

# Contents

<b>Acknowledgements</b>	7
<b>Introduction</b>	9
<b>1. Approaches to science discourse</b>	15
1.1 Science and technology: an historical overview	16
1.2 Scientific revolutions, incommensurability and science discourse	18
1.3 Notes from the sociology and rhetoric of science	21
1.4 Science journalism	28
1.5 Linguistic approaches	32
Final remarks	34
<b>2. A model for the translation of popular science discourse</b>	35
2.1 Modelling popular science translating: macrostructure	36
2.2 Modelling popular science translating: microstructure	42
2.2.1 Interlocking definitions	44
2.2.2 Technical taxonomies	46
2.2.3 Special expressions	50
2.2.4 Grammatical metaphor	53
2.2.5 Semantic discontinuity	53
Final remarks	55
<b>3. Qualitative studies of popular science discourse in translation</b>	57
3.1 Translating popular science for infotainment and crisis communication	59
3.1.1 Science news for information and entertainment	60
3.1.2 Science news in crisis communication: Pluto	64
3.1.3 Science news in crisis communication: a Theory of Everything	67
3.2 Figurative language in popular science	72
Final remarks	86

<b>4. Quantitative studies of popular science discourse in translation</b>	91
4.1 Communication strategies	92
4.2 Plain language and text analysis measures for clarity in communication	95
4.2.1 Readability	98
4.2.2 TTR, STTR and lexical density	100
4.3 Cohesion	102
4.3.1 Analysis and results: coordinating conjunctions	105
4.3.2 Analysis and results: subordinating conjunctions	109
Final remarks	111
Appendix	113
<b>Concluding remarks</b>	115
<b>References</b>	121

# Introduction

Science is one of the continuing adventures of the human mind. As ‘the systematic study of the structure and behaviour of the physical and natural world through observation and experiment’ (OED), it originates in our desire to know about the world around us. Scientific curiosity can be put to different uses, which invite societies’ engagement and ethical judgement, as in scientific advances leading to the development of drugs to treat diseases or to nuclear power, which has both civil and military applications. Communicating the proposals and results of scientific inquiries into, say, the structure of the universe or the behaviour of felines can excite the public’s sense of wonder, but this communication can also engage lay people for purposes beyond information, to spark debate, to involve them in or affect political decisions, or to raise funds for further research (Carrada 2005, Leshner and Scheufele 2017).

Notwithstanding the reason, ‘popularising’ science has been a part of ‘doing’ science. Lucretius wrote his poem *De Rerum Natura* to spread Epicurus’ theory of the natural world. We may not know who the addressee of *A Treatise on the Astrolabe* was, but what is important is that Chaucer did not use Latin, as he thought the vernacular middle English would be easier to understand: “This tretis, divided in 5 parties, wol I shewe the under full light reules and naked wordes in Englissh, for Latyn canst thou yit but small, my litel sone.”<sup>1</sup> Galileo was literally the first to use Italian instead of the domi-

---

<sup>1</sup> Chaucer’s explanation of his reasons for using English are a plea for ‘popular’ science: “The firste cause is, for that curious endyting and hard sentence is ful hevvy atones for swich a child to lerne. And the seconde cause is this, that sothly me semeth betre to wryten un-to a child

nant Latin to write letters, speeches, dialogues and treatises about science in a language that was understandable to a larger percentage of the population. These are but a few examples of writing with an eye to the public.

Because of societal implications, financial outlay and applications, communicating science effectively to the public is a complex process. First, science can be communicated for a number of reasons, so approaches need to be adapted to circumstances. Second, while in everyday life we are largely guided by intuition, science proceeds in ways that are far from being intuitive, and communicating this to the public can be challenging. Third, for topics in science such as nuclear power, genetic engineering or fracking, engaging with the public is necessary. In all the three cases one can see quite partisan arguments, which have the capacity to polarise public opinion. Science, to say the least, has become controversial.

Over the centuries, the circulation of scientific ideas has been granted in one or a limited number of languages. In ancient times, Greek was long the prevailing language of science in the Mediterranean, before it was supplanted by Latin, which became the language of all learned exchanges down to the Middle Ages. The arrival of the Arabs as a dominant political group led to large scale translation of scientific and technical texts, which, together with their power-accrued wealth and consequential scientific/technical prowess, meant that Arabic supplanted Greek and Latin as a world language of science. Furthermore, the arrival of Arabs on the Indian subcontinent, and translations from Sanskrit helped in the foundation of the new mathematics. Libraries founded in Baghdad helped in accessing, and consequently popularising, science.

It appears that political-military power helps make the language of the powerful the dominant language of science, supplanting other languages, but making science accessible to the masses. English, then, appears to be no exception. The 20<sup>th</sup> century saw the rise of the USA as an economic and military power, and its language is now the lingua franca of science (Gordin 2015). This is the premise of my work – translating popular science to make it accessible.

While the advantages of avoiding a scientific Babel cannot be denied, proficiency in English today or Greek/Latin/Arabic in the past has remained the preserve of an educated minority. There is no doubt, then, that science is largely communicated to the public using their first language(s) in

---

twyes a good sentence, than he for-gete in ones." Prologue, 25-28, *A Treatise on the Astrolabe*, The Riverside Chaucer, ed. Larry Benson, Oxford: Oxford University Press, 1988.

each country and that part of science communication is the result of translation from other languages, and this means, today, most notably English. Translation adds an extra dimension in science communication, as it implies ‘transfer’ and embedding in an altogether different culture, which may have different values and use different considerations, especially when it comes to making important life decisions (Montgomery 2000).

Most research and relating publications on translating science tend to deal with ‘scientific and technical translation’ (Pinchuck 1977, Wright & Wright 1993, Byrne 2012, Olohan 2016), i.e. treating science and technology as one category in professional translation, often also referred to more generally as ‘specialised translation’ (originally ‘traduzione specializzata’, Scarpa 2008; Fachübersetzung, Stolze 2013), ‘specialist translation’ or ‘LSP translation’ (cf. Rogers 2015). In this context, LSP texts in medicine or computing are discussed as exemplar. Popular science, however, is a hybrid general/specific discourse.

Within scientific and technical translation, popular science is regarded as a class of documents amongst others – for example scientific journal papers, technical data sheets, test instructions, expert technical reports, user guides, certificates of conformity, technical case studies (Byrne 2012) or technical instructions, technical data sheets, technical brochures, patents and scientific research papers and abstracts (Olohan 2016). Branches in specialist translation and classification of documents clearly reflect professional translation practice. Arguably (cf. Wright 2011: 245), however, the current status of English as the lingua franca of science means that a higher number and greater variety of scientific texts are translated into other languages than they are into English.

Science and technology – and attendant classes of documents – are grouped together in published translation research and translator education for the sake of convenience (Wright 2011: 243; Olohan 2016: 6), especially in book-length essays. In research articles, focus on either science or technology or on a single technical or scientific document type is often advisable, and collected papers have been published in that fashion (cf. for example Wright and Wright 1993, Cortese 1996, Gotti and Šarčević 2006, Olohan and Salama-Carr 2011). It appears important to look at the similarities and differences between the translation of scientific texts and the translation of popular science texts. This book is meant to bridge that gap by focusing exclusively on science and providing a study in the translation of popularisation – with reference to English and Italian as a language pair, and with English to Italian as the translation direction.

Scientists articulate their concepts and intuitions by theorising and by experimentation. Both involve rather creative use of language in producing the new and recasting the old. New words or terms will be coined and some of the extant vocabulary will be expunged, grammatical and semantic resources will be used – including derivational and inflexional resource as single words and, of course, complex compounds will be created. And all of this will be for an audience, fellow scientists, who have some familiarity with conceptualisation methods and technique, and above all with specialist language. A popular science writer is on double duty – an eye on the scientists and another on the public. The translation of popular science has to assimilate the work of the populariser and add the dimension of another language.

Given the importance of science and technology in all walks of life, from survival to leisure, there is considerable interest in how scientists interact amongst themselves and with the public at large (cf. Fleck, Kuhn, Fuller); how scientists conceptualise science (Papineau). And, very importantly for me, how scientists deploy language to convince, cajole and coerce (cf. Gross, Bazerman).

These works in the sociology and philosophy of science are critical for science and its public understanding, especially if the public does not share the same language/culture as the scientists and their popularisers. So popular science translation appears at one level to be a contribution to leisure literature (cf. its availability in newspaper and magazine stands of supermarkets and airports), yet at another level it is an interesting study of how the cultural and social nuances of the original creator, the brotherly/sisterly populariser, are translated for another society and culture. Translations of popular science may provide some evidence of this intercultural engagement whilst at the same time educating and entertaining audiences across cultural, linguistic and national boundaries.

While part of science, especially established science such as classical physics, may be communicated to the public by and large for information, science at the leading edge of research is often communicated for its newsworthiness and/or to involve the public in debates concerning social issues or political decisions. If state-of-the-art science is communicated in English or other languages of wider diffusion, how do translators mediate the ‘news’ elements in the texts such as new theories, discoveries, equipment and the relating terminology and grammar to bring them into existence in the target language and culture?

This is the main question that will be addressed in this book. Chapter 1 reviews approaches to science discourse while drawing distinctions between science and technology and between science and popular science with a view

to highlighting features that can be useful to build a model for translating popular science. Chapter 2 discusses methods and strategies for translating popular science based on research in Translation Studies and specifically in specialised translation and outlines a model for translating popular science. Chapter 3 describes case studies in popular science physics in the news while Chapter 4 presents an analysis of popular science translations using a corpus of particle physics articles. In the Concluding remarks results are discussed and summed up while emerging trends and useful methods and strategies in translating popular science are outlined.