

Introduction to S. Fransen, N. Hodson, K.A.E. Enenkel (eds), *Translating Early Modern Science*, Intersections 51. Leiden: Brill [forthcoming].

INTRODUCTION: TRANSLATORS AND TRANSLATIONS OF EARLY  
MODERN SCIENCE\*

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In the introduction to the German translation of Jan Baptista van Helmont's (1579-1644) originally Latin *Ortus medicinae* [The Rise of Medicine], the translator Christian Knorr von Rosenroth (1636-1689) explains that his chief aim was to make the text understandable to the reader. To accomplish that level of comprehensibility he had to make some choices:

In der Übersetzung nun hab ich mich bey einem so schweren Werck nach äusserster Müglichkeit beflissen alles verständlich zu machen[...] auch etwan neue und ungewöhliche Worte brauchen müssen, weil es die neue und ungewöhliche Lehr-Arten nicht anderst wollen zu lassen. Und um dieser Ursach willen bin ich auch mit Neben-Setzung des Niederländischen bißweilen etwas sorgfältiger gewesen, als mancher erachten dörfte nothwendig zu seyn: damit ja bey so schweren Dingen auch schier nicht ein einziges Wort hinschleichen dörfte, woraus einige Deutlichkeit zu schöpfen.<sup>1</sup>

In the translation of such a difficult work I have strived with utmost ability to make everything understandable [...] also I had to use some new and uncommon words, because the new and uncommon teachings didn't allow me otherwise. And for this reason, I have also been more precise with the

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<sup>1</sup> Knorr von Rosenroth Christian, "Andere Vorrede", in Jan Baptista van Helmont, *Aufgang der Artzney-Kunst*, trans. Christian Knorr von Rosenroth (Sulzbach: Johann Andreae Endters Sel. Söhne, 1683; reprint, with contributions by W. Pagel – F. Kemp, 2 vols. (Munich: 1971)) sig. )()()2<sup>v</sup>.

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comparison of the Dutch than many may deem necessary, so that with the complicated things, not one word would escape from which clarity could be created.<sup>2</sup>

The ‘new and uncommon’ medical theories of Van Helmont were complicated to understand for his contemporaries, as we can gather from this comment.<sup>3</sup> Fortunately for the German readers, Knorr von Rosenroth did not only use the Latin text written by Van Helmont (published posthumously in Amsterdam in 1648), but compared it with the much shorter Dutch version *Dageraad* [Daybreak] (Amsterdam: 1659).<sup>4</sup> The publication of the German translation of Van Helmont’s works can therefore be seen as a comparative translation of the Latin and Dutch source texts – both prepared by Van Helmont himself, and both published posthumously – giving the German reader all the tools to make sense of Van Helmont.

Knorr von Rosenroth’s introduction to the reader gives us a rare insight into the reasoning of a translator at work.<sup>5</sup> His apology for new words is not uncommon, but his solutions – often giving a variety of suggested translations in German – are all the more idiosyncratic when compared with other translators of Van Helmont’s texts.<sup>6</sup> After his studies in philosophy, philology, theology, and law at the universities of Leipzig, Wittenberg and Leiden, Knorr von Rosenroth was the privy counsellor of

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<sup>2</sup> All translations are my own, unless otherwise stated.

<sup>3</sup> See on Van Helmont and his new medical theories Hedesan G.D., *An Alchemical Quest for Universal Knowledge: The ‘Christian Philosophy’ of Jan Baptist Van Helmont (1579-1644)* (Abingdon – New York: 2016).

<sup>4</sup> See for a comparison of the Dutch and Latin text, Van Helmont’s use of language and the translators’ dealings with his language, Fransen S., *Exchange of Knowledge Through Translation: Jan Baptista van Helmont and his Editors and Translators in the Seventeenth Century*, Ph.D. dissertation (University of London, The Warburg Institute: 2014).

<sup>5</sup> On Knorr von Rosenroth, see Kemp F., “Christian Knorr von Rosenroth: Sein Leben, Seine Schriften, Briefe und Übersetzungen”, in Van Helmont *Aufgang der Artzney-Kunst* vol. 2, xxi-xxxviii; and Battafarano I.M. (ed.), “Special Issue: Christian Knorr von Rosenroth: Werk und Wirking”, *Morgen-Blantz* 2 (1992).

<sup>6</sup> See Fransen, *Exchange of Knowledge Through Translation* 174-192.

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Christian August, Count Palatine of Sulzbach (1622-1708) from 1668 until his death.

In Sulzbach Knorr assembled many (natural) philosophers and theologians around him, and is remembered especially for the publication of many translations and collections of cabbalistic and natural philosophical texts. He had met Van Helmont's son, Franciscus Mercurius (1614-1698) in the Netherlands in the 1660s and would maintain a life-long friendship with him. During one of his many visits to Sulzbach of the latter, Knorr von Rosenroth and Franciscus Mercurius collaborated on the full translation of all the works of Van Helmont the Elder. Knorr von Rosenroth translated works from Latin, Dutch and English into German, but he also translated Hebrew into Latin, and could be described as a professional translator.<sup>7</sup> Due to his court position, and sometimes with the financial help of Franciscus Mercurius van Helmont, Knorr von Rosenroth was also in the position to publish his translations, often by the Sulzbach printer Abraham Lichtenthaler. In contrast to some of the translators we will encounter in this volume, Knorr von Rosenroth seems to have acted on his own behalf – he was not requested to produce translations, nor did he need them to gain access to a patron, as he already had one in Count Christian August. His practices as a translator arose from his interests in certain topics and his eagerness to compare (as in Van Helmont's Dutch and Latin), compile (as in the case of his impressive *Kabbala denudata*), and comment (in all cases) on the texts of interest.<sup>8</sup> In making them available to new groups of readers, whether that was Dutch and Latin texts for

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<sup>7</sup> For a full list of his translations and publications, see Kemp, "Christian Knorr von Rosenroth" xxxii-xxxvii.

<sup>8</sup> Schmidt-Biggemann W., "Christliche Kabbala oder Philosophia Hebraeorum: Die Debatte zwischen Knorr von Rosenroth und Henry More um die rechte Deutung der Kabbala", *Morgen-Blatz* 16 (2006) 285–322.

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German readers, or Hebrew texts for Latin readers, he took on an active role in the circulation of knowledge to new audiences.<sup>9</sup>

Both Jan Baptista and Franciscus Mercurius van Helmont, and Knorr von Rosenroth can be seen as products of their time, who were tackling common issues that arose from science and language in the seventeenth century. In the early modern period many new scientific and medical theories were developed, many things were observed and discussed for the first time, and at the same time more and more people were writing about and publishing their ideas and observations in both Latin and the European vernaculars. New ideas and discoveries called for new words and new ways to describe them across the breadth of European vernaculars. As we will see in due course, the role of the many translators in the early modern period was instrumental to the way in which theories, ideas, and discoveries would travel and spread from one language and one audience to another.

### *Translation and science*

The history of early modern science is strongly connected to translation. As we shall see in this volume, translation was at the core of scientific exchange in this period. However, early modern science in Europe could not have existed without several translation movements during the middle ages. Many Greek scientific and philosophical texts were translated into Arabic during the eighth and ninth centuries, which were then translated into Latin in the eleventh to the thirteenth centuries.<sup>10</sup>

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<sup>9</sup> On Knorr von Rosenroth and *Kabbala denudata*, see Schmidt-Biggemann W., *Geschichte Der Christlichen Kabbala*, 4 vols. (Stuttgart: 2012-2015) vol. 3, Ch. 3.

<sup>10</sup> For Greek to Arabic translation, see Daiber H., “Die griechisch-arabische Wissenschaftsüberlieferung in der arabisch-islamischen Kultur in Übersetzungen des 8.-10. Jahrhunderts”, in Kittel H. – House J. – Schultze B. (eds.), *Übersetzung: Ein Internationales Handbuch zur Übersetzungsforschung = Translation: An International Encyclopedia of Translation Studies = Traduction: Encyclopédie internationale de la recherche sur la traduction*. 3 vols. (Berlin: 2004) vol. 2, 1206-1217. For translations from Arabic into Latin see Burnett C.S.F., “The Coherence of the Arabic-Latin Translation Program in Toledo in the Twelfth Century”, *Science in Context* 14 (2001) 249-288. And in

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Many of the texts translated into Latin immediately became part of the university curriculum, such as Euclid's *Elements*, Ptolemy's *Almagest*, and several Aristotelian texts. Greek, Arabic, and Latin were all, at different times, hegemonic as languages of science, although they were never the only languages read, written and spoken by those people engaging with science at any one time.<sup>11</sup> The translation movements from one dominant language to another were, however, of utmost importance for the delivery of science to the different linguistic audiences. The translators, such as Constantine the African, Gerard of Cremona, and Michael Scotus who were major actors in the process of language change from Arabic to Latin, had their own programme or rationale for choosing texts for translation. And in this way it became the translator's decisions that determined the core texts of Western science.<sup>12</sup>

The increased interest in classical texts amongst men of learning in the late fourteenth and fifteenth centuries meant that many originally Greek writings were rediscovered and translated into Latin. A text would often circulate in many different translations. In the time of the humanists there was simultaneously an increased awareness of European vernacular languages as potential languages for poetry, prose, and science.<sup>13</sup> The sixteenth and seventeenth centuries saw a dramatic rise in the production of printed books in general but also specifically in scientific texts in both Latin and vernacular languages. Educational systems – Latin schools and universities – had thus far been conducted mainly in Latin, meaning that every educated man was literate in Latin before becoming knowledgeable in any particular subject. However,

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general: Montgomery S.L., *Science in Translation: Movements of Knowledge through Cultures and Time* (Chicago – London: 2000).

<sup>11</sup> On that topic see Gordin M.D. (ed.), "FOCUS: Hegemonic Languages in Sciences", *ISIS* 108, 3 (forthcoming: 2017).

<sup>12</sup> Goyens, Michèle – De Leemans P. – Smets A. (eds.), *Science Translated: Latin and Vernacular Translations of Scientific Treatises in Medieval Europe*, *Mediaevalia Lovaniensia* ser. 1, 40 (Leuven: 2008).

<sup>13</sup> Copenhaver B.P., "Translation, Terminology and Style in Philosophical Discourse", in Schmitt C.B. – Skinner Q. – Kessler E. – Krayer J. (eds.), *The Cambridge History of Renaissance Philosophy* (Cambridge: 1988) 77-110.

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Post-Reformation Europe saw a growth in vernacular education, and in literacy more generally.<sup>14</sup> With literacy, vernacular languages became a more important vehicle of transferring knowledge than before, and the standardization and defence of the use of vernacular languages for science, was therefore especially strong in the sixteenth century.<sup>15</sup>

The greater production of books written in Latin as well as vernacular languages also increased the need for translators. As with the growth of literacy in the vernacular, there was also a diversification of language skills. To put it differently, the acceptance of writing science in vernacular languages had two sides: on the one hand the information was now more readily available for those who were literate but not in Latin. On the other hand the diversification of languages meant that Latin, which had been the dominant language of science for more than a thousand years, lost ground. One suddenly needed to know many different languages to keep up with all the scientific literature that was published. The increasing influence of these European vernaculars alongside Latin also gave rise to the important role of translators for immediate and direct communication between the different linguistic regions of Europe. Inside these linguistic borders the vernacular languages started to become more important as utilitarian languages for science. In institutions such as the Royal Society in London and the Académie des sciences in Paris, English and French respectively were the main languages of communication and administration. Whether voluntarily or involuntarily, national language were promoted as appropriate for

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<sup>14</sup> Waquet F., *Latin, or the Empire of a Sign: from the sixteenth to the twentieth centuries*, trans. J. Howe (London – New York: 2002).

<sup>15</sup> Burke P., *Languages and Communities in Early Modern Europe* (Cambridge: 2004) esp. chapters 2 and 3.

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conducting and communicating scientific research. However, there was still a choice of which language to use, especially in the circles of well-educated men and women.<sup>16</sup>

This volume thus concentrates on the sixteenth, seventeenth, and eighteenth centuries to investigate the role of translators in early modern science. Translation has become the focus of historical studies from many different disciplinary backgrounds in recent years. The relatively young field of Translation Studies has fruitfully drawn on the field of linguistics and literary studies, providing terminology and a theoretical framework necessary for the fruitful comparison of textual practices. The main focus of scholars of Translation Studies has been literary translation and translation theory, and the study of scientific texts is relatively understudied.<sup>17</sup> The interest in the historical branch of this field has increased over the last twenty years, clearly visible in an impressive three-volume encyclopaedia of translation studies, covering translation theory, cultures of translation in all historical periods and geographical regions, as well as and many case studies of biblical and literary texts.<sup>18</sup> For the early modern period, the important work of Theo Hermans on Dutch sixteenth- and seventeenth-century texts helpfully reflects on translation, as well as on the role of translators and translation practices more generally.<sup>19</sup>

Peter Burke, a cultural historian, has been of great importance in leading historians in the direction of translation.<sup>20</sup> With his book on European language societies and his various edited volumes and articles on translation he has started a

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<sup>16</sup> On the the choice between Latin and vernaculars amongst seventeenth-century practitioners of science Fransen S., “Latin in a Time of Change: The Choice of Language as a Signifier of New Science?”, *ISIS* 108, 3 (forthcoming: 2017).

<sup>17</sup> Bermann S. – Porter C. (eds.), *A Companion to Translation Studies* (Chichester: 2014) 2-6

<sup>18</sup> Kittel – House – Schultze, *Übersetzung = Translation = Traduction*

<sup>19</sup> Hermans T., *Door eenen engen hals: Nederlandse beschouwingen over vertalen, 1550-1670* (The Hague: 1996); Hermans T., “The Task of the Translator in the European Renaissance: Explorations in a Discursive Field”, in Bassnett S., *Translating Literature* (Cambridge: 1997) 14-40. See also his articles in Kittel – House – Schultze, *Übersetzung = Translation = Traduction*.

<sup>20</sup> Burke, *Languages and Communities*.

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continuing discussion. In Burke's 2007 edited volume with Ronny Po-chia Hsia we see a shift occurring: away from the comparing of texts, originals and copies, and whether or not the translator has done a 'good' or 'faithful' job. Instead, Burke examined 'cultural' translation which entails questions such as who made the translation, for whom, and what was its impact.<sup>21</sup> These questions resulted in shifting the focus of research from a purely textual analysis to the role and function of translations, and explicitly also to the role of the translator. In addition to the growing literature on the topic, there have been several large research projects within the past ten years, focussing on inventorizing, cataloguing, and analysing translation processes. These projects include the Renaissance Cultural Crossroads Project that produced a catalogue of all 'translations out of and into all languages printed in England, Scotland, and Ireland before 1641'.<sup>22</sup> Also worth mentioning is the project on Renaissance Aristotelianism in Renaissance Italy that catalogued all Italian translations of Aristotelian works between 1400 and 1650, which transformed the hitherto Latin-dominated study of early modern Aristotelian reception into a more complicated and linguistically diverse story of reception.<sup>23</sup> The edited volume on translation and the book trade by José María Pérez Fernández and Edward Wilson-Lee has added a layer of social-economical history to the role of translation.<sup>24</sup> Karen Newman and Jane Tylus recently asked whether there would have been a Renaissance

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<sup>21</sup> Burke P., "Cultures of Translation in Early Modern Europe", in Burke P. – Po-chia Hsia R. (eds.), *Cultural Translation in Early Modern Europe* (Cambridge: 2007) 7-38.

<sup>22</sup> <https://www.hrionline.ac.uk/rcc/>, accessed on 15 February 2017; and see also Barker S. – Hosington B.M. (eds.), *Renaissance Cultural Crossroads: Translation, Print and Culture in Britain, 1473-1640*, Library of the Written Word 21 (Leiden – Boston: 2013). See also Coldiron A.E.B., *Printers without Borders: Translation and Textuality in the Renaissance* (Cambridge: 2014). Bistué B., *Collaborative Translation and Multi-Version Texts in Early Modern Europe* (Farnham: 2013).

<sup>23</sup> <http://vari.warwick.ac.uk>, accessed on 15 February 2017: this website contains a searchable catalogue of 'Aristotelian works written or published in Italian between 1400 and 1650.'

<sup>24</sup> Pérez Fernández J.M. – Wilson-Lee E. (eds.), *Translation and the Book Trade in Early Modern Europe* (Cambridge: 2014).



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without translation, which they answered with ‘a resounding no’ from the perspective of literary texts and their translations.<sup>25</sup>

For the field of history of science, James Secord’s article “Knowledge in Transit” started a more intensive discussion about the role of translation in the transmission, circulation, and making of knowledge.<sup>26</sup> Burke and Po-chia Hsia paved the way for more discussions about science and translation, also paying attention to the hitherto understudied translations from vernacular languages into Latin, emphasizing that the move away from Latin as the language of science was not a simple, one-directional movement.<sup>27</sup> A volume on the translation of knowledge in the early modern Low Countries edited by Harold Cook and Sven Dupré comprises studies not only of textual translation, but broadens the scope of research into the translation of images, objects, and ideas.<sup>28</sup>

#### *Aims of the volume*

Against this backdrop of the recent work on translation, the current volume seeks to provide a point of entry into this varied and inter-disciplinary subject as it is emerging: exploring the role of translation in early modern science, and analysing the nature of translations and practices of translators. It also seeks to explore the part played by translators as mediators, agents, and interpreters in the intellectual history of the period.

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<sup>25</sup> Newman K. – Tylus J., “Introduction”, in Newman K. – Tylus J. (eds.), *Early Modern Cultures of Translation* (Philadelphia: 2015) 3

<sup>26</sup> Secord J.A., “Knowledge in Transit”, *Isis* 95, 4 (2004) 654–672.

<sup>27</sup> Burke – Po-chia Hsia, *Cultural Translation*; Pantin I., “The Role of Translations in European Scientific Exchanges in the Sixteenth and Seventeenth Centuries”, in Burke – Po-chia Hsia, *Cultural Translation* 163–79.

<sup>28</sup> Cook H.J. – Dupré S. (eds.), *Translating Knowledge in the Early Modern Low Countries*, Low Countries Studies on the Circulation of Natural Knowledge 3 (Zürich – Münster: 2013).

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By focussing on particular translators, networks of translators, translated texts, and the reception of sources by translators, this volume tackles a number of important questions that shape our understanding of the circulation of knowledge in the early modern world. Starting with Peter Burke's questions about who translated scientific texts – how, why, and for whom – we take the investigation further by looking at how translations were distributed, read, used, and understood. Exploring these questions across the translation of texts, images, and ideas offers fresh insights into how the process of translation worked, and how essential it was to the daily life of physicians, natural philosophers, and other practitioners of science. It also shows that translators often had reasons to translate beyond a simple desire to bring the content of a certain text to a new linguistic audience. Rather, social and economical profit, as well as a veiled means of bringing the translator's own thoughts to an audience, were often the motivating factors behind publishing translations of scientific texts.

By investigating translators and translations of scientific texts in the early modern period, the editors and contributors of this volume aimed to further our understanding of the circulation of knowledge, and the way such a knowledge is transformed by the actions – intentionally or not – of the persons involved in the process. In this volume early modern translators of scientific texts have been examined by scholars with a wide variety of methods and theoretical background. As historians of science, literature and linguistics, theology, philosophy, art, and language, the authors show that translation is a powerful tool for historical research. Across all fields of historical research, whether in literature, science, or theology, translation played an important role in the distribution of knowledge, and the wide range of disciplinary backgrounds of the authors proves that the study of translation is a useful way to transcend differences in approach and disciplinary boundaries to

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interpret and understand the making of knowledge and science. Although all articles are published in English, the authors discuss translations from, in, and between Dutch, English, French, German, Greek, Italian, Latin, Turkish, and universal languages. In addition to the historical translations that are studied by the authors, the variety of early modern languages in the source texts has naturally brought up the additional issue of providing modern translations of these texts to make the articles and comparisons therein understandable for the readers of this volume in English. We hope that the inclusion of all text fragments in the original languages will help those readers who might want to have a look at the primary source material themselves. Since the current academic world has adopted English as its hegemonic language, this seemed a workable compromise.<sup>29</sup>

This volume is divided into three parts. Contributions in the first part discuss the translation practices of individuals in the context of scholarly societies and networks. Felicity Henderson opens with a chapter on Robert Hooke and the translations he and some of his colleagues at the Royal Society made in order that topics could be discussed in English in the meetings of the Royal Society. Henderson concentrates on the translations that were never printed and have therefore received less attention by historians. Many of these translations were produced in collaboration and the dominant theme of the translated texts is travel. The chapter shows how translations were not only provided for publication, but often on a more informal basis for immediate use. The following chapter by Jan van de Kamp discusses another Fellow of the Royal Society, Theodore Haak, and his translations of theological texts and how these practices were connected, both interfering with and influencing his

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<sup>29</sup> See on the history of English as a language of science Gordin M.D., *Scientific Babel: The Language of Science* (Chicago: 2015).

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interests in natural philosophy. Haak's large network of German, Dutch, Danish, and French men of learning often led to him translating texts on request. In Haak's case it seems to have been more important to be part of these networks and circles, than what the exact content of the text for translation was. Michael Bycroft discusses the case of Charles Dufay, a well-known member of the Académie des sciences in Paris. Bycroft investigates the almost entirely unknown translation project that secured Dufay a place in the Académie in the first place. His French translation of the Italian naturalist Filippo Buonanni, *Trattato sopra la vernice* is not only an interesting case of the translation of practical and artisanal vocabulary, it also shows how the production and publication of a translation can give the translator access to certain authorities or networks. In the final article of this section, Meghan Doherty discusses the translation of images between the Royal Society and the Académie des sciences and their respective journals. Both journals consisted mainly of articles in English and in French respectively, and thus, if reproduced in either journal, needed translating. How did the editors of both journals deal with the images? Could they be understood without translation? These questions lead to a wonderful discussion about images as a potential universal language, and the necessity for visual education.

Contributions in the second part of the volume discuss the translation of practical knowledge. Charles van den Heuvel discusses the unpublished writings and drawings of the Dutch mathematician and advocate of the Dutch language, Simon Stevin. Van den Heuvel's chapter looks at the reception of Stevin's texts in various translations. And taking Stevin's perspective, it seems that many of his translators did not always understand his mathematics. Thomas Morel in the next chapter discusses the influx of learned classical mathematics into vernacular manuals of subterranean geometry – how did Euclid end up in mining manuals in the language used by

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German miners? Using newly found manuscripts and printed texts, Morel shows how studying translations can tell us when and how classical mathematical texts were added to these manuals, most likely with the aim of explaining the theoretical background of more complex problems. Joyce van Leeuwen's chapter is about the translational practices of Niccolò Leonico Tomeo, an Italian professor in philosophy at the university of Padua. He translated Aristotle's Greek *Mechanics* into Latin and added his own commentaries. Particularly interesting, from the perspective of translation processes, is that we have not only a printed translation produced by Tomeo, but also two manuscript versions of his translation, and a manuscript version of his attempt to reconstruct the original Greek text. Within the text Tomeo included explanatory diagrams, which form, together with the text, the focus of this chapter. In the final chapter of this section, Richard Oosterhoff investigates the potential readership of the French translations of Latin mathematical texts produced by Charles de Bovelles. Oosterhoff discusses how the translation occurs on two levels: between languages, and between spaces of expertise, from the Latin study to the French workshop.

The third part consists of four articles dealing with the translation of more theoretical and philosophical texts. Rodolfo Garau examines Pierre Gassendi's Latin translation of the classical author Epicurus. The whole translation process is, as in several cases discussed in earlier chapters, as much a commentary as a translation, according to Garau, in order to accommodate the readers' understanding and acceptance of the text. Another contemporary English translation (by Walter Charleton) provided the opportunity to examine a double translation and double attempt to adapt the text to a new audience. This chapter is followed by Harun Küçük's discussion of the translation of Copernican science into Turkish by the

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central-European Ibrahim Müteferrika. This Islamic convert used his translations to implant radical early Enlightenment thought from Western Europe into Ottoman science in the early eighteenth century. His translation practices combined his religious and scientific networks in a similar way to the case of Theodore Haak, even though the content was very different. We return to English soil for the last two chapters. Iolanda Plescia provides a detailed study of the translational practices of the Englishman Thomas Salusbury and his translations of Galileo. Plescia's close analysis of the Italian and English texts demonstrates that the choices of the translator can determine the outcome and understanding of the text. Salusbury used his authority as a translator to decide on the English interpretation of Galileo's work, potentially with the final aim of being accepted as a Fellow of the Royal Society. The final article of the volume by Fabien Simon, deals with the lively seventeenth-century discussion about constructing a universal language. As touched upon in Doherty's chapter, some seventeenth-century authors thought that images could represent a sort of universal scientific language, but many other people at the time thought that the diversification of languages (Latin plus all the vernaculars) called for a new, artificial, elite language of science. Simon argues that the universal languages discussed in England and on the continent were as much a code or a distinction of social status as Latin had been in the past. This also meant that in order to use any of the suggested universal language, one had to learn that language, and translators were required to translate into and from a universal language.

Several themes recur across the contributions, proving that however diverse the scientific texts under investigation may be, and however varied the theoretical backgrounds of the authors are, studying translations and their translators brings forth important points about the circulation and transfer of knowledge in early modern

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Europe. Several articles argue that the goal of the translator in producing (and publishing) a translation was to gain entry into a network. By translating Filippo Buonanni's *Tratatto sopra la vernice* from Italian into French, Charles Dufay not only demonstrate his linguistic qualities, but especially his understanding of the chemical experiments necessary for the making of Buonanni's varnish. It was these skills, as Michael Bycroft explains in his chapter, that interested the members of the Académie des sciences in Paris: Dufay's translation, more than his previous publications, showed that he was capable of experimenting and would be worthy of a place in the Académie. Thomas Salusbury similarly tried to gain access to the Royal Society by translating Galileo into English; he would, however, never become a Fellow. In Harun Küçük's chapter, we encounter a translator, Ibrahim Müteferrika, who used his position as a printer for the Ottoman Sultan to bring Copernican and Cartesian ideas into discussions on science and religion in the Ottoman Empire.

A second important theme that arises from several articles relates to questions about images: how images were translated, whether they needed to be translated, and how they could be used to overcome linguistic barriers. Research into the use, making, and role of images in early modern science is currently the subject of many projects and publications.<sup>30</sup> The focus of this volume brings an important aspect to the fore: namely the translatability of images, as well as the similarities and dissimilarities in the treatment of translating text and images. Doherty shows how the translations between English and French of articles published in the *Philosophical Transactions*

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<sup>30</sup> See for example Daston L., 'Epistemic Images', in Payne A. (ed.), *Vision and Its Instruments: Art, Science, and Technology in Early Modern Europe* (University Park, PA: 2015) 13-35; Kusukawa S., *Picturing the Book of Nature: Image, Text, and Argument in Sixteenth-Century Human Anatomy and Medical Botany* (Chicago: 2012); Hunter M., "Introduction", *Huntington Library Quarterly* 78, 2 [Special Issue Henderson F. – Kusukawa S. – Marr A. (eds.), "Curiously Drawn: Early Modern Science as a Visual Pursuit"] (2015): 141–55; Lüthy C. – Smets A., "Words, lines, diagrams, images: towards a history of scientific imagery", *Early Science and Medicine* 14 (2009) 398-439; Marr A., "Knowing Images", *Renaissance Quarterly* 69, 3 (2016) 1000–1013.

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and *Journal des Sçavans* came with a discussion about the images. Are these images universally intelligible, or do they need translating as well? In the chapter on the posthumous publications of some works by Simon Stevin, Charles van den Heuvel argues that Stevin's son adapted the images in such a way that they could stand on their own, whereas the original manuscript had assumed a side-by-side reading of text and image. This shows how images could become themselves independent items of scientific evidence and argument. Still further, Joyce van Leeuwen, in her chapter on Niccolò Leonico Tomeo analyses how Tomeo inserted images into his translations, sometimes as a 'proof' of a mathematical calculation, sometimes as an illustration of the text. As a whole, images could be seen as a visual commentary on the text itself, where Tomeo inserts himself as non-verbal commentator.

This brings us to theme of commentaries and pseudo-translations. In the chapter by Van Leeuwen we encounter visual commentary, and in the chapters by Thomas Morel and Rodolfo Garau we find explicit discussions of a translation as a form of commentary on a source text. Morel does so by labelling the translation of Euclid into German mining texts as 'pseudo-translation', whereas Garau discusses translations as commentaries.<sup>31</sup> In all three chapters translations are problematized to show that this practice allows the translator to explicitly comment on a work of his specific interest.

The problem of language diversity and the lack of a universal language for science was a problem that occupied many early modern authors of scientific texts. Fabien Simon devotes his entire chapter to the quest for a universal language in learned circles, and how the search for language was as much a social endeavour as well as a matter of mutual understanding. Doherty also discusses the idea of a

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<sup>31</sup> Enenkel K.A.E. – Nellen H. (eds.), *Neo-Latin Commentaries and the Management of Knowledge in the Late Middle Ages and the Early Modern Period (1400 -1700)* (Leuven: 2013).



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universal language in relation to images, and Bycroft explains how a universal system of measurements can be seen as a universal language of science.

Finally, we see the authority and power of the translator in adapting, changing, and transforming text and image recurring in several articles. The different editions of Charles de Bovelles's mathematical texts show how his reshaping of texts reached multiple audiences. Likewise, the many unpublished translations in the circle of Robert Hooke show that it was through translations that many formal and informal discussions could take place. The careful search for French vocabulary for practical experiments meant that Charles Dufay had an influence on the way these topics were discussed in the Académie de sciences in Paris. Similarly, Müteferrika's translations made it possible to discuss radical religious and political thought in the Ottoman Empire, through discussing Copernican and Cartesian worldviews. In all these examples – and the many more that fill all twelve chapters – the translator has an (often unacknowledged) authority in transferring the particular knowledge from the source text to the translation.

Despite the variety of topics and the many different languages and directions of translation discussed in this volume, all these cases show that translators of scientific texts were dealing with similar problems. By bringing together so many different topics in the realm of early modern history of science, written by scholars with different backgrounds, this volume shows how the study of translation thrives on interdisciplinarity and can bring new insights into the history of science. It is the image on the book cover that embodies these sentiments: whatever linguistic, cultural, or disciplinary background we may come from, let us 'samen spraeken in acht taelen' [speak together in eight languages], or however many more languages we bring together.

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