# Translating Science in the Ottoman Empire: Translator-educators as "Agents of Change" in the Ottoman Scientific Repertoires (1789-1839)

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*Osmanlı İmparatorluğu'nda Bilimi Çevirmek: Osmanlı Bilim Repertuarlarında "Değişim Özneleri" Olarak Mütercim-Hocalar (1789-1839)*

Öz ■ 1789-1839 arası elli yıllık döneme odaklanan bu çalışma, modern bilimin batıdan Osmanlı İmparatorluğu'na aktarılmasında kilit rol oynayan tercümanları ve tercümelerini çeviribilim bakış açısıyla incelemeyi amaçlamaktadır. Tartışmanın somut verilere dayandırılması için seçilen dönemde eğitim amaçlı tercüme edilmiş bilimsel-teknik eserlerden bir bütünce oluşturulmuştur. Çalışma, Osmanlı İmparatorluğu'nda askeri alanda yapılması öngörülen değişiklik ve ilerlemelerin Osmanlı eğitim ve bilim repertuarlarındaki batı odaklı tercüme faaliyetleri ile doğrudan ilgili olduğunu ortaya koymaktadır. III. Selim ve II. Mahmud döneminde askeri kaygılarla açılan ilk sistemli, batı tarzı eğitim kurumları mütercim-hocaları, dil dersleri ve matbaaları ile hem tercüme bürosu hem de tercüman eğitim merkezleri olarak işlev görmüştür. Bu kurumlarda görev yapan mütercim-hocalar Osmanlı kültür repertuarında önemli değişikliklere neden olmuştur. Çalışmada 'değişim özneleri' olarak adlandırılan mütercim-hocalar Türkçe'nin bilim dili olarak gelişmesine, dine dayalı geleneksel ilim anlayışının çağdaş bilim anlayışına dönüşmesine katkı sağlamış ve Osmanlı İmparatorluğu'nda bilim repertuarları dışında kalan diğer repertuarlarda ortaya çıkacak epistemolojik kaymalara zemin hazırlamıştır.

Anahtar Kelimeler: Çeviri tarihi, Osmanlı Bilim Repertuarları, Mütercim-Hocalar, Değişim Özneleri

Recent research in translation studies points to the transmission of scientific knowledge as a significant and productive site of critical inquiry.[1] The historical

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1 The history of scientific translation and translators' agency in the dissemination of scientific knowledge have not attracted much attention by translation scholars until quite recently. One of these

perspective on scientific translation highlights the agency of the translator in the dissemination of knowledge and the constitution of scientific discourse itself.[2] Rather than assuming the translation of scientific material as a neutral site, free from ideological manipulation, researchers have recently proposed a direct relation between scientific translation and power struggles, and have acknowledged "the potential of scientific translations and translators to generate epistemological, narrative, ideological shifts in the dissemination of scientific materials"[3] . Parallel to these historical perspectives, by focusing on the period which is characterized by the onset of modernization in the Ottoman Empire, the present study attempts to reveal which scientific texts were translated by whom, and from which language, and identify why and how, and with what effect. In the light of its findings, I aim to demonstrate the pivotal role of translators and translations in the transmission of modern science in the Ottoman Empire, which has long been overlooked from a translation studies perspective.

In the eighteenth century, the weakening of central authority, disruption of political and economic stability, decline in conquests, and perpetual territorial loses laid bare the urgency of a revision of the education system which had fallen behind the West in both terms of technical expertise and scholarly inquiry.[4] The field of military education, in which reform first appeared, became by far the most important channel through which western sciences were transmitted from the West (particularly France) to the Empire.[5] Therefore, the aspiration to raise the status of the Ottoman Empire in the military field brought with it the

recent stimulating publications which acknowledges the potential of translations and translators in the dissemination of scientific knowledge and reconceptualization of scientific discourses is the special issue of *The Translator* on scientific translation (2011). This special issue, from different perspectives, explicates the representation of scientific knowledge through translation.

2 Maeve Olohan and Myriam Salama-Carr, "Translating Science", *The Translator*, 17/2 (New York: Routledge, 2011): pp. 179-188; Ruselle Meade, "Translation of a Discipline", *The Translator* 17/2 (New York: Routledge, 2011): pp. 211-3; Sonia Vandepitte and others, "Travelling Certainties: Darwin's Doubts and Their Dutch Translations", *The Translator*, 17/2 (New York: Routledge, 2011): pp. 275-99; Dolores Sánchez, "Translating Science: Contexts and Contests: On the Translation of a Misogynist Scientific Treatise in Early Twentieth-Century Spain", *The Translator*, 17/2 (New York: Routledge, 2011): pp. 325-48.

3 Olohan and Salama-Carr, p. 179.

4 Ekmeleddin İhsanoğlu, *Science, Technology in the Ottoman Empire*, (Great Britain: Ashgate Publishing Ltd., 2004), pp. 27-28; Bernard Lewis, *The Emergence of Modern Turkey*, (London: Oxford University Press, 1968), p. 38.

5 Lewis, p. 56.

concomitant need to reshape the educational and scientific fields. Subsequent to the shortlived Western-style school for the bombardiers, *Humbarahane* (1735), and school of geometry, *Hendesehane* (1775),[6] the first large-scale modern planning initiatives were launched in the era of Sultan Selim III (1789-1808), and continued with Mahmud II (1808-1839). During the reigns of these Sultans, western scientific knowledge was transmitted throughout the Ottoman Empire through three different but correlated transfers: the transfer of institutions, individuals and texts. The newly-introduced modern schools and their curricula were patterned after Western models; foreign experts who worked in tandem with Turkish interpreters were assigned to these schools. Many treatises were translated and published by the educators at the schools. The local educators, whose major role was as translators,[7] had a say in matters of science, and they were given licence to select the content of and the approach to translation.[8] Through translations, the translator-educators contributed to the modern Ottoman reform, and provided the continuence of the Ottoman contact with western science.

For the purposes of the present essay, in order to conduct a review of the translators of the era, their translations and the institutions they served, a corpus of translated scientific works (1789-1839) was established based on various secondary and tertiary sources.[9] However, the information provided by these sources regarding translation and translated works was not considered without performing a careful evaluation. In the following part, the course for establishing the corpus and my criticisms regarding the conceptualization of translation in these secondary sources

6 Different sources provide different dates for the establishment of these schools. In the present study, the dates are cited from Ekmeleddin İhsanoğlu, *Osmanlılar ve Bilim*, (İstanbul: Nesil Yayınları, 2003).

7 Seyfi Kenan argues that not all local educators of the era acquired perfect language skills. See Seyfi Kenan. "III. Selim Dönemi Eğitim Anlayışında Arayışlar". *Nizam-ı Kadim'den Nizam-ı Cedid'e III. Selim ve Dönemi*, (Ankara: İSAM Yayınları), pp. 129-152.

8 However, the multi-functionality of the translator's role and the need to fulfill several tasks in the Ottoman scientific repertoire were not unique, as in history these mediators usually came out of diverse groups such as monks, scholars, explorers, soldiers to name but a few. See Scott L. Montgomery, *Science in Translation: Movements of Knowledge Through Cultures and Time*, (Chicago: University of Chicago Press, 2000), p. 4.

9 The reason for resorting to secondary sources rather than primary sources is my inability to read Ottoman Turkish. As may be known, in 1928, as one of Mustafa Kemal Atatürk's reforms in the early years of the Republic of Turkey, the Ottoman script was replaced with a phonetic variant of the Latin alphabet. Now, the vast majority of Turkish people in Turkey are unable to read Ottoman Turkish.

will be provided, along with brief information on the corpus itself. Throughout the study, the corpus will be analyzed from a systemic view point: the outputs will be associated to the dynamics of the Ottoman cultural "polysystem".[10] In this regard, Itamar Even-Zohar's concept of "culture repertoire"[11] which refers to "the aggregate of options utilized by a group of people and by the individual members of the group, for the organization of life"[12] will be drawn upon. Even-Zohar states that culture repertoire can be constructed "deliberately" as well as "inadvertently" by people who are members of the repertoire and engaged in its making.[13] When it is deliberate, agents openly and deliberately engage in devising or adopting some options for social and individual life while rejecting or eliminating others. This deliberate intervention, which comes to mean the promotion of certain cultural elements and the suppression of others, is labelled "culture planning" by Even-Zohar. The planning initiatives carried out via "import" and "transfer".[14] Such planning is either fulfilled openly, or discreetly by those "agents" who have the power to influence society.[15] Referring these agents, who change and reinforce the culture repertoire they are in with the power they have, as "agents of change"; Gideon Toury underlines the significant role the agents play in the culture.[16] Within this scope, the translator-educators will be referred to as "agents of change" due to their significant role in the military-oriented "planning" of the Ottoman educational and scientific repertoires, and also their engendering of significant changes in the Ottoman conception of science with the alternative "options" they provided to the "repertoire".

### Description of the Corpus on Translated Scientific Texts (1789-1839)

The corpus consists of scientific-technical texts translated for educational purposes during the reign of Sultan Selim III and Mahmud II. Only the texts which

10 Itamar Even-Zohar, "Papers in Culture Research", (Tel Aviv: Unit of Culture Research, Tel Aviv University, 2010), accessed on February 3, see http://www.tau.ac.il/~itamarez/works/books/EZ-CR-2005_2010.pdf

11 Even-Zohar 2010.

12 Even-Zohar 2010, p. 70.

13 Even-Zohar 2010, p. 72.

14 Even-Zohar 2010.

15 Ibid.

16 Gideon Toury, "Translation as a Means of Planning and the Planning of Translation: A Theoretical Framework and an Exemplary Case", in *Translations: (Re)shaping of Literature and Culture*, ed. by Saliha Paker. (İstanbul: Boğaziçi University Press, 2002), p. 151.

were published (or remained as manuscript) in the Ottoman territories –apart from Egypt- were included in the corpus.[17] In order to identify the translated materials in the chosen period, as well as secondary sources, several bibliographies[18] were drawn upon. The meticulous nature of these studies greatly contributed to the creation of the corpus, and enabled arguments to be constructed. However, in the process of classifying the works as translation, rather than adhering strictly to the given and fixed definitions of translation in the discourse of science historians I critically surveyed, the detailed information they provided from the historical-descriptive and systemic perspective in Translation Studies. Considering the heterogeneity and time- and culture-specific aspects of translation practices in the Ottoman culture,[19] I identified "translation-based text productions"[20] in the Ottoman scientific repertoires were identified and added them to the corpus.

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17 It is known that a concurrent culture planning independent from the rest of the Ottoman Empire was carried out by Muhammed Ali Pasha in Egypt. See Ercüment Kuran, "Sultan II. Mahmud ve Kavalalı Mehmed Ali Paşa'nın Gerçekleştirdikleri Reformların Karşılıklı Tesirleri", in *Sultan II. Mahmud ve Reformları Semineri*, (İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Basımevi, 1990), pp. 107-111; Ekmeleddin İhsanoğlu, *Mısır'da Türkler ve Kültürel Mirasları*, (İstanbul: IRCICA, 2006); J. Heyworth-Dunne, *An Introduction to the History of Education in Modern Egypt,* (London: Luzac&Co, 1938); Johann Strauss, "Turkish Translations from Mehmed Ali's Egypt: A Pioneering Effort and its Results", in *Translations: (Re)shaping of Literature and Culture*, ed. by Saliha Paker. (İstanbul: Boğaziçi University Press, 2002), pp. 108-148. Muhammed Ali's culture planning which started with Napolean Bonaparte's invasion of Egypt (1798) bears resemblance to that of Selim III and Mahmud II; in so far as some scholars argue that Muhammed Ali's reforms in Egypt had an impact upon those carried out by II. Mahmud in Anatolia and İstanbul (See Kuran, 111). The culture planning and, in conjuction with this, the translation activity which took place in Egypt are the subject of a future study. Therefore, in the present study, only the scientific materials which were published or remained as manuscript in Anatolia and İstanbul will be dwelled upon.

18 Bibliographical references which are drawn upon throughout the study are as follows: Jale Baysal, *Müteferrika'dan Birinci Meşrutiyete Kadar Osmanlı Türklerinin Bastıkları Kitaplar*, (İstanbul: İstanbul Üniveristesi Edebiyat Fakültesi Yayınları, 1968).
Ekmeleddin İhsanoğlu, *Türk Kimya Eserleri Bibliyografyası*, (İstanbul: IRCICA, 1985).
Ekmeleddin İhsanoğlu, *Osmanlı Matematik Literatürü Tarihi 2*, (İstanbul: IRCICA, 1999).
Ekmeleddin İhsanoğlu, *Osmanlı Coğrafya Literatürü Tarihi 2,* (İstanbul: IRCICA, 2000).
Ekmeleddin İhsanoğlu, *Osmanlı Askerlik Literatürü Tarihi 2*, (İstanbul: IRCICA, 2004).

19 For more information on time- and culture-bound translational practices see Cemal Demircioğlu, "From Discourse to Practice: Rethinking Translation(Terceme) and Related Practices of Text Production in the Late Ottoman Literary Tradition" (doctoral dissertation), Boğaziçi University, 2005.

20 Cemal Demircioğlu, "Tuzaklar ve 'Kapılar': Osmanlıda Çeviri Tarihini Araştırırken Nereden Başlamalı?", in *Uluslararası Çeviribilim Konferansı Bildirileri, Çeviribilimde Yeni Ufuklar, 11-12 Mayıs 2006, Hacettepe University* (Ankara: Bizim Büro Yayıncılık, 2008), pp. 237-249.

Scott L. Montgomery, in a discussion of the transference of scientific knowledge beyond borders, regards translation as "canopy under which gather great crowdy of phenomena".[21] Such an approach while pointing to the enormous variety and complexity of the transfers, underlines the creation of a " true cultural product", which "is given a wholly new voice and context".[22] When viewed from this perspective, it becomes clear that many concepts and practices involved in the process of translation have passed unnoticed in the discourse of Turkish science historians. Most researchers consider the translation practices of the time as being detached from the given temporal and cultural context. While classifying the scientific texts as "*tercüme*" [translation] or "*telif*" (generally regarded as to refer to *originality*) or evaluating them as "*sadık*" [faithful], "*serbest*" [free], "*mealen*" [sense-for-sense], "*harfiyyen*" [literal], "*aşırı serbest*" [extremely free], they consider the translation practices of the period only in terms of the modern conceptualization of translation –"*çeviri*".[23] However, the concept and practices of translation [*terceme*] in the Ottoman period and those of today [*çeviri*] are clearly distinct, and need to be considered as culture- and time-bound notions.[24] The diverse strategies used in producing translation-based texts in the Ottoman literary repertoires may well represent types of "translational works" which cannot be adequetly explained in terms of the above-mentioned binary oppositions, such as *telif-tercüme* or *sadık-serbest*.[25]

Translation practices such as *nazire, nakl, hülasa, taklid, şerh* may be cited as translation-based text productions in the "Ottoman interculture".[26] To these

21 Montgomery, p. 3.

22 Montgomery, p. 4.

23 For example see Emre Dölen, "Tanzimat'tan Cumhuriyet'e Bilim". *Tanzimat'tan Cumhuriyet'e Türkiye Ansiklopedisi*, I, (1985), p. 163; İhsanoğlu, *Osmanlı Matematik Literatürü Tarihi,* p. 593.

24 See Saliha Paker, "Translation as Terceme and Nazire: Culture-bound Concepts and their Implications for a Conceptual Framework for Research on Ottoman Translation History" in *Crosscultural Transgressions, Research Models in Translation Studies II Historical and Ideological Issues*, ed. by Theo Hermans, (Manchester, UK and Northampton MA, 2002), pp. 120-143; Saliha Paker, "Ottoman Conceptions of Translation and its Practice: The 1897 'Classics Debate' as a Focus for Examining Change", in *Translating Others*, Vol. 2, ed. by Theo Hermans, (Manchester: St. Jerome, 2006), pp. 325-348; Saliha Paker, "Translation, the Pursuit of Inventiveness and Ottoman Poetics: A Systemic Approach", in *Between Culture and Texts: Itineraries in Translation History*, (Frankfurt A.M.: Peter Lang GmbH, 2011); Demircioğlu, "From Discourse to Practice".

25 Demircioğlu, "Tuzaklar ve Kapılar", p. 4.

26 Paker, "Translation as Terceme and Nazire", pp. 137-139. Based on Anthony Pym's concept of "interculture" (See Anthony Pym, *Method in Translation History*, Manchester: St Jerome, 1998),

*terceme* practices, Paker (2011, 2014) adds "*telif*" and correlates it with *terceme* practices of the time.[27] Paker argues that "*telif,* an equivocal term used in modern Turkish scholarship to describe the literary status of a work elevated above that of *terceme,* does *not* signify 'originality', but creative mediation, an inventive form of translation" (Paker 2011:2). At this juncture, Paker's findings and arguments on *telif* and *terceme* manifest the correlation between the procedures of "invention" and "import", which are mentioned in Even-Zohar's work (2010), but which remain vague concepts, as they are not exemplified with unambiguous cases. Even-Zohar clearly argues that "even in cases of seemingly conspicuous 'originality', i.e., inventiveness which cannot be traced back to a simple source, import may be present" (ibid). For the very reason, the terms and concepts of *terceme* and *telif* in the Ottoman interculture, which are scrutinized by Paker (2011, 2014), exemplify the inextricable links between the procedures of invention and import in the making of culture repertoire. The findings of the present study point out that Paker's statements on *terceme* and *telif* in the Ottoman literary repertoires are also valid for Ottoman scientific repertoires. My arguments are supported by the information presented by science historians, and diverse definitions found in these studies, which lead to various conceptual confusions, for example, between terms such as "telif", "tercüme yoluyla telif edilmiş" (translation-based telif), "yarı-tercüme" (semi-translation), "tercüme-telif".[28] Many scientific works emerged as the result of translator-educators' "creative mediations".[29]

Thus, the works which are not directly classified as translation in the studies of science historians, but, with the information provided, allude to *terceme* practices of the time are regarded as translation, and have been added to the corpus.

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Saliha Paker suggests a new concept, "*Ottoman interculture"*, in order to contextualize the translation practices of "poet-translators" in the Ottoman culture. She defines "Ottoman interculture" as "a hypothetical site where poet-translators operated in the overlap of Turkish, Persian, and Arabic cultures, an overlap that should be distinguished from the generally held notion of a 'common Islamic culture'". Contrary to Pym's ideas on "interculture", Paker argues that her concept of "Ottoman interculture" refers to an autonomous literary and cultural system which, by the sixteenth century, had developed as a result of linguistic and cultural hybridization.

27 Saliha Paker, "Terceme, Te'lif ve Özgünlük Meselesi", in *Metnin Halleri : Osmanlı'da Telif, Tercüme ve Şerh*, (İstanbul: Klasik, 2014); Paker, "Translation, the Pursuit of Inventiveness and Ottoman Poetics".

28 İhsanoğlu, *Osmanlı Matematik Literatürü Tarihi-2*; İhsanoğlu, *Osmanlı Coğrafya Literatürü Tarihi- 2;* İhsanoğlu, *Osmanlı Askerlik Literatürü Tarihi 2*.

29 Paker, "Translation, the Pursuit of Inventiveness".

Some other scientific works that lacked detailed explanation or textual analyses, were not included in the corpus. However, it is clearly possible that there will be an increase in the number of the translations in the corpus after further textual analyses. The analyses of primary sources will provide translation scholars with invaluable information regarding diverse translation practices in the scientific repertoires.

My corpus of translated scientific texts includes the date/period of publication, the name of the work, author and translator, the scientific field of the work, the source language of the translation. I will discuss the inferences of the corpus analysis in detail in the following parts. However, in the first place, it will be useful to provide brief details of the quantitative data the corpus presents. There are 89 translated scientific works in the corpus. Of these, 35 were translated from French, 10 from Arabic, 6 from English, 5 from Italian, and 1 from Persian. The source languages of remaining 32 works are unknown. While most of the works in the corpus are direct translations, 6 works are indirect translations. Italian is used as mediating language in all 5 works and Arabic is used only once for indirect translation. The abundance of the texts translated from French in the corpus indicates that in the making of Ottoman scientific repertoires in the chosen period, the French scientific texts were seminal. The political relationship between the two empires, the prevalence of a knowledge of French among Turkish intellectuals and the urge to imitate the new order that arose in France as a result of 1789 revolution can be counted as the likely reasons for this situation.[30] When the time period of publications is considered, it is clear that 26 scientific texts were translated during the reign of Sultan Selim III, and 52 during the reign of Sultan Mahmud II. Although the remaining 11 works were found to be translated between 1789 and 1839, no information could be obtained regarding the exact publication year, which makes it impossible to specify in whose reign the translations were carried out. The abundance of the translations in the reign of Mahmud II points out that the contact with western science, which had begun in the era of Sultan Selim III, continued its momentum in the following years. The texts were related to different scientific fields, such as military science, mathematics, geography, medicine, pharmacology, physics, chemistry and astronomy. However, it appears that the translations on military science, geography and mathematics outnumber other fields. Out of 89 works, 32 were on military sciences, 26 on mathematics and 11 on geography.

30 Lewis, pp. 56-57.

Such a finding supports the argument that scientific translations were mostly done with the intention of bringing the Ottoman armed forces up to the standards of contemporary Western armies in terms of technical equipment, training and skill. All translations –except for Yahya Zade Mehmed Ruhiddin's *Terceme-i 'İlm al Hisab* – were in Ottoman Turkish rather than Arabic, which was for long time accepted as the language of science in the Ottoman Empire. Although the names of the authors were generally absent in the bibliographies drawn upon, the names of the translators for all works except 5 were provided as they appeared on the title or cover pages of the primary sources. The esteem accorded to the translator-educators may well be attributed to their scholarly reputation in the field. The investigation of the corpus also reveals that number of translator-educators in the scientific field was limited to a certain number of people serving specific enlightened institutions in the Ottoman Empire. Below, I will explore these institutions and their translator-educators in detail.

### Leading Institutions as Channels of Scientific Transmission: *Mühendishane, Tıphane, Mekteb-i Harbiye*

The leading institutions of learning in the Ottoman Empire were the *medrese*s. In these institutions, the rational sciences, such as mathematics and astronomy, -known as *ulum-i akliye*- were taught in addition to traditional sciences related to Islam, such as fiqh, hadith and tafsir -known as *ulum-i nakliye* during the classical period.[31] But the dominating subjects or courses in medrese education were always centered around fiqh and kelam.[32] However, from the seventeenth century onwards, this traditional education system failed to overcome the challenges of the era as well as satisfying the needs of the Ottomans.[33] The Empire shifted its

31 Ekmeleddin İhsanoğlu, "Ottoman Science in the Classical Period and early Contacts with European Science and Technology" in *Transfer of Modern Science and Technology to the Muslim World 1/48*, (Turkey: IRCICA, 1992), pp. 1-11; Ekmeleddin İhsanoğlu, *History of the Ottoman State, Society and Civilisation Vol. 2.* (İstanbul: IRCICA, 2002), pp. 365-390; Ahmet Cihan, *Reform Çağında Osmanlı İlmiye Sınıfı*, (İstanbul: Birey Yayınları, 2004); Benjamin C. Fortna, "Islamic Morality in Late Ottoman 'Secular' Schools", *International Journal of Middle East Studies 32/3,* (USA, Cambridge University Press, 2000), pp. 369-393.

32 Seyfi Kenan, "Türk Eğitim Düşüncesi ve Deneyiminin Dönüm Noktaları Üzerine bir Çözümleme", *Osmanlı Araştırmaları/The Journal of Ottoman Studies* (2013) 41:2, pp. 1-32.

33 Adnan Adıvar, *Osmanlı Türklerinde İlim*, (İstanbul: Remzi Kitabevi, 1970) p. 193; Roderic H. Davison, *Essays in Ottoman and Turkish History 1774- 1923: The Impact of the West*, (Austin: University of Texas Press, 1990), p. 166; İhsanoğlu, *History of the Ottoman State*, p. 387.

educational focus and turned towards western sciences. Under the reigns of Selim III and Mahmud II, the *Mühendishane*, *Tıphane-i Amire* and *Mekteb-i Harbiye* were introduced as modern options to the Ottoman culture repertoire. These schools were modelled on western precedents and constituted the prototypes of the western-style educational institutions.[34] Efforts were made to overcome the language barrier, which "was the central problem of the educational and indeed of the entire reform project",[35] by either incorporating foreign language classes into the curricula of these western-style schools, or, in the era of Mahmud II, by sending students to European countries.[36] Most of the students who graduated from western-modelled schools or returned from European countries either became translator-educators in their schools or served as translators in different institutions.[37] Many scientific and technical translations were published directly by the schools for their own use. These educational institutions, with the translator-educators working for them, with the print houses they harboured and with the language courses they provided, functioned as translation bureaus, and even as translator-training centers at the time.

### *Mühendishane*

The foundation of the *Hendesehane* (school of mathematics) in 1775 within the Imperial Maritime Arsenal was a significant step forward in military education. The school was later reorganized and renamed as *Mühendishane* (1781) and *Mühendishane-i Bahri-i Hümayun* [the Imperial School of Naval Engineering] (1793) by the imperial decree of Selim III. Another *Mühendishane,* which was also known as *Mühendishane-i Cedide*, was also established in 1795. It was reorganized and renamed as *Mühendishane-i Berri-i Hümayun* [The Imperial School of Military Engineering] in 1806, again by the decree of Selim III. Under the reign of Mahmud II, following the destruction of the Janissaries (1826) and the transfer of control of the school to İshak Efendi, there was a growth of scientific and technical studies at the *Mühendishane.* Both these *Mühendishane* served the Empire for a considerable time.[38] The schools which were the first to introduce the accoutrements

34 İhsanoğlu, *Osmanlılar ve Bilim,* p. 267.

35 Stanford Shaw and Ezel Kural, *History of the Ottoman Empire and Modern Turkey 2*, (New York: Cambridge University Press, 2002), p. 85.

36 Lewis, p. 104; Cahit Bilim, "Tercüme Odası", *OTAM* 1 (1990), pp. 29-43.

37 İhsanoğlu, *History of the Ottoman State*, p. 441.

38 İhsanoğlu, *Science, Technology in the Ottoman Empire*, pp. 29-30.

of modern-style education –e.g. chairs, classroom- and to incorporate western-language education into curricula in the Ottoman Empire, were based on French model.[39] Some of the classes taught at the *Mühendishane* were as follows: Arabic, French, mathematics, orthography, mechanical drawing, geography, astronomy, mapping, military organization, design and construction, artillery, and military engineering.[40] Most of the classes were new to the repertoire, and they represented a focus which was very different from the formal education offered in the *medrese*s. Until then, the scientific and technical books written in these fields were few in number in the Ottoman Empire. Therefore, in this reform era, the education relied heavily on foreign experts and educators who were also translators engaged in various forms of text production. Because some of the classes were taught in Turkish, foreign experts had to be accompanied with interpreters.[41]

### *Tıphane-i Amire*

The first modern medical school was founded in 1827 in the era of Mahmud II under the name of *Tıphane-i Amire*.[42] In the same year another medical school, *Cerrahhane-i Amire*, was also established. In contrast to the medical education based on old Turkish-Islamic scientific tradition in the *medrese*s, these two institutions and their curricula were based on western models.[43] Because the language of education at *Tıphane-Amire* was French, French rather than Turkish text books were used, and medical translations were few in number. Hekimbaşı Mustafa Behçet Efendi, one of the translator-educators of the school at that time, contributed much to the foundation of the school. Many treatises taught at the school were brought from Paris.[44] *Tıphane-i Amire* and *Cerrahhane-i Amire* merged under the name of *Mekteb-i Tıbbiye-i Adliye-i Şahane* in 1839.[45] Medical classes continued to be given in French.

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39 Kemal Beydilli, *Türk Bilim ve Matbaacılık Tarihinde Mühendishane Matbaası ve Kütüphanesi*. (İstanbul: Eren Yayınları, 1995), pp. 29-30; Kenan, "Türk Eğitim Düşüncesi ve Deneyiminin Dönüm Noktaları Üzerine bir Çözümleme".

40 İhsanoğlu, *History of the Ottoman State,* pp. 424-433; Beydilli, pp. 59-75.

41 Beydilli, p. 87.

42 Shaw and Kural, p. 48; Aykut Kazancıgil, *Osmanlılarda Bilim ve Teknoloji*, (İstanbul: Gazetecilik ve Yazarlar Vakfı Yayınları, 1999), p. 258; İhsanoğlu, *Osmanlılar ve Bilim*, pp. 275-78.

43 Lewis, p. 84.

44 İhsanoğlu, *Osmanlılar ve Bilim*, p. 276.

45 İhsanoğlu, *History of the Ottoman State*, p. 435; Dölen, pp. 154-196.

### *Mekteb-i Harbiye*

This school was opened in 1834 in order to produce modern, westward-looking, military officers.[46] The institution was designed by Namık Paşa on the model of Lancaster system. The teaching staff of the school was composed of those graduated from the *Mühendishane* and of foreign experts.[47] Classes taught at the institution included chemistry, mathematics, geometry, astronomy, physics, language and military sciences.[48] The curricula were determined by the translator-educators who were also working for the *Mühendishane*. Besides scientific translations and indigenous works published in its printing house, the textbooks translated and/or written for the *Mühendishane* also constituted the primary sources of the institution.[49] The foreign experts and translator-educators at the school produced many works on modern sciences, military arts and sciences.[50] Niyazi Berkes, a well-known sociologist, states that the establishment of *Mekteb-i Harbiye* is a notable step in the process of the secularization[51] of the Empire, since the military and ideological impact of the institution shaped the further development of the Ottoman intellectual thought.

## Translator-educators and Their Translations (1789-1839)

From the sixteenth century onwards, the works of western science (particularly from the fields of geography, astronomy and medicine) were incorporated into the Ottoman scientific and educational repertoires. The transfer of scientific texts from German, Italian and, particularly, French continued intermittently in the seventeenth and eighteenth centuries.[52] Thus the scientific-epistemic domain, dominated by Arabic, Persian and Turkish languages until

46 İhsanoğlu, *Osmanlılar ve Bilim*, p. 278; Cihan, pp. 129-131.

47 Niyazi Berkes, *Türkiye'de Çağdaşlaşma*, (İstanbul: Bilgi Yayınevi, 1973), pp. 170-171.

48 Cihan, 130; İhsanoğlu, *History of the Ottoman State*, pp. 438-439.

49 İhsanoğlu, *History of the Ottoman State*, p. 438.

50 İhsanoğlu, *Science, Technology in the Ottoman Empire*.

51 Berkes' conceptualization of 'secularism' is closer to the definition of 'rationalization' or 'modernization' than 'irreligion' (See Niyazi Berkes, *The Development of Secularism in Turkey*, (London: C.Hurst&Company, 1998), pp. 5-10. He claims that in a non-Christian society "the basic conflict in secularism is often between the forces of tradition, which tend to promote the domination of religion and sacred law, and the forces of change" (ibid).

52 Feza Günergün, "Ondokuzuncu Yüzyıl Türkiye'sinde Kimyada Adlandırma", *Osmanlı Bilimi Araştırmaları*, 5, 1 (2003), p. 2; İhsanoğlu, *Osmanlılar ve Bilim*, pp. 248-254.

the sixteenth century, started to take a different path from the literary-epistemic domain of "poet-translators", which is conceptualized by Saliha Paker as "Ottoman interculture".[53] From the sixteenth century onwards, the site of operation of translators in the scientific repertoires became multicultural and multilingual, unlike the trilingual, tricultural site of operation of poet-translators in the literary repertoires.

The political and military alliance between the Ottoman Empire and France[54] at the time had an impact upon the transference of scientific works: most of the scientific texts were translated from French.[55] Some translation were printed at the press of the French Embassy, which was the best equipped press in the city.[56] The translator-educators serving these institutions usually acquired at least one western language in addition to Arabic and Persian. For instance, Hüseyin Rıfkı Tamani, the first chief instructor of the Mühendishane, had learnt French, Latin, Italian and English as well as oriental languages.[57] Mustafa Behçet Efendi and Şanizade Ataullah Efendi could speak Italian and French.[58] Some translators, according to the foreign language they had acquired, engaged in mediated translations.[59] The translations of the educator-translators were used as textbooks in various schools.[60] In all the western-style schools, French was adopted as the language of education. The students who acquired the language and were well-informed about recent developments in the West were expected to translate them into Turkish. This body of translator-educators comprised people from different backgrounds: graduates of western-style schools; translators of the Imperial Chancery such as

53 Paker, "Translation as Terceme and Nazire".

54 The French, out of regard for military alliance, provided the Ottomans with experts, instructors and technical equipment (See Halil İnalcık, "Some Remarks on the Ottoman Turkey's Modernization Process", *Transfer of Modern Science & Technology to the Muslim World*. (İstanbul: IRCICA, 1991), p. 54).

55 İnalcık, p. 54; Lewis, pp. 56-57.

56 Lewis, p. 57; Alpay Kabacalı, *Türkiye'de Matbaa, Basın ve Yayın*, (İstanbul: Literatür Yayıncılık, 2000), pp. 27-28.

57 İhsanoğlu, *Osmanlı Matematik Literatürü*, pp. 266-272.

58 Kazancıgil, pp. 255-259.

59 e.g. Mustafa Behçet Efendi translated *Makale-i Emraz-ı Frengiye* not from its source language, German, but from its Italian translation (see Kazancıgil, p. 256).

60 Ekmeleddin İhsanoğlu, *Başhoca İshak Efendi: Türkiye'de Modern Bilimin Öncüsü*, (Ankara: Kültür Bakanlığı Yayınları, 1989), pp. 33-67; Kazancıgil, pp. 259-260.

İshak Efendi, Zenop Efendi and Yahya Naci Efendi;[61] medrese teachers; and foreign experts.[62] [63] As in the case of Yahya Naci Efendi, many translators who were appointed as foreign language teachers to the schools taught not only French language but also science from their own translations.[64] The translator-educators sometimes worked for more than one institution at the same time.[65] For example, Hoca İshak Efendi who played a key role in the *Mühendishane* as chief-instructor also taught at *Mekteb-i Harbiye*.[66] Together with Yahya Efendi, he also worked for the Imperial Chancery [Divan-ı Hümayun] and undertook diplomatic missions.[67]

The translator-educators who contributed translations to western-style military and technical schools, played a key role in the modernization and development of Ottoman scientific repertoires. Hüseyin Rıfkı Tamani's translations on mathematics and engineering were leading texts in the field, and they were used as textbooks at the *Mühendishane* (İhsanoğlu 1998:9). In the field of medicine, Şanizade Mehmed Ataullah's compiled translation *Hamse-i Şanizade*[68] was the first to introduce modern anatomy to the Ottoman repertoires.[69] Moreover, the translations of Mustafa Behçet Efendi were the first to mention the concepts of modern physiology and biology.[70] İshak Efendi was also one of the pioneers in importing modern science into Ottoman scientific and educational repertoires. His compiled translation *Mecmua-i Ulum-i Riyaziye* covers all positive sciences except for biology.[71] Therefore, this translation took on the role of reference

61 Some of these translators received scientific or technical education. For example İshak Efendi who later became the chief instructor of the *Mühendishane* had been student in the same school between 1806 and 1815 (see İhsanoğlu, Başhoca İshak Efendi, p. 9).

62 e.g. An English engineer who assisted the chief instructor Hüseyin Rıfkı Tamani contributed to the translation of John Bonnycastle's book on Euclides geometry into Turkish (see Günergün, "Ondokuzuncu Yüzyıl Türkiye'sinde Kimyada Adlandırma", p. 3).

63 Beydilli, pp.312-321; Günergün, "Ondokuzuncu Yüzyıl Türkiye'sinde Kimyada Adlandırma", p. 3; İhsanoğlu, *Başhoca İshak Efendi*, p. 264.

64 Ebru Ademoğlu, "Yahya Naci Efendi ve Fırlatılan Cisimlerin Hareketiyle İlgili Eseri", *Osmanlı Bilimi Araştırmaları*, 4, 1, (2002), p. 8.

65 Beydilli, pp. 312-321; Ademoğlu.

66 İhsanoğlu, *Başhoca İshak Efendi*.

67 İhsanoğlu, *Başhoca İshak Efendi*, pp. 16-17; Bilim.

68 In the corpus, the parts were taken as separate books.

69 Kazancıgil, p. 259; Ziya Yılmazer, *Şânî-zâde Mehmed 'Atâ'ullah Efendi, Şânî-zâde Târîhi (1223-1237 / 1808-1821)*. (İstabul: Çamlıca Yayınevi, 2008).

70 Kazancıgil, pp. 256, 264.

71 Kazancıgil, p. 311.

guide for all western-style schools, and became the earliest form of an exhaustive modern textbook.[72]

In the period under study, when the scientific and educational repertoires were shaped by translator-educators, and their translations took on a central position, the boundaries between indigenous writing and translations became less distinct. Translator-educators, through significant interventions in terms of omission, addition, adaptation of illustrations, appropriated the texts for the Ottomans. Many translated works, among which there were Şanizade's *Hamse-i Şanizade*, Yahyazade Mehmed Ruhiddin's *Tuhfe-i Zabitân der Beyân-ı İstihkamât-ı Sahra*, İshak Efendi's *Mecmua-i Ulûm-i Riyaziye*, were supplemented with figures, explanations and translator-educators' own findings.[73] Konstantin İpsilanti, while translating *Vauban*, defined the practice he adopted as *mebsûten tercüme* [expanded translation], which involved appending his own figures and pictures.[74] Moreover the period was also marked by compiled translations. For example İbrahim Kami's *Maftuh* was a translation compiled from various sources, including Giyasuddin Cemşid al-Kaşi's *Miftah al Hussâb* from Arabic, as well as diverse western scientific sources.[75] Hüseyin Rıfkı Tamani compiled *Usûl-i Hendese* from John Bonnycastle's *Elements of Geometry* and Robert Simson's *Elements of Euclid*.[76] İshak Efendi's four volume *Mecmua-i Ulûm-i Riyaziye* was also compiled from different sources.[77] The sources of these translations generally remained unspecified. Of the translations in the corpus established for the present study, half mentioned no source texts, and were released as indigenous works. These concealed translations were revealed after meticulous exploration and discourse analyses undertaken by the science historians.[78]

There were not any organized institutions responsible for examining translated works or establishing scientific terminology. The scientific translation activities of the era were determined through the individual efforts of both the

72 Ekmeleddin İhsanoğlu, "Osmanlı İmparatorluğunda Bilim, Teknoloji ve Sanayide Modernleşme Gayretleri", *Osmanlı Bilimi Araştırmaları II*. (İstanbul: İ.Ü. E.F. Yayınları, 1998), p. 9.

73 Kazancıgil, p. 260.

74 Beydilli, p. 183.

75 İhsanoğlu, *Osmanlı Matematik Literatürü Tarihi*, pp. 256-261.

76 Ali Rıza Tosun, "Hüseyin Rıfkı Tamani'nin Çalışmaları Işığında Öklid Geometrisi'nin Türkiye'ye Girişi", (doctoral dissertation), Ankara Üniveristesi Sosyal Bilimler Enstitüsü, 2007, p. 159.

77 Kazancıgil, pp. 312-313.

78 For example see Günergün, "Kimyada Adlandırma", p. 10; Ademoğlu, p. 32.

Sultan and translator-educators. Some of the western sources were translated on the order of the Sultan in order to be used as textbooks at schools. Mehmed Raşid's translation of *Fenn-i Harbe Dair Risâle* from French, Mehmed Said Paşa's *Zavâbit-i Harbiye* and İpsilanti's *Vauban* are cases in point. They were translated on the orders of Selim III and Mahmud II respectively.[79] Selim III got personally involved in the translation process of *Vauban*, made suggestions and preserved the translation in his own library.[80] Many other scientific works, on the other hand, were selected for translation by the translator-educators themselves.[81] For example while his predecessors taught from traditional Islamic sources, İshak Efendi gave preference to the translations of western scientific sources on becoming the chief instructor of the *Mühendishane*.[82] However, whether or not translated by the order of the Sultans, almost all translated works were presented to them, and some translators used their prefaces to dedicate their works to the Sultans.[83] The presentation of the translated scientific works were appreciated by the Sultans, and translator-educators were given financial rewards or promotion.[84] To exemplify, İshak Efendi's *Riyaziye* was awarded 250 gold coins by Mahmud II.[85] Most of the translations were printed, while a small number remained in manuscript form. In some cases, the print runs were determined by the Sultan himself. For example, the first print run of Asım Efendi's *Kamus* was determined as 500 by Mahmud II.[86] The involvement of the Sultans in the selection and distribution of scientific translations, and their absolute control over the status and earnings of the translators indicate that the scientific and educational repertoires at the time were regulated by an undifferentiated imperial "patronage".[87] However, when it is considered that publishing as a private enterprise began only after the second

79 İhsanoğlu, *Science, Technology in the Ottoman Empire*, p. 64.

80 Kenan, "III. Selim Dönemi Eğitim Anlayışında Arayışlar", pp. 160-161.

81 Günergün, "Kimyada Adalandırma", p. 2.

82 İhsanoğlu, Osmanlılar ve Bilim, p. 272.

83 İhsanoğlu, *Osmanlı Matematik Literatürü Tarihi*, p. 304.

84 Beydilli, p. 184, 311.

85 İhsanoğlu, *Başhoca İshak Efendi*, p. 33.

86 Beydilli, p. 213.

87 Andre Lefevere, *Translation, Rewriting, and the Manipulation of Literary Fame*, (London and New York: Routledge, 1992); According to Andre Lefevere, "undifferentiated patronage" occurs when the translator derives status, economic support and ideological legitimacy from one individual or group (Lefevere, p.17)

half of the nineteenth century in the Ottoman Empire,[88] the Sultans' control over translation practices is not unexpected.

### Translator-educators as *Agents of Change*

Before the reigns of Sultan Selim III and Sultan Mahmud II, Ottoman educational and scientific repertoires had been under the auspices of the members of the *İlmiye*. The *İlmiye* was the leading religious institution, exercising power over law, justice, religion and education. It was in charge of traditional religious learning, or *ilm,* which was taught in the medreses at the time, and refered to "the acquiring of knowledge pertaining to God, to man's duties to Him, and to the relationship among men in terms of those duties".[89] *Ilmiye* comprised the *ulema* class, an elite class who were well-versed in the Muslim sciences, both theoretically and practically. The members of the *ulema* played significant roles in the empire as theologians, canon lawyers, judges, instructors and high state religious officials.[90]

When modern learning was introduced along with the western-style schools and textbooks, rather than *ilm*, it was called *fen* [science], which meant "art or practical skill", and referred to the rational sciences.[91] The scientific translations of the translator-educators at the time replaced traditional, religious learning, *ilm*, with modern science [*bilim*], which was based on rational knowledge of the West rather than religion. They replaced the traditional system of learning, which was incapable of providing the repertoire with new options, with a modern sense of science, and saved the system from stagnation. It may be argued that the translator-educators of the period were the first members of the *modern intelligentsia* (*münevver*), destined to supersede the religious elite of scholars, *ulema*. When the far-reaching impact of *Ilmiye* and *ulema* on various repertoires of the Ottoman culture is considered, it appears that the impact of translations did not remain restricted to the military, educational and scientific repertoires, but also caused gradual epistemological shifts in other repertoires. This process enabled the proliferation of enlightened thinkers, who would soon play significant roles in a series of reforms, such as those of the *Tanzimat*.[92] Thus, the translator-educators took

88 Berkes, *Türkiye'de Çağdaşlaşma,* p. 54.

89 Berkes, *The Development of Secularism*, p. 100.

90 Fortna, p. 382.

91 Berkes, *The Development of Secularism*, p. 100.

92 In Turkish history, *Tanzimat* [re-organization] period (1839-1876), with many administrative,

on the role of 'agents of change' of the period of modernization that characterised the reigns of Selim III and Mahmud II's. The modernising options provided by the agents of change also faced counter-forces. Some conservative scholars and physicians persisted in the traditional learning.[93] Such a case led to a dichotomy in the educational and scientific repertoires: modern scientific knowledge versus ulema's *ilm*.[94] For the first time in Turkish history, with the translations from modern science, there appeared a segregation between rational science/enlightenment and traditional learning/religion. From then on, the 'worldly' sciences were regarded as separate from 'religious' sciences.[95] Particularly in the era of Mahmud II, when the Ottoman society was completely remodelled by diverse secular reforms, the translator-educators serving western-style schools played indispensable roles as part of the official cultural planning.

Another significant contribution of the translator-educators at the time was the development of Turkish as the language of science in the Ottoman Empire. However, efforts for achieving this end were not new to the field. In the empire, Arabic had long dominated the 'scientific' repertoires; nevertheless, in some 'scientific' disciplines, the scholars had been writing in Turkish since its establishment. Many texts available in Arabic were rewritten in Turkish. Particularly from the sixteenth century, the increasing preference of Turkish as medium in the scientific repertoires continued.[96] With the establishment of western-style schools, such as the *Mühendishane* in the era of Selim III and Mahmud II, Turkish as a scientific language gained wider currency[97] because of translations from western sources.[98] While these translations from the West occupied a central position in the scientific repertoires, at the periphery, translations from Arabic and Turkish indigenous works persisted. Based on a study of prologues and epilogues of scientific texts, İhsan Fazlıoğlu identifies three main motives for the adoption

legal and educational reforms, marks the beginnings of the intensive Europeanization movement (See Lewis, pp. 74-128).

93 Adıvar, p. 190.

94 Adıvar, pp. 192-193.

95 Berkes, *Türkiye'de Çağdaşlaşma*, p. 90; İhsanoğlu, *Osmanlılar ve Bilim*, pp. 280-281.

96 İhsan Fazlıoğlu, "The Place and Importance of the Scientific Works Written in or Translated into Turkish in the Formation of Language Consciousness in the Ottoman Period", *Kutadgubilig Felsefe-Bilim Araştırmaları 3* (2003), pp. 151-184.

97 In the corpus, except for one work which was translated into Arabic, *Terceme-i 'İlm al-Hisab*, all translations are in Turkish.

98 İhsanoğlu, "Modernleşme Gayretleri", p. 11.

of Turkish as scientific language in the Ottoman empire:[99] (1) Most authors/translators wrote in or translated into Turkish so as to be understood by the target audience, such as students at schools, occupational groups, or the Sultan himself. (2) By using Turkish, the translators and authors intended to publicize knowledge which had previously been under the control of the religious elite. (3) Moreover, some also wanted to raise awareness of the Turkish language. When focused on the era of Selim III and, particularly, Mahmud II, it may be also argued that the development of Turkish as the language of science in the Ottoman Empire was one of the goals of the official culture planning at the time. Kuyucaklızade Muhammed Atıf, in the preface of his translation, writes that Mahmud II particularly ordered a Turkish translation of Bahauddin al-Amili's *Hulasat al-Hisab* -which until then had been read in Arabic in the medreses.[100] The remarks of Mahmud II at the inauguration of the medical school in 1838 also indicate that there were conscious efforts by the authorities to promote an official planning of translation and language in the educational and scientific repertoires: "You will study scientific medicine in French…my purpose in having you taught French is not to educate you in the French language; it is to teach you scientific medicine and little by little to take it into our language…work to acquire a knowledge of medicine from your teachers, and strive gradually to take it into Turkish and give it currency in our language…".[101]

The publication of dictionaries from Arabic and Persian into Turkish as well as scientific works in the *Mühendishane* can be considered as an attempt to expand the vocabulary of Turkish and to prepare the way for scientific and educational translations. Besides developing Turkish as a language in general, the translation of western sources with multitudinous unfamiliar scientific concepts and terms brought with it attempts to constitute a Turkish nomenclature. The translator-educators of the era were the first to take concrete steps towards developing scientific terminology in Turkish, either by transliteration or invention. While inventing Turkish terms, the translator-educators established linguistic rules and drew upon Arabic and Persian affixes and word roots, as well as Turkish ones.[102] The resultant polyglossic scientific repertoire reflected par excellence the East–West synthesis of the period. Many Turkish scientific terms and concepts

99 Fazlıoğlu, pp. 151-184.

100 İhsanoğlu, *Osmanlı Matematik Literatürü*, p. 293.

101 Lewis, p. 85.

102 Ademoğlu, pp. 26, 46, 47; Günergün, "Kimyada Adlandırma", pp. 10-20.

introduced by the translator-educators of the era, Şanizade[103] and İshak Efendi[104] in particular, were used for many years years in the disciplines.[105] In the later years, the translations from western sciences reached beyond the borders of Anatolia and were published in other Islamic cultures such as Egypt, Persia, Iraq. Therefore Turkish, for the first time in history, became the scientific lingua franca of the whole Islamic world.[106]

Taking all the above into consideration, it is apparent that translator-educators in the chosen period played a determining role in the scientific and educational repertoires. However, the analysis of the corpus established for this study reveals that the translation activity, which was of key importance for the desired kind of reformation in the military, technical, educational and scientific fields, remained restricted to certain names and works in the era of Selim III and Mahmud II. This is due to the limited number of scholars acquainted with western sciences and languages. Moreover, when contemporary developments of the time are considered, the endeavours in the Ottoman scientific repertoires were deficient. İshak Efendi's translation *Mecmua-i Ulum-i Riyaziye* is a case in point. While it is regarded as a significant contribution to the Ottoman scientific and educational repertoires, it is also criticized by some science historians as being outdated for its time.[107] At this juncture, Emre Dölen states that the understanding of chemistry in İshak Efendi's book was far removed from that of the time, although adequate for Ottoman military objectives.[108] On the other hand, Aykut Kazancıgil adds that the sections in the book on physics followed the developments in the West from afar.[109] Some translations are also criticized for being partial and lacking detail.[110] The underlying reason for all these criticisms is that the decision on what and how to translate was driven by military concerns alone.[111] The evidence for this is the abundance of the military texts in the corpus.

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103 See Kazancıgil, p. 26.

104 See Dölen, p. 163; Adıvar, p. 19.

105 Kazancıgil, p. 312.

106 Fazlıoğlu, p. 45

107 Kerim Erim,"Riyaziye". *Tanzimat*. (İstanbul, 1999), p. 479.

108 Dölen, p. 181.

109 Kazancıgil, pp. 312-314.

110 Kazancıgil, p. 312.

111 İhsanoğlu, *Osmanlılar ve Bilim*, pp. 283, 284.

## Conclusion

Instead of literary translations which are largely dealt in mainstream translation studies and considered to have relatively closer ties to cultural policies, this study, by focusing on the reigns of Selim III and Mahmud II, attempted to explore scientific-educational translations in the Ottoman repertoires. In order to ensure that the discussion was based on tangible data, I established a corpus covering the scientific-technical translations of the era. The corpus was built on data gathered from secondary and tertiary sources, and therefore may well be incomplete. The findings of future research which will analyze primary sources will certainly contribute to expanding and improving the present corpus. Nevertheless the data gathered from secondary and tertiary sources enabled a desciptive and critical discussion on the scientific translations and translator-educators of the period. It was revealed that the earliest systematic, western-style schools with military concerns in the period under focus, with the classes and print houses they harboured also functioned as effective translation bureaus. The translator-educators who served these schools were responsible for translating many scientific-technical texts from modern western sources into Turkish. The shaping of the Ottoman educational and scientific repertoires through these translations, ultimately contributed to the process of conversion of the religion-based education system into a modern-secular system inspired by western science and modernity. Therefore, the translator-educators of the period can be regarded as agents of change in the Ottoman culture repertoire. Moreover, by using Turkish as the medium of translation and by introducing new scientific concepts and terms into the language, they played a key role in promoting Turkish at the expense of Arabic in the Ottoman scientific repertoires.

This study has the potential to contribute to translation studies, translation history and culture studies in three major ways: (1) It manifests that, in terms of culture planning, the translations in scientific-educational repertoires are likely to be as significant as those in literary repertoires. Moreover, it points to the diversity of the potential roles of the translators in different repertoires. (2) It reveals that future historical studies focusing on Ottoman scientific, educational and technical repertoires may well contribute to the discovery of culture- and time-specific aspects of Ottoman translation practices, terms and concepts. (3) It underlines that diverse institutions may function as translation institutions, even though translation was not their primary purpose.

## The Scientific-Educational Texts Translated Under the Reigns of Selim III and Mahmud II in the Ottoman Empire

| | DATE / PERIOD OF PUBLICATION | TRANSLATOR | AUTHOR | TITLE OF THE SCIENTIFIC TEXT | FIELD | SOURCE LANGUAGE |
|---|---|---|---|---|---|---|
| **1** | Selim III | Mehmed Raşid | | Fenn-i Harbe Dair Risale Tercümesi | military | French |
| **2** | Selim III | İbrahim Edhem Paşa | | Sath-i Müstevi Hakkında Risale | mathematics | French |
| **3** | Selim III | İbrahim Edhem Paşa | Legendre | Kitab-ı Usulü'l-Hendese | mathematics | French |
| **4** | Selim III | Abdurrahman Efendi | W. Faden | Cedid Atlas Tercümesi | geography | English |
| **5** | 1786 | | Lafitte Clave | Usulü'l-Maarif fi Tertibü'l-Ordu | military | French |
| **6** | 1786 | | De Truguet | Usulü'l-Maarif fi Vech-i Tasfif-i Sefain-i Donanma | military | French |
| **7** | 1787 | | De Truguet | Risalet fi Kavaninü'l-Melahat Ameliyyen | military | French |
| **8** | 1792 | Konstantin Ipsilanti | Vauban | Terceme-i Risale-i Fenn-i Harb | military | French |
| **9** | 1792 | Hüseyin Rıfkı Tamani | | Logaritma Risalesi | mathematics | |
| **10** | 1792-1794 | İbrahim Kami B. 'Ali | Giyasuddin Cemşid al-Kaşi's work atogetner with various western sources | Maftuh (compilation) | mathematics | Arabic and western languages |
| **11** | 1793 | Konstantin Ipsilanti | Vauban | Terceme-i Risale-i Fenn-i Lağım | military | French |
| **12** | 1794 | Konstantin Ipsilanti | Vauban | Usul-i Harbiye/ Fenn-i Muhasara | military | French |
| **13** | 1794 | Müfti-zade Abdurrahim Efendi | | Terceme-i Aşkal al-Ta'sis | mathematics | Arabic |
| **14** | 1796 | Mustafa Behçet Efendi | Antonio | Vezaif-i A'za | medicine | Italian |
| **15** | 1797 | Mütercim Asım Efendi | Tebrizli Hüseyin | Burhan-ı Katı | dictionary | Persian |
| **16** | 1797 | Hüseyin Rıfkı Tamani (with the help of English engineer Selim Efendi) | John Bonnycastle ve Robert Simson | Tercüme-i Usul el-Hendese (compilation) | mathematics | English |
| **17** | 1800/01 | Hüseyin Rıfkı Tamani | | Ma'rifet-i Terfi'-i Eskalde Telhis el-Eşkal | mathematics | |
| **18** | 1801 | Mustafa Behçet Efendi | Jenner | Risale-i Telkih-i Bakari | medicine | Italian (mediating lang) |
| **19** | 1802 | Mehmed bin Mustafa el-Vani | İsmail bin Hammad el-Cevheri | Vankulu Lugatı | dictionary | Arabic |
| **20** | 1802 | Hüseyin Rıfkı Tamani | | İmtihan el-Mühendisin | mathematics | English |
| **21** | 1803 | Mustafa Behçet Efendi | Johann Plench | Makale-i Emraz-ı Frengiye | medicine | Italian (mediating lang.) |

| | | | | | | |
|---|---|---|---|---|---|---|
| **22** | 1804 (2.baskı: 1826) | Yakovaki Efendi | Raif Mahmud Efendi | Ucalat al-Geography | geography | French |
| **23** | | İbrahim Edhem Paşa | Jean François Callet | Tarcamat al-Kitab li İsti'mal Cadavil al-Ansab, Logaritma | mathematics | French |
| **24** | 1805 | Hüseyin Rıfkı Tamani | | Mecmua el-Mühendisin | mathematics | Various languages |
| **25** | 1806 | | | Vesaya-yı Harbiye | military | |
| **26** | 1807 | Yahya-Zade Mehmed Ruhuddin | Jamberiche | Tuhfe-i Zabitan der Beyan-ı İstihkamat-ı Sahra | military | French |
| **27** | Selim III/ Mahmud II? | Hafız Mehmed Emin Efendi | | Tertib-i Zi Azla'-ı Kasıra 'ala'l-Arz | mathematics | French |
| **28** | Selim III/ Mahmud II? | Hafız Mehmed Salih | | Usul-i Tahtit-i Muhit al-Da 'ira | mathematics | French |
| **29** | Selim III/ Mahmud II? | Hafız Mehmed Salih | | Zemin Üzerine Bir Hat Tahdid Etmenin Tarikidir | mathematics | French |
| **30** | Selim III/ Mahmud II? | | | Pergar-ı Nisbet Risalesi | mathematics | |
| **31** | Selim III/ Mahmud II? | Şanizade Mehmed Ataullah Efendi | | Vesaya Name-i Seferriyye | military | |
| **32** | Selim III/ Mahmud II? | Şanizade Mehmed Ataullah Efendi | | Usul-i Sak | military | |
| **33** | Selim III/ Mahmud II? | Şanizade Mehmed Ataullah Efendi | | Tanzim-i Piyadegan ve Süveriyan | military | |
| **34** | Selim III/ Mahmud II? | Mustafa Behçet Efendi | Bonant | Mütalaa-yi Tabi'i | | English |
| **35** | Selim III/ Mahmud II? | Mustafa Behçet Efendi | Abdurrahman al-Cabarti | Mazhar al-Takdis bi Huruci Taifat al-Francis | military | Arabic |
| **36** | Selim III/ Mahmud II? | Mustafa Behçet Efendi | Buffon | Tarih-i Tabi'i | geography | |
| **37** | Selim III/ Mahmud II? | | | Rehber-i Menazil | geography | French |
| **38** | Mahmud II | Mustafa Behçet Efendi | Johann Plench | Ameliyat-ı Tıbbıye | medicine | |
| **39** | Mahmud II | Şanizade Mehmed Ataullah Efendi | Charles Bossut | Tercüme-i Cedide-i Usul-ü Talimiyye | mathematics | |
| **40** | Mahmud II | Şanizade Mehmed Ataullah Efendi | Charles Bossut | Cebr-i Mukabele | mathematics | |
| **41** | Mahmud II | Şanizade Mehmed Ataullah Efendi | Charles Bossut | Usul-i Hendese | mathematics | |
| **42** | Mahmud II | Şanizade Mehmed Ataullah Efendi | | Mizan'ül Edviyye | pharmacol-ogy | |
| **43** | Mahmud II | Şanizade Mehmed Ataullah Efendi | | Mufradat-ı Kulliya fi Savahil al-Bahriya | geography | French (?) |
| **44** | Mahmud II | Güzeloğlu Aram | | Hikmet-i Harbiye Tercümesi | military | French |
| **45** | Mahmud II | Güzeloğlu Aram | | Hikmed-i Cedid | military | French |
| **46** | Mahmud II | Güzeloğlu Aram | | Mecmu'a-i Musahabet | language | French |
| **47** | Mahmud II | Ahmed Tevhid Efendi | | Nuhbat al-Hisab (compilation) | mathematics, geography | |
| **48** | Mahmud II | Ahmed Tevhid Efendi | | Hall al-Aş'ab fi Taz'if al-Muka"ab | mathematics | |

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| **49** | Mahmud II | Ahmed Tevhid Efendi | | Macmu'at al-Fara'id va Lubb al-Fava'id | mathematics | |
| **50** | Mahmud II | Mashariyeci-zade Hüseyin Efendi | | Mesaha ve Musellesat Risalesi | mathematics | French |
| **51** | Mahmud II | Mehmed Arif Hilmi All-İstanbuli | Abi Bakr al-Haravi | Tarcama al-Tazkirat al-Haraviya fi'l-Hiyal al-Harbiye | military | Arabic |
| **52** | Mahmud II | Yahya-Zade Mehmed Ruhuddin | | Teslis-i Zaviye Risalesi Tercümesi | military | French |
| **53** | Mahmud II | Kuyucaklı-zade Muhammed Atıf | Bahauddin al-Amili | Nihaye el-Elbab fi Tercüme Hulasa el-Hisab | mathematics | Arabic |
| **54** | Mahmud II | Seyid Abdülhalim | | Geometri risalesi | mathematics | French |
| **55** | Mahmud II | Mehmed Tahir | | Müsellesat-ı Cebriye | mathematics | English |
| **56** | Mahmud II | Mehmed Tahir | | Terceme-i Fasl-ı Rabi' fi Bayan al-Zavaya | mathematics | French |
| **57** | Mahmud II | Mustafa Behçet Efendi | Bruno | Hikmet-i Tabiiyye | | |
| **58** | Mahmud II | Mustafa Behçet Efendi | | Ruhiye veya Kusur-i Lebeniye | medicine | |
| **59** | Mahmud II | Örfi Paşa | | Geography (compilation) | geography | French |
| **60** | Mahmud II | Mehmed Said Paşa | Napolyon | Zavabit-i Harbiye | military | |
| **61** | Mahmud II | Theologu Aleko | Louis-Jean Charles | Fenn-i Harb | military | French/ German ? |
| **62** | Mahmud II | Theologu Aleko | Kuçek | Risale | military | |
| **63** | Mahmud II | Yahya-Zade Mehmed Ruhuddin | | Risala fi'l-Misaha | military | |
| **64** | 1809 | Yahya Naci Efendi | | Risale-i Hikmet-i Tabıiyye | physics and chemistry | |
| **65** | 1811 | İstavraki | William Playfair | | geography | English |
| **66** | 1812 | Yahya Naci Efendi | | Risale-i Seyyale-i Berkiyye | physics | French |
| **67** | 1814-1817 | Mütercim Asım Efendi | Firuzabatlı Hüseyin | Kamus (3 volumes) | dictionary | Arabic |
| **68** | 1815 | Güzeloğlu Aram | | Hikaye-i Bahriye | geography | French |
| **69** | 1818 | Şayh Vahid | | Tuhfe-i Kemankeşan | military | |
| **70** | 1819 | Şanizade Mehmed Ataullah Efendi | Anton Baron von Störck | Mi'yarü'l-Etıbba | medicine | Italian (mediating lang.) |
| **71** | 1819 | Şanizade Mehmed Ataullah Efendi | Anton Baron von Störck | Mirat'ül Ebdan fi Teşrih-i Aza'ul İnsan | medicine | Italian (mediating lang.) |
| **72** | 1819 | Şanizade Mehmed Ataullah Efendi | | Usulü't- Tabia | medicine | |
| **73** | 1824 | Hüseyin Rıfkı Tamani | | Fenn-i Lağım (compilation) | military | |
| **74** | 1824 | Seyid Ali Paşa | Ali Kuşçu | Mir'at el-'Alem | astronomy | Arabic |
| **75** | 1825 | Mehmed Münib Efendi | İmam Muhammed | Siyer-i Kebir Tercümesi | military | Arabic |
| **76** | 1826 | Başhoca İshak Efendi | | Naşb al Hıyam | military | |
| **77** | 1826 | Hüseyin Hüsnü Efendi | Ladende | Tables Astronomiques'in tercümesi | astronomy | Arabic (mediating lang.) |

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| **78** | 1828 | Mehmed İzzet | | Logaritma Cedvellerinin İstihracına ve İstimaline Dair Risale | mathematics | French |
| **79** | 1828 | Şanizade Mehmed Ataullah Efendi | | Kanun'ul Cerrahin | medicine | |
| **80** | 1829 | Theologu Aleko | | Cruza Geographysı | geography | French |
| **81** | 1830 | Başhoca İshak Efendi | Robert Fulton | Deniz Lağımı Risalesi | military | French |
| **82** | 1831-1833 | Başhoca İshak Efendi | | Usul üs siyağa | military | French |
| **83** | 1831-1834 | Başhoca İshak Efendi | | Mecmua-i Ulum-i Riyaziye (compilation) | Compilation from diverse fields | |
| **84** | | Başhoca İshak Efendi | | Risale-i Ceyb | military | |
| **85** | 1833 | Mehmed Esad | | Lağımcı Manevrası | military | |
| **86** | 1834 | Başhoca İshak Efendi | Beloin | Usul-i İstihkamat (compilation) | military | French |
| **87** | 1835 | Mehmed Hüsrev Paşa | | | military | |
| **88** | 1836 | Yahya-Zade Mehmed Ruhuddin | Charles Bossut | Terceme-i 'İlm al-Hisab (A) | military | French |
| **89** | | Seyid Ali Paşa | | Atlas de Zenfan | geography | French |

*Translating Science in the Ottoman Empire: Translator-educators as "Agents of Change" in the Ottoman Scientific Repertoires (1789-1839)*

Abstract ■ Focusing on the fifty-year period between 1789 and 1839, the study aims to showcase the pivotal role of translators and translations in the transmission of modern science in the Ottoman Empire, which has long been ignored from a translation studies perspective. In order to ground the discussion, a corpus of scientific-educational translations of the era has been created. The paper reveals that the aspiration of raising the status of the Ottoman Empire in the military arena brought a concomitant need to reshape the Ottoman educational and scientific repertoires through translations of works from western sources. The first systematic, western-style military schools, which incorporated translator-educators, language courses and printing houses, functioned not only as translation bureaus but also translator-training centers at the time. The translator-educators serving at these institutions enabled significant transformation in the Ottoman culture, thus acting as 'agents of change': They promoted Turkish as a scientific language, contributed to the conversion of the religion-based learning system into a secular one, and also stimulated epistemological shifts in other repertoires.

Keywords: Translation History, Ottoman Scientific Repertoires, Translator-educators, Agents of Change

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