granted. For this purpose, the translator has transformed an active form ("assumes") into a passive one ("viene portato ad assumere" / is guided to assume).

A comparison of extracts 21a and 21b also reveals minor changes on a semantic level. In the former, the information is that the primary care physician is prompted to follow the patient in his/her periodic check-ups, and the information is given as a fact. By contrast, in extract 21b the information becomes a sort of 'suggestion' so that the primary care physician will be encouraged (presumably by guidelines) to assist the patient in carrying out follow-up after stroke. A fact in the ST becomes a recommendation in the TT.

Another important difference that emerged from comparing L1 and L2 texts regards the use of the deontic modal verb *should* in the STs and that of its corresponding translation in the TTs. In the STs "should" shows 84 overall occurrences; in 80 of these, the verb is never rendered in the conditional form in the TTs but in the indicative one. Some examples are reported below:

23a. Candidates for prosthetic rehabilitation should demonstrate adequate wound healing, range of motion, muscle strength, motor control [...]. Owing to the increased metabolic demands of prosthesis use, these patients should also have adequate pulmonary and cardiovascular reserves (*Rehabilitation after Amputation*, Vol. 8, Part III, Sec. IV, p. 197).

23b. I soggetti candidati alla riabilitazione protesica devono presentare una corretta cicatrizzazione della ferita del moncone, e mobilità articolare, forza muscolare e controllo motorio di buon livello. A causa delle aumentate richieste metaboliche dovute all'uso della

protesi, i pazienti devono inoltre possedere una riserva polmonare e cardiaca sufficiente (*Terapia riabilitativa dopo amputazione*, Vol. 8, Parte III, Sez. IV, p. 197).

24a. In patients with classic rachitic or osteomalacic changes [...], renal tubular acidosis should be suspected as the underlying cause of the disease (*Rickets, Osteomalacia, and Renal Osteodystrophy*, Vol. 8, Part I, Sec. IV, p. 212).

24b. In pazienti con classiche alterazioni rachitiche od osteomalaciche [...], un'acidosi tubulare renale deve essere sospettata (*Rachitismo, osteomalacia e osteodistrofia renale*, Vol. 8, Parte I, Sez. IV, p. 212).

25a. The mattress should provide firm support and be left flat to avoid promoting flexion contractures (*Rehabilitation after Stroke*, Vol. 8, Part III, Sec. IV, p. 200).

25b. Il materasso deve fornire un supporto sufficientemente rigido e deve essere lasciato in piano, così da evitare lo sviluppo di contratture in flessione (*Riabilitazione dopo ictus*, Vol. 8, Parte III, Sez. IV, p. 200).

The shift from the use of the conditional in the STs to the use of the indicative of *dovere* (must) in the TTs also represents a shift from what is perceived as a sort of expectation (e.g. “the mattress should provide”, extract 25a) to what is rendered as a peremptory instruction (“Il materasso deve fornire” (the mattress must provide), extract 25b). The result is a more marked pedagogical argumentation in the TTs as compared to that in the STs. Moreover, the deontic “dovere” was used on five other occasions in the TTs also where no modal verb was deployed in the STs. Three different functions were accomplished, and one example of each is reported below:

26a. After the history is taken, a complete physical examination is performed, and antero-posterior and standing lateral radiographs of the thoracic and lumbar spine are obtained (*Osteoporosis*, Vol. 8, Part I, Sec. IV, p. 219).

26b. Dopo la raccolta dell'anamnesi, deve essere eseguito un esame clinico completo e un esame radiografico della colonna dorsale e lombare in proiezione antero-posteriore e laterale in ortostatismo (*Osteoporosi*, Vol. 8, Parte I, Sez. IV, p. 219).

27a. The patient is taught to use the remaining functional capabilities to compensate for the residual deficits of stroke (*Rehabilitation after Stroke*, Vol. III, Part III, Sec. IV, p. 201).

27b. Il paziente deve essere istruito a utilizzare le capacità residue in modo da compensare il più possibile i deficit residui (*Riabilitazione dopo ictus*, Vol. III, Parte III, Sez. IV, p. 201).

28a. Spinal cord or cauda equina involvement is even less common and suggests other conditions, such as infection or tumor, expansile primary bone tumors, Paget's disease, metastases, myeloma, or lymphoma (*Osteoporosis*, Vol. 8, Part I, Sec. IV, p. 218).

28b. L'interessamento midollare o della cauda equina è ancora meno frequente e deve suggerire altre affezioni, quali processi infettivi o tumorali, tumori ossei primitivi espansivi, malattia di Paget, metastasi, mielomi, o linfomi (*Osteoporosis*, Vol. 8, Parte I, Sez. IV, p. 218).

In extract 26b, the use of “dovere” emphasizes the organization whereby the methodological procedure of history-taking and physical examination takes place, even though, especially if read by expert or semi-expert users, it serves a basically stylistic function as a clinical examination must necessarily follow the patient’s history. Here, the use of “deve” does not particularly affect the meaning of the information conveyed, unlike extract 27b, where “deve” in “il paziente deve essere istruito” (the patient must be taught) serves a function of direction as regards the procedure that must be carried out. Finally, the same function is also served in extract 28b, where the presence of the modal verb assumes the value of instruction/teaching (if given conditions are present, i.e. the involvement of the spinal cord or cauda equina, then the presence of specific underlying diseases must be suspected). By contrast, this function is not present in the source text, where the absence of ‘must’ next to “suggest” gives the discourse a descriptive connotation rather than an instructive one.

5. Conclusions

The investigation carried out in this study has attempted to highlight some aspects of medical English translation into Italian in one of the most authoritative and influential medical texts ever published. The translations were carried out by doctor-translators, and therefore they were considered to be an important example of terminological accuracy and discourse precision. The study of these translations has made it possible to identify different levels of compliance of the TTs with the STs depending on the type of topic dealt with. A higher degree of adherence of the TL to the SL is displayed in the anatomical and physiological descriptions of the musculoskeletal system, whereas discourse becomes ‘more autonomous’ in the TL in relation to the SL as discourse progresses towards exposition of the clinical aspects of the topics treated (symptoms, signs, diagnoses, therapies, remedies, etc.). The use of extra, often unnecessary, elements, to convey the concepts included in the STs was identified in the TTs, even when fewer phrasal components would have been sufficient to communicate the meanings efficiently and clearly in the TL. However, albeit in very few cases, the presence of extra elements in the TTs is also due to a need for discourse clarity, as strict obedience to the structure and amount of elements included in the SL texts would not have produced an adequate and ‘acceptable’ text in the TL. Moreover, in the Italian translations recourse to paraphrase and clarification was identified as a means of shifting attention to a given aspect of the topic dealt with. From a terminological point of view, a comparison of source and target languages displays differences in the use of some terms as regards their belonging either to common language or to specialized lexicon. In some cases, where the English texts use words and expressions taken from general communication, the Italian translations deploy terms belonging to the specialized lexicon as equivalents. Finally, the constant use, in the TTs, of the deontic modal verb *dovere* (must) in the present indicative form to translate the conditional *should* in the STs makes the argumentation more effective from a pedagogical perspective, as it causes a change from what may be perceived as a ‘recommendation’ in the SL to what is understood as a guideline or an instruction in the TL.

The Italian translations investigated in this study offer an example of the extent to which specialized translation can be a process of recontextualization where several adjustments are made, including omissions, additions, paraphrases, clarifications, re-

formulations, as well as variations that are carried out according to the discourse goals to be accomplished in the TL. In this respect, further research should be carried out on Netter's 13-volume collection to see whether the linguistic aspects identified in this study can also be found in medical topics other than the ones explored here, to mention only one of the innumerable features that could be scrutinized in such a broad work.

It is hoped that this study can represent the beginning of a path, within ESP for medical purposes, that can provide Italian sports sciences undergraduates – and all learners concerned with health-related issues – with useful suggestions to understand medical material in English and translate it correctly into Italian, and, conversely, support them in text production in English, in compliance with the linguistic rules and conventions of both languages. In this regard, in addition to other types of linguistic activities, excerpts from Netter's texts and corresponding Italian translations are recommended as parallel text corpora to be used to find terminological equivalents and for effective classroom translation activities, including back translation. They provide learners with an important example of terminological precision and first-hand comparison between different discourse styles and aesthetic conventions. Finally, Netter's timeless work and its Italian translations should be taken into account for word alignment multilingual construction projects, also for the benefit of professional translators engaged in the medical domain.

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