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Arabic Types in Europe and the Middle East, 1514–1924: Challenges in the Adaptation of the Arabic Script from Written to Printed Form

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**University of
Reading**

Declaration

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

Emanuela Conidi

Abstract

This thesis investigates the transition of the Arabic script from written to printed form and the influence that this process had on the evolution of Arabic typeforms. This study aims to acknowledge and interrogate the factors that influenced the typographic shaping of the script in response to typemaking and typesetting technology, and the cultural environment in which these developments took place.

The historical scope of the research covers the pre-industrial production of Arabic founts, focusing on letterpress printing and types for hand composition, beginning with the first Arabic movable types in Italy in 1514.

The thesis covers developments to 1924, when the Būlāq printing house in Cairo produced the first typographically composed Qur'ān to be approved by a Muslim authority. The Būlāq edition marked what could be arguably considered the highpoint of composing Arabic with foundry type and its typeface supplied the model for the development a hot-metal fount, formally bridging hand-set and mechanical technologies for the typesetting of the Qur'ān.

The research investigates the relationship between the manuscript models and the typographic representation of the Arabic script; and outlines significant developments in Arabic typographic history with selected case studies, chosen to highlight various aspects of the design and manufacturing processes, as well as discuss approaches of different type-makers and printers.

This study draws on primary sources that have not been examined as a set before, employing a methodology of visual documentation that supports detailed comparative analysis. This approach enables a focus on the critical assessment and qualitative appraisal of the Arabic types according to specific parameters. The research aims to shed light on the reasons for the discontinuity between manuscript and print forms, and reveal relationships between the visual forms of letters and the skills, knowledge and resources available to the people involved in the type-making process. It also aims to trace the establishment of typographic conventions for the Arabic script that either originated or departed from manuscript practice.

In conclusion, this research extends and deepens the historical narrative of Arabic type history, and provides a valuable source for scholars, students and practitioners in the field.

Contents

XI	Acknowledgements
XIII	Initial notes
XVII	Scheme of transliteration
XIX	Abbreviations
XXV	List of appendices

1	INTRODUCTION	1
1.1	Is Arabic typographic history relevant?	1
1.2	Framework overview	9
1.2.1	Approach	9
1.2.2	Preparatory work	11
1.2.3	Scope	19
1.3	Cultural and political context of Arabic printing	23
1.3.1	Book printing, funding, market and trade	23
1.3.2	Migration of communities	27
1.3.3	The drive for printing Arabic books in Europe	29
1.3.4	Arabic speakers and manuscripts in 16th-century Europe	35
1.4	Development of the Arabic script	43
2	ARABIC MANUSCRIPTS: A MODEL FOR PRINTING	53
2.1	Authentic Arabic and calligraphic elegance: more than beauty that meets the eye	55
2.2	Identifying and defining models	71
3	THE TECHNICAL CHALLENGES OF PRINTING ARABIC	97
3.1	Manuscript to print: challenges in the translation of the script	97
3.1.1	Some observations on writing and printing letterforms and the notion of variation	97
3.2	Punch-cutting, typefounding and typesetting of Arabic founts	119
3.2.1	Methods of Arabic punch-cutting	119
3.2.2	Methods of Arabic typefounding	133
3.2.3	Methods of Arabic typesetting	139
3.3	The collaborative nature of Arabic type-making	165
4	A METHODOLOGY FOR EVALUATING ARABIC TYPES	169
4.1	Development of criteria to assess typographic quality	169
4.1.1	Degree of simplification	171
4.1.2	Calligraphic properties and diversification of letters	175
4.1.3	Letter-joining and multilevel composition	179
4.1.4	Regularity of fitting	181
4.1.5	Evenness of texture and colour density	183
5	PRINTING ARABIC IN EUROPE IN THE 16TH CENTURY	185
5.1	Beginnings of Arabic printing: wood types	185
5.2	The first two Arabic movable metal types: pioneers	195
5.2.1	Gregorio de Gregori in Fano	195
5.2.2	Agostino Giustiniani in Genoa	217
5.3	The first type to print the Qur'an: progression	241
5.3.1	Paganino and Alessandro Paganini in Venice	241

5.4	The transitional type of the Jesuit Press: regression	283
5.4.1	Tipografia del Collegio Romano in Rome	283
6	SETTING NEW STANDARDS: INNOVATORS	299
6.1	A 16th-century master at work: Robert Granjon	299
6.1.1	The first Arabic type for the Papal Polyglot Press	301
6.1.2	The <i>Typographia Medicea</i>	319
6.1.3	The second Arabic type	337
6.1.4	The third Arabic type	343
6.1.5	The fourth Arabic type	369
6.1.6	The fifth Arabic type	379
6.1.7	The apprentice of Granjon: Jean Cavaillon	389
6.2	A 17th-century noteworthy improvement: the types of Savary de Brèves	397
7	IMITATIONS & THE TRADE OF TYPES: SUCCESSORS	413
7.1	New 16th–17th centuries Arabic types of some notable successors	413
7.1.1	Franciscus Raphelengius	415
7.1.2	Thomas Erpenius	425
7.1.3	<i>Sacra Congregatio de Propaganda Fide</i>	431
7.2	Other significant new Arabic types in Europe	445
7.2.1	Typographic ventures in Italy	445
7.2.2	Typographic ventures in England and Germany	455
7.2.3	Some considerations on the trade of Arabic foundry types	465
8	PRINTING ARABIC IN THE MIDDLE EAST IN THE 18TH CENTURY	469
8.1	Simply a matter of resistance?	469
8.2	Christians printing Arabic in 18th-century Syria and Lebanon: pioneers	481
8.2.1	The Byzantine Orthodox press of Athanasius Dabbās	481
8.2.2	The Catholic press of 'Abdallāh az-Zāhir	489
8.3	The first Ottoman-Muslim printing venture: a turning point	501
8.3.1	İbrahim Müteferrika	501
8.4	A new wave of 19th century missionary presses for the Middle East	525
8.4.1	The English CMS Press in Malta	525
8.4.2	The American ABCFM Press in Beirut	541
8.4.3	The Imprimerie Catholique in Beirut	565
8.5	The indigenous simplified Arabic types of Ibrāhīm al-Yāzīğī	569
9	TOWARDS ACCEPTANCE OF ARABIC TYPOGRAPHY IN THE MIDDLE EAST	571
9.1	The role of 18th–19th century Armenian printers in Istanbul	571
9.1.1	Poghos Arapian	573
9.1.2	Ohannes Mühendisyan	583
9.2	The first Muslim authorised typographic reproduction of the Qur'ān	603
9.2.1	The Egyptian Būlāq Press	603
9.2.2	The King Fu'ād Qur'ān	615
10	CONCLUSION	625
	Arabic glossary	639
	Arabic nomenclature	643
	Primary sources of images: list and location	649
	Bibliography	673
	Appendices	705

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Initial notes

This thesis is typeset in Brill, designed by John Hudson (assisted by Alice Savoie and Karsten Lücke), and DTP Naskh, designed by DecoType.

Notes on typographic conventions

This thesis generally follows the guidelines of the Chicago Manual of Style, 17th edition, with minor adaptations for British usage. Italic is used for key terms at their first occurrence, besides the conventional use in bibliographic references. Arabic names and terms are transliterated according to the conventions of the Deutsche Morgenländische Gesellschaft. Extracts of the Qur'an are translated according to the King Fahd Complex for the Printing of the Holy Qur'an (Madinah, K.S.A.).¹

Any formatting in quotations is preserved from the original and no specific formatting is applied. This includes particular spellings, italics and other elements that are maintained as in the source.

Arabic glossary and Arabic nomenclature

These two sections provide a summary of key Arabic terms used in the thesis and a selection of technical terms relating to the anatomy – and identifying features – of Arabic letterforms, which either derive from calligraphic practice or that are used in the type analysis. The terminology related to Islamic calligraphy and penmanship is drawn from the books of Iraqi master calligrapher Hāsim Muḥammad Al-Bağdadi² and Syrian master calligrapher Anwar 'Abdul Salam Al-Ḥalawani.³ Moreover, from the works of Adam Gacek,⁴ a specialist in Islamic studies and Uğur Derman, a specialist in Islamic calligraphy.⁵ Additional technical terms in relation to the Arabic letterforms are drawn by the author from contemporary Arabic design practice.

Illustrations and primary sources

Images are reproduced by courtesy of the libraries listed in the section 'Abbreviations'. Provenance and scale for each illustrations are provided in the accompanying caption. All images are by the author at the original scale of 100%, unless otherwise stated. The images purchased or downloaded by the author from the library in which the source is located, carry the abbreviation IPL or IDL (i.e. image purchased/ downloaded from library), in the following format:

Peter Kirsten, *Schema characterum Arabicorum*, Breslæ, 1609, ULB [De 520.2°]/IPL.

1. Taqī-ud-Dīn al-Hilālī, Dr. Muhammad and Dr. Muhammad Muhsin Khān, *Translation of the Meanings of The Noble Qur'an in the English Language* (Madinah, K.S.A.: King Fahd Complex for the Printing of the Holy Qur'an, n.d.).
2. Hāsim Muḥammad Al-Bağdadi (Qawa'id Al-ḥaṭ Al-'Arabi, Rules of Arabic Calligraphy) (Baghdad: Institute of Fine Art, 1961).
3. Anwar 'Abdul Salam Al-Ḥalawani, (معال خط الثلث: تاريخه، قواعده، أسراره) (Ma'alim ḥaṭ Al-Thuluth: Tariḥuh, Qawa'iduh, Asraruh, Guide to Thuluth Calligraphy: Its History, Guides and Secrets), 1st ed. (Aleppo: Dar Al-Qalam Al-'Arabi, 2007).
4. Adam Gacek, *Arabic Manuscripts: A Vademecum for Readers* (Leiden: Brill, 2012), 142, 318–39 and from the same author, *The Arabic Manuscript Tradition: A Glossary of Technical Terms and Bibliography – Supplement* (Leiden: Brill, 2012).
5. Uğur M. Derman, *The Sultan's Signature. Ottoman Calligraphy From the Sakıp Sabancı Museum* (Berlin: Deutsche Guggenheim, 2001) and from the same author, *Eternal Letters* (Sharjah, U.A.E.: Sharjah Museum of Islamic Civilization, 2009).

The provenance of the primary sources uses an abbreviation of the relevant library or other source followed by the location number.

The primary sources that are not included in the bibliography – and from which images are drawn – are listed in the section ‘Primary sources of images: list and location’. Other images drawn from published secondary sources are credited accordingly in the captions.

Throughout the thesis, when type examples are compared with manuscript examples, the image of the manuscript is always positioned on the left side of the pair.

Abbreviations

The abbreviations used in this study for the location of primary sources and for referencing Arabic types are provided in the section ‘Abbreviations’. The designations of the Arabic types to facilitate their identification are according to the most relevant name associated with each of them (e.g. the printer, printing office, type-maker, scholar, source).

Dates

The dates are given in the Islamic calendar, also known as *Hijrī* (H), and the Western solar year/Christian Gregorian calendar (A.D.). When a pair of dates is given (e.g. 584/1188–9), the *Hijrī* year is given first.

Scheme of Transliteration

Letter name	Transliteration	Isolated	Final	Medial	Initial
هَمْزَةٌ hamzah	'	'	'		
الْأَلِفُ alif	a	ا	ا		
بَاءٌ bā'	b	ب	ب	ب	ب
تَاءٌ tā'	t	ت	ت	ت	ت
ثَاءٌ tā'	ت	ث	ث	ث	ث
جَمْ جِمْ ḡim	ḡ	ج	ج	ج	ج
حَاءٌ hā'	h	ح	ح	ح	ح
حَاءٌ hā'	h̄	خ	خ	خ	خ
دَالِ dāl	d	د	د	د	د
ذَالِ dāl	d̄	ذ	ذ	ذ	ذ
رَاءٌ rā'	r	ر	ر	ر	ر
زَاءٌ zā'	z	ز	ز	ز	ز
سِينٌ sīn	s	س	س	س	س
شِينٌ šīn	š	ش	ش	ش	ش
صَادٌ šād	š̄	ص	ص	ص	ص
ضَادٌ dād	d̄	ض	ض	ض	ض
طَاءٌ tā'	ت	ط	ط	ط	ط
ظَاءٌ zā'	ز	ظ	ظ	ظ	ظ
عَينٌ 'ayn	'	ع	ع	ع	ع
غَينٌ ḡayn	ḡ	غ	غ	غ	غ
فَاءٌ fā'	f	ف	ف	ف	ف
قَافٌ qāf	q	ق	ق	ق	ق
كَافٌ kāf	k	ك	ك	ك	ك
لَامٌ lām	l	ل	ل	ل	ل
مَيمٌ mīm	m	م	م	م	م
نُونٌ nūn	n	ن	ن	ن	ن
هَاءٌ hā'	h	ه	ه	ه	ه
وَاوٌ wāw	w	و	و	و	و
يَاءٌ yā'	y	ي	ي	ي	ي

Abbreviations

Abbreviations of locations: libraries, archives and personal collections

ASFI	Archivio di Stato Firenze
ASV	Archivio Segreto Vaticano, Rome
AU	Ankara Üniversitesi
BAV	Biblioteca Apostolica Vaticana, Rome
BEM	Biblioteca Estense Modena
BL	British Library, London
BPBA	Būlāq Press Museum Bibliotheca Alexandrina, Cairo
BMF	Biblioteca Marucelliana Firenze
BML	Biblioteca Medicea Laurenziana, Florence
BMP	Bibliothèque Mazarine Paris
BNB	Biblioteca Nazionale Braidense, Milan
BNCF	Biblioteca Nazionale Centrale Firenze
BNCR	Biblioteca Nazionale Centrale Roma
BNF	Bibliothèque Nationale de France, Paris
BNM	Biblioteca Nazionale, Venice
BNN	Biblioteca Nazionale Napoli
BSB	Bayerische StaatsBibliothek, Munich
BV	Biblioteca Vallicelliana, Roma
CDP	Cabinet des Poinçons, Imprimerie Nationale, Douai
CUL	Cambridge University Library
DTP	DecoType
FGC	Fondazione Giorgio Cini, Venice
FR	Fiona Ross, private collection
FS	Fred Smeijers, private collection
HLHU	Houghton Library Harvard University
IRCICA	Research Center For Islamic History, Art and Culture, Istanbul
İBB	İBB Atatürk Kitaplığı, Istanbul
İÜK	İstanbul Üniversitesi Kutuphane (Istanbul University Library)
MSJK	Monastère St. Jean Khenchara, Lebanon
MTS	Monotype Archive Salfords
NLTC	Non-Latin Type Collection, University of Reading
OY	Onur Yazıcıgil, private collection
PMM	Plantin-Moretus Museum
SBL	St Bride Library, London
SFDV	San Francesco della Vigna, Venice
SYEK	Süleymaniye Yazma Eser Kütüphanesi Müdürlüğü, Istanbul
SOAS	School of Oriental and African Studies, London
SOL	Selly Oak Library, Birmingham (Cairo Koran)
SSM	Sabancı Üniversitesi Sakıp Sabancı Müzesi, Istanbul
SZB	Staatsbibliothek zu Berlin
TM	Thomas Milo, private collection
UE	Universität Erfurt (University and Research Library Erfurt/Gotha)
UL	Universiteit Leiden (Leiden University Library)
ULB	Universitäts- und Landesbibliothek Sachsen-Anhalt in Halle (Saale)/ Bibliothek der Deutschen Morgenländischen Gesellschaft
UORL	University of Reading Library
UVA	Universiteit van Amsterdam (Amsterdam University Library)

Abbreviations of Arabic types

AD1	Athanasius Dabbās 1
AD2	Athanasius Dabbās 2
AD3	Athanasius Dabbās 3
ADA	<i>Arabe d'Alde</i> [CDP]
AG	Antonio Giggei
AK1	‘Abdallāh az-Zāhir 1
AK2	‘Abdallāh az-Zāhir 2 [woodblock]
APBW1	American Press Beirut Watts 1
APBW2	American Press Beirut Watts 2
APBH1	American Press Beirut Hallock 1 – Schoolbook [American Arabic]
APBH2	American Press Beirut Hallock 2 – Common printing
APBH3	American Press Beirut Hallock 3 – Bible
APBH4	American Press Beirut Hallock 4 – Marginal references
APBH5	American Press Beirut Hallock 5 – 5th
APBH6	American Press Beirut Hallock 6 – 6th
APBH7	American Press Beirut Hallock 7 – Ornamental
APBH8	American Press Beirut Hallock 8 – Captions
APBH9	American Press Beirut Hallock 9 – Thouluth
APQ1	Alessandro Paganino Qur’ān 1
APQ2	Alessandro Paganino Qur’ān 2 [woodblock]
BP1	Būlāq Press 1
BP2	Būlāq Press 2
BP3	Būlāq Press 3
BP4	Būlāq Press 4
BPQ	Būlāq Press Qur’ān
BT	Berlin Typeface
CMSS1	Church Missionary Society Šidyāq 1
CMSS2	Church Missionary Society Šidyāq 2
CMSS3	Church Missionary Society Šidyāq 3
CMSS4	Church Missionary Society Šidyāq 4
CMSW1	Church Missionary Society Watts 1
CMSW2	Church Missionary Society Watts 2
EF	Edmund Fry
FR1	Franciscus Raphelengius 1
FR2	Franciscus Raphelengius 2
FT	Flügel/Tauchnitz
GBA1	Giambattista Bodoni – Arabo 1
GBA2	Giambattista Bodoni – Arabo 2
GBP1	Giambattista Bodoni – Persiano 1
GBP2	Giambattista Bodoni – Persiano 1
GDG1	Gregorio de Gregori 1
GDG2	Gregorio de Gregori 2 [woodblock]
GLB	Guillaume II Le Bé
IM	İbrahim Müteferrika
JC1	Jean Cavaillon 1
JC2	Jean Cavaillon 2
JC3	Jean Cavaillon 3
JC4	Jean Cavaillon 4
JC5	Jean Cavaillon 5
JC6	Jean Cavaillon 6
JC7	Jean Cavaillon 7
JH	John Hayes

JJ	Joseph Jackson
JS	John Selden
MW ₁	Martin-Wilkins 1
MW ₂	Martin-Wilkins 2
OM ₁	Ohannes Mühendisyan 1
OM ₂	Ohannes Mühendisyan 2
OM ₃	Ohannes Mühendisyan 3
OUP ₁	Oxford University Press 1
OUP ₂	Oxford University Press 2
OUP ₃	Oxford University Press 3-line nonpareil
OUPB	Oxford University Press Berthold 14 point
PA	Poghos Arapian
RG ₁	Robert Granjon 1
RG ₂	Robert Granjon 2
RG ₃	Robert Granjon 3 – <i>Arabe des Quatre Évangiles</i> [CDP]
RG ₄	Robert Granjon 4 – <i>Arabe d'Euclide</i> [CDP]
RG ₅	Robert Granjon 5 – <i>Arabe d'Avicenne</i> [CDP]
PDA	<i>Persan d'Alde</i> [CDP]
PK	Peter Kirsten
PPP	Pietro/Paolo Porro Psalter
SCPF ₁	Sacra Congregatio de Propaganda Fide – <i>Arabe de la Propagande</i> [CDP]
SCPF ₂	Sacra Congregatio de Propaganda Fide – <i>Arabe de la Collection</i> [CDP]
SDB ₁	Savary de Brèves 1 – <i>Gros Arabe</i> [CDP]
SDB ₂	Savary de Brèves 2 – <i>Moyen Arabe</i> [CDP]
SDB ₃	Savary de Brèves 3 – <i>Petite Arabe</i> [CDP]
SDB ₄	Savary de Brèves 4
TCR ₁	Tipografia Collegio Romano 1
TCR ₂	Tipografia Collegio Romano 2
TE ₁	Thomas Erpenius 1
TE ₂	Thomas Erpenius 2
TR	Thomas Roycroft
TSP	Tipografia del Seminario di Padova
WC	William Caslon

List of appendices

APPENDIX 1 – Title-page of the *Liber Tasriphi*, Romæ, 1608, included in the manuscript copied by Raimondi, BNCF [Magl.III.63]/IPL, f.130r.

APPENDIX 2 – *Kitāb Al-Taṣrīf Al-‘Izzī*, by ‘Izz al-Dīn ‘Abd al-Wahhāb al-Zanḡānī, copied by G.B. Raimondi, Rome, 1574, BML [Orientale 34b]/IPL, ff.65v–66r.

APPENDIX 3 – *Kitāb Al-Taṣrīf Al-‘Izzī*, by ‘Izz al-Dīn ‘Abd al-Wahhāb al-Zanḡānī, copied by Domenico Sirleto, Rome, 992/1584, BML [Orientale 96c]/IPL, ff.iv–2r.

APPENDIX 4 – ‘Arabe (corps 22). Méthode simplifiée pour imprimer l’arabe avec les points voyelles’, *Folders*, CDP.

APPENDIX 5 – ‘Arabe Nesky, 17 points (9+4+4) ou Arabe d’Avicenne simplifié par A. P. Pihan, en 1863’, *Folders*, CDP.

APPENDIX 6 – Comparative table of Arabic types showing different approaches for the ġīm letter group.

APPENDIX 7 – Tipografia del Collegio Romano (TCR1), 122 punches stamped 10 on shank, BML. Indicated as Arabe N4 in Charles Whitehouse’s work.

APPENDIX 8 – Tipografia del Collegio Romano (TCR2), 72 punches stamped 13 on shank, BML. Indicated as Arabe N6 in Charles Whitehouse’s work.

APPENDIX 9 – Printing proof of the *Evangelium* with added interlinear Latin version by hand (left) and of the *Avicenna* with manual notes and corrections (right), from *Impressa Partim Exarata Manus*, BML [Or.459]/IPL, ff.490r, 552r.

APPENDIX 10 – Granjon’s second Arabic type (RG2), 108 punches stamped 21 on shank (except 2 punches stamped 12, BML. Indicated as Arabe N.5 in Charles Whitehouse’s work.

APPENDIX 11 – ‘Glossary Coptic-Arabic, part of a codex containing fragments of Christian texts in various languages’, copied by G.B. Raimondi, Rome, XVI–XVII cent., BML [Orientale 461]/IPL, ff.16v–17r. Perhaps a preparatory work for the polyglot Bible, never accomplished.

APPENDIX 12 – *Ianua Linguae Persicæ*, copied by F.C. Amerino, Rome, 1614, BAV [Vat. pers.24]/IPL, ff.2r–3v.

APPENDIX 13 – ‘*Parua Rudimenta Linguae Persicæ Arabicè Primùm Ab Ignoto Auctore Explicata, Nouissimè À Joanne Baptista Raimundo Cremonense Latinè Interpretata*’, copied by G.B. Raimondi, XVII cent. BNM [Or. LIII (27)].

APPENDIX 14 – *Dictionarium Persianum Cum Latina Interpretatione*, copied by G.B. Raimondi, XVI cent., BNM [Or. LV (64)].

APPENDIX 15 – *Thaalebi Vel Physicæ Tractatus, Arabice, Cum Principio Latinæ Versionis Jo. Baptistae Raimundi. Cod. 6.*, copied by G.B. Raimondi, XVI cent. BNCF [Naz.II.I.6]/IPL.

APPENDIX 16 – Calligraphic extracts from Raimondi’s papers:

- ASFI [Misc.Med.720 (3) n.68, f.25v]/IPL
- ASFI [Misc.Med.720 (3) n.67, f.25r]/IPL
- ASFI [Misc.Med.720 (3) n.57, f.17v]/IPL
- ASFI [Misc.Med.720 (3) n.56, f.16r]/IPL
- ASFI [Misc.Med.720 (3) n.89, f.67v]/IPL
- ASFI [Misc.Med.720 (4) n.6–7, f.14v–15r]/IPL
- ASFI [Misc.Med.720 (3) n.74, n.75, f.28r]/IPL

APPENDIX 17 – Surviving labels of the Arabic types from the *Typographia Medicea*, BML.

APPENDIX 18 – ‘Conto della gittatura dell’Ara[bi]ca grande ad un corpo | et del stagno, et danari dati p[er] essa et giust[ificatu]ra | di madre fatta dopoi’, 1588–1590, ASFI [Misc.Med.717 (8), ff.78–84]/IPL.

APPENDIX 19 – ‘Ponsoni et madre dell’Arabica pic | colina incominciata à 6 di Settembre | 1586 et recevuti in piu partite, come | à 15 di Ottobre 1586’, 1586–1591, ASFI [Misc.Med.718 (2), ff.1–11]/IPL, reduced 30%. In the last page there is a rare example of Granjon’s signature.

APPENDIX 20 – ‘A 4 di Decembre 1587’, ASFI [Misc.Med.719 (12), ff.1–2]/IPL.

APPENDIX 21 – ‘Carattere Arabico grande fatto da Ms. | Giovanne Caviglioni francese et | In | cominciato à 20 di Marzo 1591’, 1591–1592, ASFI [Misc.Med.718 (13), ff.1–4]/IPL.

APPENDIX 22 – ‘Carattere Arabico mezano fatto da Ms. | Giovanne Caviglioni francese, et incomin | ciato à 16 di Settembre 1591’, 1591–1592, ASFI [Misc. Med.718 (14), ff.1–4]/IPL.

APPENDIX 23 – ‘Carattere Arabico commune | fatto da Mastro Giovanne Cavi | glione Francese, et incomincia | to alli 3 d’Ottobre 1592 sabbato’, 1592–1596, ASFI [Misc.Med.718 (17), ff.1–9]/IPL.

APPENDIX 24 – Some proofs of Medicean types, possibly attributable to Jean Cavaillon, ASFI [Misc.Med.720 (6), n.16 f.15v and n.17 f.16r]/IPL
 – ASFI [Misc.Med.720 (6), n.22 and n.23 f.25v]/IPL. Two more copies of this same proof are n.20 and n.21, f.25r.
 – ASFI [Misc.Med.720 (6), n.24 f.26r]/IPL
 – ASFI [Misc.Med.720 (6), n.6 f.11r]/IPL
 – ASFI [Misc.Med.720 (6), n.3 and n.4 f.10r]/IPL

APPENDIX 25 – Raimondi’s nastalīq handwriting, from *Frammenta Arabica*, BML [Or. 460, f.13v]/IPL.

APPENDIX 26 – Raimondi’s nastalīq handwriting, ASFI [Misc.Med.720 (3), n.4 and n.5 f.5r; n.6 f.5v]/IPL. The document n.6 is entitled ‘Madre della Persiana | frappata à caldo’: it refers to the matrices of the Persian type.

APPENDIX 27 – One of the large unidentified Arabics in the Medicean Collection, wrongly labelled outside the box as ‘Arabo Vangeli’ (RG3) in occasion of the exhibition *Le vie delle Lettere*, 2013, BML. Indicated as Arabe N.1 in Charles Whitehouse’s work, the case contains 121 punches stamped 28 on shank.

APPENDIX 28 – One of the large unidentified Arabics in the Medicean Collection, BML. Indicated as Arabe N.2 in Charles Whitehouse’s work, the case contains 86 punches stamped 26 on shank.

APPENDIX 29 – One of the two unidentified Persian types in the Medicean Collection, BML. Indicated as Arabe-Persian N.2 in Charles Whitehouse’s work, the case contains 212 punches, 210 stamped 22 on shank and 2 without number but same shape.

APPENDIX 30 – ‘Refusi e caratteri diversi trovati al termine del lavoro’, *Typographie Orientale Des Médicis*, I, CDP, actual scale. Some extracts of pages showing two sizes of nastalīq persian printed characters.

APPENDIX 31 – ‘Persan d’Alde’, *Typographie Orientale Des Médicis*, II, CDP, actual scale. Some extracts of pages showing the large nastalīq persian characters.

APPENDIX 32 – ‘Arabe des Quatre Évangiles 30 points. Casse en quatre parties’, *Modèles De Casses*, 1885, CDP.

APPENDIX 33 – ‘Arabe des Quatre Évangiles’, 30 points, punches, CDP.

APPENDIX 34 – ‘Arabe des Quatre Évangiles’, matrices (1 of 3), CDP.

APPENDIX 35 – ‘Arabe de l’ Évangile’, *Typographie Orientale Des Médicis*, I, CDP.

APPENDIX 36 – ‘Arabe de l’Evangile sur seize points, Florence’, *Recueil Des Empreintes*, XI, 1828, CDP.

APPENDIX 37 – ‘Arabe de l’Evangile sur 16 points (Florence)’, *Caractères Etrangers. Cahiers D’empreintes Des Poinçons À Reformer*, CDP.

APPENDIX 38 – ‘Arabe de l’Evangile sur 16 points’, *Caractères Etrangers. Cahiers D’empreintes Des Matrices À Reformer*, CDP.

APPENDIX 39 – Edict of Sultan Murad III, from *Kitāb Taḥrīr Usūl Li-Ūqlīdis*, Roma, ex *Typographia Medicea*, 1594, BMF [1.L.IV.11].

APPENDIX 40 – ‘Arabe d’Euclide 22 points. Casse en quatre parties’, *Modèles De Casses*, 1885, CDP.

APPENDIX 41 – ‘Arabe d’Euclide’, 22 points, punches, CDP.

APPENDIX 42 – ‘Arabe d’Euclide’, matrices (1 of 4), CDP.

APPENDIX 43 – ‘Arabo soprolineato’ part of Granjon’s fourth Arabic type (RG4), 73 punches stamped 29 on shank, BML. Indicated as Arabe N.10 in Charles Whitehouse’s work.

APPENDIX 44 – ‘Alphabet Arabe du caractère d’Euclide’, in ‘Arabe Nesky, corps 22 (10+6+6) ou Arabe d’Euclide’, *Folders*, CDP.

APPENDIX 45 – ‘Table Des Ligatures de l’Arabe d’Euclide’, in ‘Arabe Nesky, corps 22 (10+6+6) ou Arabe d’Euclide’, *Folders*, CDP.

APPENDIX 46 – ‘Arabe d’Euclide’, *Typographie Orientale Des Médicis*, I, CDP.

APPENDIX 47 – ‘Arabe de l’Euclide sur douze points, Florence’, *Recueil Des Empreintes*, XI, 1828, CDP.

APPENDIX 48 – ‘Arabe d’Euclide sur 12 points (Florence)’, *Caractères Etrangers. Cahiers D’empreintes Des Poinçons À Reformer*, CDP.

APPENDIX 49 – ‘Arabe d’Avicenne 17 points. Casse en quatre parties’, *Modèles De Casses*, 1885.

APPENDIX 50 – ‘Arabe d’Avicenne 12 et 17 points’, *Modèles De Casses*, 1885, CDP.

APPENDIX 51 – ‘Arabe d’Avicenne 17 points. Sortes Supplémentaires’, *Modèles De Casses*, 1885, CDP.

APPENDIX 52 – ‘Arabe d’Avicenne’, 17 points, punches, CDP.

APPENDIX 53 – ‘Arabe d’Avicenne’, matrices (1 of 1), CDP.

APPENDIX 54 – ‘Alphabet du caractère d’Avicenne, pour l’Arabe, le Turk et le Persan’, in ‘Arabe Nesky, corps 17 (7+5+5) ou Arabe d’Avicenne’, *Folders*, CDP.

APPENDIX 55 – ‘Table Des Ligatures de l’Arabe d’Avicenne’, in ‘Arabe Nesky, corps 17 (7+5+5) ou Arabe d’Avicenne’, *Folders*, CDP.

APPENDIX 56 – ‘Arabe d’Avicenne’, *Typographie Orientale Des Médicis*, I, CDP.

APPENDIX 57 – ‘Arabe d’Avicenne sur dix points, Florence’, *Recueil Des Empreintes*, XI, 1828, CDP.

APPENDIX 58 – ‘Arabe d’Alde’, punches, CDP.

APPENDIX 59 – ‘Arabe d’Alde’, matrices (1 of 3), CDP.

APPENDIX 60

– ‘Gros Arabe’ in Joseph de Guignes, *Inventaire De La Typographie Orientale De L’imprimerie Royale Et Y Éxistante Au Premier Janvier 1787*, BNF [RES G-Q-180 (1)].

– ‘Table alphabétique des Lettres simples du Gros Arabe’ in Joseph de Guignes, *Inventaire De La Typographie Orientale De L’imprimerie Royale Et Y Éxistante Au Premier Janvier 1787*, BNF [RES G-Q-180 (2)].

APPENDIX 61

– ‘Moyen Arabe’ in Joseph de Guignes, *Inventaire De La Typographie Orientale De L’imprimerie Royale Et Y Éxistante Au Premier Janvier 1787*, BNF [RES G-Q-180 (1)].

– ‘Table alphabétique des Lettres simples du Moyen Arabe’ in Joseph de Guignes, *Inventaire De La Typographie Orientale De L’imprimerie Royale Et Y Éxistante Au Premier Janvier 1787*, BNF [RES G-Q-180 (2)].

APPENDIX 62

– ‘Petit Arabe’ in Joseph de Guignes, *Inventaire De La Typographie Orientale De L’imprimerie Royale Et Y Éxistante Au Premier Janvier 1787*, BNF [RES G-Q-180 (1)].

– ‘Table alphabétique des Lettres simples du Petit Arabe’ in Joseph de Guignes, *Inventaire De La Typographie Orientale De L’imprimerie Royale Et Y Éxistante Au Premier Janvier 1787*, BNF [RES G-Q-180 (2)].

APPENDIX 63 – ‘Gros Arabe 64 points. Casse en Six Parties. Première et Deuxième Parties’, *Modèles De Casses*, 1885, CDP.

– ‘Gros Arabe 64 points. Casse en Six Parties. Troisième Partie’, *Modèles De Casses*, 1885, CDP.

– ‘Gros Arabe 64 points. Casse en Six Parties. Quatrième Partie’, *Modèles De Casses*, 1885, CDP.

– ‘Gros Arabe 64 points. Casse en Six Parties. Cinquième Partie’, *Modèles De Casses*, 1885, CDP.

– ‘Gros Arabe 64 points. Casse en Six Parties. Sixième Partie’, *Modèles De Casses*, 1885, CDP.

APPENDIX 64 – ‘Gros Arabe’, 64 points, 254 steel punches, CDP.

APPENDIX 65 – ‘Gros Arabe’, matrices (1 of 4), CDP.

APPENDIX 66 – Printing proof sheet, 1819, in ‘Arabe Nesky, corps 64 (20+4 fois 11) ou Gros Arabe. Gravé par le soins et aux frais de Savary de Brèves, ambassadeur à Constantinople de 1591 à 1605), et à Rome, de 1608 à 1614’, *Folders*, CDP.

APPENDIX 67 – Printing proof sheet in ‘Arabe Nesky, corps 64 (20+4 fois 11) ou Gros Arabe. Gravé par le soins et aux frais de Savary de Brèves, ambassadeur à Constantinople de 1591 à 1605), et à Rome, de 1608 à 1614’, *Folders*, CDP.

APPENDIX 68

– ‘Arabe Moyen 29 points. Casse en Six Parties. Première Partie’, *Modèles De Casses*, 1885, CDP.

– ‘Arabe Moyen 29 points. Casse en Six Parties. Deuxième Partie’, *Modèles De Casses*, 1885, CDP.

– ‘Arabe Moyen 29 points. Casse en Six Parties. Troisième Partie’, *Modèles De Casses*, 1885, CDP.

– ‘Arabe Moyen 29 points. Casse en Six Parties. Quatrième Partie’, *Modèles De Casses*, 1885, CDP.

– ‘Arabe Moyen 29 points. Casse en Six Parties. Cinquième et Sixième Parties’, *Modèles De Casses*, 1885, CDP.

APPENDIX 69 – ‘Arabe Moyen’, 29 points, 487 steel punches CDP.

APPENDIX 70 – ‘Arabe Moyen’, matrices (1 of 3), CDP.

APPENDIX 71 – Printing proof sheet, 1819, in ‘Arabe Nesky, corps 29 (9+10+10) ou Arabe Moyen. Gravé par le soins et aux frais de Savary de Brèves, ambassadeur à Constantinople (1591–1605) et à Rome (1608 – 1614). Acheté pour ordre de Louis XIII en 1632’, *Folders*, CDP.

APPENDIX 72 – Printing proof sheet of the Atelier Oriental, 23 Mai 1877, in ‘Arabe Nesky, corps 29 (9+10+10) ou Arabe Moyen. Gravé par le soins et aux frais de Savary de Brèves, ambassadeur à Constantinople (1591–1605) et à Rome (1608 – 1614). Acheté pour ordre de Louis XIII en 1632’, *Folders*, CDP.

APPENDIX 73 – ‘Arabe sur 8 points (Savary de Brèves)’, *Caractères Etrangers. Cahiers D’empreintes Des Poinçons À Reformer*, CDP.

APPENDIX 74 – Peter Kirsten, *Tria Specimina Characterum Arabicorum*, Breslæ, 1608, SOAS [ED60.7/11755/2].

APPENDIX 75 – Franciscus Raphelengius, Leiden 1595, ‘open letter’, from Alastair Hamilton, *Arab Culture and Ottoman Magnificence in Antwerp’s Golden Age* (London: The Arcadian Library, 2001).

APPENDIX 76 – Joseph Justus Scaliger, *Opus De Emandatione Temporum*, Lugduni Batavorum, 1598, UL [420 B 1].

APPENDIX 77 – Franciscus Raphelengius, *Lexicon Arabicum*, Leidæ, 1613, BL [622.l.5. or V 4217].

APPENDIX 78 – Thomas Erpenius, *Grammatica Arabica*, Leidæ, 1613, SOAS [EB61.27/11052].

APPENDIX 79 – Thomas Erpenius, *Proverbiorum Arabicorum*, Leidæ, 1614, UL [842 C 26].

APPENDIX 80 – Unknown author, manuscript on parchment, 57 ff., maǵribi script, two hands. Provenance: Collection Franciscus Raphelengius, UL [Or. 251]. Used as model for FR2, contains the smoke-proofs.

APPENDIX 81 – Unknown author, manuscript on parchment, 40 ff., fully vocalized maǵribi script, one copyist. Provenance: Collection Franciscus Raphelengius, UL [Or. 228].

APPENDIX 82 – Unknown author, manuscript on parchment, 146 ff., ca. 1175A.D., probably copied in Toledo. Provenance: acquired by Guillaume Postel in 1532, used by Raphelengius, UL [Or. 231].

APPENDIX 83 – Sacra Congregatio de Propaganda Fide, *Alphabeta Varia Typographiae Sacrae Congregations De Propaganda Fide*, Romæ, ca. 1776, HLHU [TypTS 525 95.749]/IPL.

APPENDIX 84 – Sacra Congregatio de Propaganda Fide, *Specimen Characterum Typographei S. Concilii Christiano Nominis Propagando [...]*, Romæ, 1843, BL [Digital Store 819.m.12].

APPENDIX 85 – ‘Arabe de la Propagande 13 points. Casse en quatre parties. Les sortes supplémentaires sont placées dans la casse du caractère Bouguis’, *Modèles De Casses*, 1885, CDP.

APPENDIX 86 – ‘Arabe de la Propagande’, 13 points, 256 steel punches, CDP

APPENDIX 87 – ‘Arabe de la Propagande’, matrices (1 of 3), CDP.

APPENDIX 88 – ‘Arabe sur 6 points’, *Caractères Etrangers. Cahiers D’empreintes Des Poinçons À Reformer*, CDP.

APPENDIX 89 – Printing proof sheet, 1819, in ‘Arabe Nesky, Corps 13 (6+3½+3½) ou Arabe de la Propagande’, *Folders*, CDP.

APPENDIX 90 – Printing proof sheet, 1878, in ‘Arabe Nesky, Corps 13 (6+3½+3½) ou Arabe de la Propagande’, *Folders*, CDP.

APPENDIX 91 – A. I. Silvestre de Sacy, *Grammaire Arabe*, Sacy, Paris, 1810, SOAS [CWML D.7/10].

APPENDIX 92 – ‘Arabe de la Collection 24 points. Casse en quatre parties’, *Modèles De Casses*, 1885, CDP.

APPENDIX 93 – ‘Arabe de la Collection’, 24 points, 343 steel punches, CDP.

APPENDIX 94 – ‘Arabe de la Collection’, matrices (1 of 5), CDP.

APPENDIX 95 – Printing proof sheet, 1819, in ‘Arabe Nesky, Corps 24 (12+6+6) ou Arabe de la Collection Orientale’, *Folders*, CDP.

APPENDIX 96 – Printing proof sheet, 1878, in ‘Arabe Nesky, Corps 24 (12+6+6) ou Arabe de la Collection Orientale’, *Folders*, CDP.

APPENDIX 97 – ‘Arabo della Propaganda’ in *Catalogo Dei Punzoni E Delle Matrici Orientali E Latini Esistenti Nella Tipografia Poliglotta Vaticana*, Rome, 1919. Copy: SBL [43120].

APPENDIX 98 – ‘Arabo della Biblioteca Vaticana’ in *Catalogo Dei Punzoni E Delle Matrici Orientali E Latini Esistenti Nella Tipografia Poliglotta Vaticana*, Rome, 1919. Copy: SBL [43120].

APPENDIX 99 – Table of SDB4, adapted from Stefano Paolini, *Institutiones Linguæ Arabicæ*, Romæ, 1624, by Petrus Metoscita, BL [236.C.27.].

APPENDIX 100 – Stefano Paolini, *Totum Arabicum Alphabetum*, by Vittorio Scialac, Romæ, MDCXXIII (1624), BMP [8° 20334-12 [Res]].

APPENDIX 101 – Giambattista Bodoni, *Pel Solenne Battesimo Di S. A. R. Ludovico Principe Primogenito Di Parma [...] Iscrizioni Esotiche, A Caratteri Novellamente Incisi E Fusi*, Parma, 1774, BL [Digital Store J/10631.h.30]/IPL.

APPENDIX 102 – Giambattista Bodoni, *Epithalamia Exoticis Linguis Reddita*, Parmæ, MDCCLXXV (1775), BL [37/826.l.18.].

APPENDIX 103 – The JJ1 Arabic type in John Richardson, *A Dictionary, Persian, Arabic, and English* [...], Oxford, MDCCLXXVII (1777), BL [X 131].

APPENDIX 104 – ‘Arabic to Dto.’, Oxford University Press. Adapted from Hart, *Notes on a Century of Typography at the University Press*.

APPENDIX 105 – *List of Remaining OUP Type*, St Bride Library, London.

APPENDIX 106 – ‘A supplement to the Arabick Alphabet, to print any thing in the Persian, Turkish, and Malayan Languages’, Oxford University Press’ *Specimen*, 1693. Adapted from Hart, *Notes on a Century of Typography at the University Press*.

APPENDIX 107 – Oxford University Press’ Arabic type ‘Berthold 14 point’ (OUPB), NLTC:

- a packet of ‘stock’ consisting of rarer characters and a packet of diss undistributed
- a packet of diss undistributed and its printed image.

APPENDIX 108 – Oxford University Press’ Arabic type ‘3-line nonpareil’ (OUP3), one page of diss, NLTC.

APPENDIX 109 – The WC1 type used in Erpenius’ *Elementa Linguæ Arabicæ*, Londini, MDCCXXX (1730), SOAS [EB77.83/11551].

APPENDIX 110 – Cambridge University Press, *Oriental Founts Available for Book Composition at the University Press, Cambridge, England*, 1933, UORL [FOLIO--655.24-CAM]

APPENDIX 111 – From left: the FT Arabic type in *Catalogue Des Caractères Non-Latins Employées À L'imprimerie E.J. Brill*, Leide, 1883, UL [HOTZ 270]; *Catalogue Des Caractères Étrangers De L'imprimerie E.J. Brill*. Leyde: Brill, 1931, UL [785 B 31] and *Catalogue Des Caractères Étrangers De L'imprimerie E.J. Brill*: [1683-1938]. Leiden: Brill, 1938, UL [Z250 B85 1938]. The same type is used to set different languages.

APPENDIX 112 – The FT Arabic type in *Proeven Van Oostersche Schriften Der Lettergieterij “Amsterdam” Voorheen N. Tetterode*, 1910, TM. Available for Arabic, Malay, Turkish and Persian languages.

APPENDIX 113 – The Arabic type of Richard Watt (also used by Enschedé) in *Proeven Van Oostersche Schriften Der Lettergieterij “Amsterdam” Voorheen N. Tetterode*, 1910, TM. Available for Arabic, Malay, Turkish and Persian languages.

APPENDIX 114 – Two pages of the *Kitāb Az-Zabūr Ash-Sharīf* [...] *Wayatlūh Ashar Tasābih* (Psalter), Aleppo, 1706, CUL [7828.c.5], using the AD1 type for the text.

APPENDIX 115 – Two pages of the *Paracleticum Secundum Ritum Melchitarum*, Alep, 1711, BAV [Liturgia.B.Folio.16.cons.], using the AD2 and AD3 types for the text.

APPENDIX 116 – A page of the *Horologion*, printed in Snagov (Bucharest) in 1702. From Ioana Feodorov, ‘Beginnings of Arabic Printing in Ottoman Syria (1706-1711).’

APPENDIX 117 – Two printed editions of the Khenchara Press: the *Kitāb Muršed Al Masiḥy* (‘Livre du Guide du Chrétien’), 1738 and *Kitāb Al Liturğya* (‘Liturgicon’), 1880. Both from MSJK.

APPENDIX 118 – *Kitāb An Nabū’ Āt Al Kanasi* (‘Livre des Prophéties’), aš-Šuwayr, 1883, 3rd edition, MSJK.

APPENDIX 119 – Some of the surviving engraved wooden and metal blocks of the larger Arabic characters, MSJK.

APPENDIX 120 – Arabic characters for titles in a different style, on thin plates attached to wooden blocks, MSJK.

APPENDIX 121 – Surviving punches of the Khenchara Press, MSJK.

APPENDIX 122 – Surviving matrices of the Khenchara Press, MSJK.

APPENDIX 123 – Surviving cast letters of the AK type disposed on wooden composing tools, MSJK.

APPENDIX 124 – Letterpress plates mounted on wooden blocks, used to print the *Kitāb Tafsīr Sab’at Mazmūrāt At Tawbat* (‘Livre du Commentaire des sept Psaumes du Prophète David’, entitled ‘Psaumes de la Pénitence’), 1753, MSJK.

APPENDIX 125 – İbrahim Müteferrika b. Abdullah el-Müthedi, *Usulü'l Hikem Fi Nizamü'l Ümem*, Istanbul, Sha'bān 1144/February 1732, SK [Haci Mahmud Efendi 4937]/IPL.

APPENDIX 126 – İbrahim Müteferrika b. Abdullah el-Müthedi, *Usulü'l Hikem Fi Nizamü'l Ümem*, Istanbul, 1143/1730–1, SK [Hüsrev Paşa 292]/IPL.

APPENDIX 127 – İbrahim Müteferrika, *Risale-i İslamiye*, Istanbul 1710, SK [Esad Efendi 1187]/IPL.

APPENDIX 128 – İbrahim Müteferrika, *Grammaire Turque*, Istanbul, 1730, by Jean-Baptiste Holderman, BNM [Or. 175 (=56)].

APPENDIX 129 – Title-page and internal page showing the two sizes of Arabic types supplied by Watts in used at the ABCFM Press. From *Kitāb Faṣl Al-Khitāb Fī Uṣūl Lughat Al-Ārāb*, Beirut, 1836, by Nāṣif al-Yāzīgī, CUL [Moh.315.d.15].

APPENDIX 130 – Title-page and internal pages of the CMS Press' *Kitāb Baḥth Al-Maṭālib Fī Ilm Al-Ārābīyah*, Malta, 1836, by Jibra'il Farḥāt al-Ḥalabī al-Mārūnī, BL [306.47.C.3], showing larger characters, especially engraved or lithographed.

APPENDIX 131 – Homan Hallock's pantograph. From Hallock, *The New Arabic Type*.

APPENDIX 132 – First page of the ABCFM Press' *Amtāl Sulaimān Al-Hakūm Ibn-Dā'ūd*, Beirut, 1842, ULB [Ib 1165].

APPENDIX 133 – Reconstruction of a wood type for the insertion of diacritic dots by mean of grooves from Roman Scherer, Lucern, c. 1930, fr. The complete set is in the personal collection of Prof Rudolf Barmettler of Zurich University of the Arts (ZHDK). Diagram by the author.

APPENDIX 134 – Samples of wooden letters used at the Bülāq Press in 1820, showing grooves for the insertion of diacritic dots, BPBA, scale unknown. Photographs by Gerry Leonidas.

APPENDIX 135 – From left: the 'American Arabic' type in *Catalogue Des Caractères Non-Latins Employées À L'imprimerie E.J. Brill*, Leide, 1883, UL [HOTZ 270]; *Catalogue Des Caractères Étrangers De L'imprimerie E.J. Brill*. Leyde: Brill, 1931, UL [785 B 31] and *Catalogue Des Caractères Étrangers De L'imprimerie E.J. Brill*: [1683-1938]. Leiden: Brill, 1938, UL [Z250 B85 1938]. The same type is used to set different languages.

APPENDIX 136 – *Al-Kitāb Al-Muqaddas*, Beirut, 1864–5, translated by Eli Smith and Cornelius Van Dyck, BL [14500.e.5.].

APPENDIX 137 – *Specimen Des Caractères Fondus À L'imprimerie Catholique Des Missionnaires De La Compagnie De Jésus À Beyrouth*, Beirut, c. 1877, BL [11899.g.6.(3.)].

APPENDIX 138 – Calligraphic album in nash and ṭuluṭ of 'Deli' Seyyid Osman Efendi, *Murakka*, end of 18th century, SSM [120-0218]/IPL. Size of original 25,6 × 18,1 cm.

APPENDIX 139 – Small nash of 'Deli' Seyyid Osman Efendi, *Kasîde-i-Bürde*, end of 18th century, SSM [190-0329]/IPL. Size of original 14 × 9,9 cm.

APPENDIX 140 – First two pages from Ohannes Mühendisyan's album, Istanbul, 1305/1888, İÜK [M 090025]/IPL, showing his 18pt and 24 pt nasta'līq types.

APPENDIX 141 – Third, fourth and fifth page from Ohannes Mühendisyan's album Istanbul, 1305/1888, İÜK [M 090025]/IPL, showing his 24pt, 16pt and 6pt nash types.

APPENDIX 142 – The sixth (and last) page from Ohannes Mühendisyan's album, Istanbul, 1305/1888, İÜK [M 090025]/IPL, showing his vocalised Arabic in 24pt and 16pt nash types.

APPENDIX 143 – The two pages from Ohannes Mühendisyan's album, İBB [Bel_Osm_0.2645]/IDL, showing different samples of his 18pt and 24 pt nasta'līq types.

APPENDIX 144 – Earliest identified number of the *Takvim-i Vekayi* using Mühendisyan's 16pt Arabic nash type. Printed in Istanbul in 1307/1889, AU [Gazeteler Veritabani]/IDL.

APPENDIX 145 – The first known ruq‘ah typeface, from *Esfatı Bahriye-i Osmaniye*, Istanbul, 1306/1888, by Mehmet Şükrü, TM.

APPENDIX 146 – ‘Turkisch-Arabischer Kasten’, *Arabisch-Turkisch Und Andere Islamitische Sprachen. Geschnitten Und Herausgegeben Von Der Schriftgiesserei Und Messinglinien-Fabrik D. Stempel-Aktienges*, Frankfurt am Main, Leipzig, Vien, Budapest, 1922, NLTC.

APPENDIX 147 – Handwritten chart of Arabic characters showing the the ġīm letter group with the connecting stroke starting under the head of the characters. From Hans Jürg Hunziker, ‘Aspekte Der Arabischen Schriftreform’, *Typographische Monatsblätter*, no. 4 (1985).

APPENDIX 148 – Tables and internal pages of the Arabic characters imported from Istanbul by the Imprimerie Catholique, showing a mixture of the cascading and linear methods. From *Grammaire Arabe*, Beyrouth, 1891–2, CUL [Aa.10.105] (left) and *Course Pratique De Langue Arabe*, Beyrouth, 1902, CUL [Moh.315.c.115].

APPENDIX 149 – Edward William Lane, *An Arabic-English Lexicon*, London: Williams and Norgate, 1863, BL [ORB.40/762].

APPENDIX 150 – Case-lay of the BPQ type. ‘Chart of non-vocalised Arabic typesetting case’, MTS [Correspondance folder Arabic (Egyptian 2)].

APPENDIX 151 – Extracts of the non-vocalised case-lay of the the BPQ type and the corresponding pictures of the arranged metal sorts.

1 INTRODUCTION

1.1 Is Arabic typographic history relevant?

Arabic is the second most widely used script in the world, yet its typographic history is a relatively uncharted territory. The earliest Arabic printing with movable type post-dates the Latin by 60 years. This time frame may be considered less significant taking into account that both scripts used a technology already 'developed and practiced at least two if not four centuries earlier in China.'¹ However, the delay becomes more significant when we consider the body of literature on the type-making process as a whole for each script.² Academic research is contributing to fill the gap with some notable efforts in recent years, producing an increasing number of studies focused on the history of Arabic type³ and typography. Although 'reliable published sources are sparse and primary research about Arabic typographic history is wanting',⁴ the renewed interest in the field is an encouraging sign.

It may be timely to remember that studies on the history of printing and typography do not follow the same approach but have been 'developed for particular purposes', as remarked by Robin Kinross, typographer and editor. In his *Modern Typography*, Kinross distinguished the following leading strands: printing history, with a developed tendency to focus on machinery of the trade; bibliographical history, as the study of printed texts and their transmission; cultural history, where printing is a key factor in historical change; and history of typography, concentrated on printed products and their design, including the history of typefaces.⁵

With regard to Arabic printing, previous studies – mainly produced by historians, linguists and bibliographers – have focused on the historical aspects and cultural significance following its introduction, offering primarily bibliographical information on Arabic typography. Following a descriptive narrative, some of these works present surveys on Arabic printing, in catalogue form: widely known sources of this kind are for instance Schnurrer's *Bibliotheca Arabica*,⁶ Fück's *Die Arabischen Studien*

1. Graham Shaw, 'Non-Latin Scripts and Printing Technologies: Triumphs and Tribulations', in *Non-Latin Scripts: From Metal to Digital Type* (London: St Bride Library, 2012), 20. He reports that the first movable types were made in China, first in clay (1041–1048) and later in wood (1290–1301); and that 'there is ample evidence [...] that movable metal types had been perfected in Korea' in the thirteenth century.
2. The same applies for literature on the process of design and production of types, but also the background of the type-makers and other elements influencing their work.
3. The term type is used in this thesis to refer to the pieces of metal bearing the typeface (i.e. the letterforms). The term typeface is used to refer to the design (i.e. a set of character shapes that share common designs characteristics), the image of the type. The term fount (used in the British spelling, not the American spelling of 'font') is used to refer to a particular casting size. The term font is only used for digitally produced typefaces.
4. Titus Nemeth, 'Arabic Type-Making in the Machine Age: The Influence of Technology on the Form of Arabic Type, 1908–1993', (PhD thesis, University of Reading, 2013), 21. This thesis refers to the PhD version of this work, although it has also been published recently: Titus Nemeth, *Arabic Type-Making in the Machine Age. The Influence of Technology on the Form of Arabic Type, 1908–1993* (Leiden: Brill, 2017).
5. Typographic history is additionally described as the vaguest and the least substantial category. See Robin Kinross, *Modern Typography: An Essay in Critical History*, 2nd ed. (London: Hyphen press, 2004), 16–17.
6. Christian F. Schnurrer, *Bibliotheca Arabica* (Halle, 1811).

*in Europa;*⁷ Krek's *Typographia Arabica*;⁸ de Nave's *Philologia Arabica*,⁹ Smitskamp's *Philologia Orientalis*¹⁰ and Gdoura's 'L'édition Arabe En Europe'.¹¹ Other important works that contributed to investigating the establishment of printing presses and typefoundries in the Middle East¹² and opened to wider and more thematic discussions are Balagna's *L'Imprimerie Arabe En Occident*,¹³ Aboussouan's *Le Livre Et Le Liban*,¹⁴ Nasrallah's *L'Imprimerie Au Liban*,¹⁵ Gdoura's *Le Début De L'imprimerie Arabe À Istanbul Et En Syrie*,¹⁶ and of more recent publication – are collections of scholarly papers like *The Book in the Islamic World*,¹⁷ *Middle Eastern Languages and the Print Revolution*,¹⁸ and *Historical Aspects of Printing and Publishing in Languages of the Middle East*,¹⁹ to name just a few. Also worthy of mention are publications that focus on particular countries, thus providing more specific information: two recent representatives of these works are *Arabic studies in the Netherlands*²⁰ and *Printing Arab Modernity*.²¹

The shared feature of this list of studies is that their narrative focuses on the evolution of the Arabic printed book over that of the Arabic typefaces, which are at times only briefly addressed.²² While providing an invaluable source of the much broader

7. Johann Fück, *Die Arabischen Studien in Europa Bis in Den Anfang Des 20. Jahrhunderts* (Leipzig: Otto Harrassowitz, 1955).
8. Miroslav Krek, *Typographia Arabica: The Development of Arabic Printing as Illustrated by Arabic Type Specimens* (Waltham: Brandeis University Library, 1971). From the same author see also: *Sixty Typefoundries, Type Cutters, Printers and Their Arabic Type* (Cairo, 1984).
9. Francine De Nave, ed., *Philologia Arabica. Arabische Studien En Drukken in De Nederlanden in De 16e En 17e Eeuw* (Antwerpen: Museum Plantin-Moretus, 1986)
10. Rijk Smitskamp, *Philologia Orientalis: A Description of Books Illustrating the Study and Printing of Oriental Languages in 16th and 17th Century Europe* (Leiden: E.J. Brill, 1992).
11. Wahid Gdoura, 'L'édition Arabe En Europe Aux XVI Et XVII Siecles', (Memoire, n.p.: École Nationale Supérieure de Bibliothécaires, 1980).
12. The term Middle East is preferred in this thesis to designate the territory under consideration predominantly because it includes Turkey; it should be noted that for practical reasons the island of Malta is also included under this geographic denomination. The term Arab world is occasionally used to refer to the Arabic-speaking countries, whereas the term Islamic world (or Muslim world) refers to the community of people that adhere to the religion of Islam across the world, regardless of geographic boundaries.
13. Josée Balagna, *L'Imprimerie Arabe En Occident: XVIe, XVIIe Et XVIIIe Siècles* (Paris: Editions Maisonneuve & Larose, 1984).
14. Camille Aboussouan, ed., *Le Livre Et Le Liban Jusqu'à 1900: Exposition* (Paris: Unesco, 1982).
15. Joseph P. Nasrallah, *L'Imprimerie Au Liban* (Beyrouth: Harissa, 1949).
16. Wahid Gdoura, *Le Début De L'imprimerie Arabe À Istanbul Et En Syrie: Évolution De L'environnement Culturel, 1706-1787* (Tunis: Institut supérieur de documentation, 1985).
17. George N. Atiyeh, ed., *The Book in the Islamic World: The Written Word and Communication in the Middle East* (Albany: State University of New York Press, 1995).
18. Eva-Maria Hanebutt-Benz, Dagmar Glass, and Geoffrey Roper, eds., *Middle Eastern Languages and the Print Revolution: A Cross-Cultural Encounter; A Catalogue and Companion to the Exhibition* (Westhofen: WVA-Verlag Skulima, 2002).
19. Geoffrey Roper, ed., *Historical Aspects of Printing and Publishing in Languages of the Middle East: Papers from the Third Symposium on the History of Printing and Publishing in the Languages and Countries of the Middle East, University of Leipzig, September 2008* (Leiden: Brill, 2014).
20. Arnoud Vrolijk and Richard van Leeuwen, *Arabic Studies in the Netherlands: A Short History in Portraits, 1580-1950* (Netherlands: Brill, 2013).
21. Hala Auji, *Printing Arab Modernity: Book Culture and the American Press in Nineteenth-Century Beirut* (Leiden: Brill, 2016).
22. The following works represent some exceptions, attempting a more detailed description of Arabic types and their making: John A. Lane, R. Breugelmans, and Jan Just Witkam, *The Arabic Type Specimen of Franciscus Raphelengius's Plantinian Printing Office* (Leiden: The University Library, 1997);

subject, these works lack a focus on the critical assessment and a qualitative appraisal of the Arabic types through an insightful analysis, for which the perspective of a practitioner is desirable: this study attempts to fill this gap in knowledge. Yasin Safadi²³ suggests that more concentrated information is 'available in the histories and records of individual firms of printers, and in the biographies and autobiographies of the pioneers in this field and of the founders of publishing houses and major booksellers'.²⁴ Nonetheless, the details that these sources provide about the design and production processes of Arabic types and their development are rather limited and incomplete, if given in the first place.²⁵

The production of typographic history by practising typographers (and type designers) is not immune from faults. As Kinross points out, it carries the mixed benefit of being connected with practice: in this regard, he laments mainly the lack of thorough and sound archive-based research, and of a critical effort that ventures beyond the 'aesthetic factor of printing' and 'the accompanying rituals of admiration and distaste'.²⁶ Recent academic research carried out by practitioners has certainly challenged such concern with significant works on non-Latin scripts to implement this deficiency: Fiona Ross on Bengali;²⁷ Jo de Baerdemaeker on Tibetan typeforms;²⁸ and Titus Nemeth on Arabic type-making in the twentieth century.²⁹ A shared trait of these works is the appreciation of history to inform current practice rigorously through sound research, besides relying on a critical approach to form judgments and challenge conventions; this study aims to position itself in the same category.

As already mentioned, this research is motivated by the lack of typographic information on the evolution of early³⁰ Arabic types both on the design and type-making processes. To inform this discussion, investigation of the transition of Arabic letter-forms from writing to printing methods provides a starting point; whereas considerations regarding the influence of this evolution on the development of subsequent typographic production are necessary to extend and deepen the historical narrative of Arabic type history.

Some may argue against the need for more historical research in a field currently in great expansion, supporting the idea that a focus on the future possibilities for the Arabic script and typography should be the preferred approach rather than looking into past practices. On the other hand, it can be argued that for the very same reason

Hendrik D. L. Vervliet, 'Cyrillic & Oriental Typography in Rome at the End of the Sixteenth Century: An Inquiry into the Later Work of Robert Granjon; 1578–1590', in *The Palaeotypography of the French Renaissance. Selected Papers on Sixteenth-Century Typefaces* (Leiden: Brill, 2008). A similar work for the Greek script was carried out by Nicolas Barker in *Aldus Manutius and the Development of Greek Script and Type in the Fifteenth Century*, 2nd ed. (New York: Fordham University Press, 1992).

23. Former curator of the Oriental Manuscripts and Printed Books Department of the British Library, London.
24. Yasin H. Safadi, 'Arabic Printing and Book Production', in *Arab Islamic Bibliography: The Middle East Library Committee Guide. Based on Giuseppe Gabrieli's Manuale di Bibliografia Musulmana*, ed. Diana Grimwood-Jones, Derek Hopwood, and J. D. Pearson (London: Harvester Press, 1977), 221.
25. Some examples are mentioned in § 1.2.2.
26. Kinross, *Modern Typography*, 17.
27. Fiona Ross, *The Printed Bengali Character and Its Evolution* (Richmond, Surrey: Curzon, 1999).
28. Jo De Baerdemaeker, 'Tibetan Typeforms: An Historical and Visual Analysis of Tibetan Typefaces from Their Inception in 1738 up to 2009', (PhD thesis, University of Reading, 2009).
29. Titus Nemeth, 'Arabic Type-Making in the Machine Age'.
30. This term refers in general to Arabic foundry types in the pre-industrial era: it includes the pioneers of Arabic type-making in Europe and the Middle East, but also significant later developments. See following sections in this chapter and Chapter 4, where the methodology is discussed.

this may be the most appropriate time to question the knowledge that drives decisions in Arabic type design and to evaluate the sources that inform the judgments by today's practitioners.

An additional reason that has motivated this work is the discrepancy between the calligraphic models of the Arabic script and its typographic development, and the lack of studies that trace the origin of this divergence, explaining the factors that caused it. It is clear that to find answers, it is necessary to build an understanding of the elements that in calligraphy contributed to produce an 'authentic' representation of the Arabic script, and investigate how these were attended to in the typographic environment. Secondarily, it is necessary to establish whether certain type-makers'³¹ approaches failed to meet the script requirements, thus compromising a faithful typographic reproduction of the script. The lack of authenticity is often identified as a determining factor in the 'foreign' appearance of Arabic typefaces and is associated with the early Arabic types produced in Europe versus their counterparts produced in the Middle East: thus types carrying certain deficiencies have been described as having a 'markedly "European" appearance'.³² This definition has also been used in current type design practice to describe Arabic typefaces that do not conform to the calligraphic representation of the script.

It should be stressed, in conclusion, that analysing the challenges that emerged when the script had to be adapted for the first time to a medium other than writing, enables the identification of the solutions devised to overcome particular technological issues. Identifying the same solution across different Arabic typefaces indicates that a typographic convention has been established. Only the critical evaluation of the Arabic foundry types can determine whether typographic conventions have altered the script's appearance to the extent of becoming characteristic features themselves; whereas the connection with current practice can provide evidence of which of these conventions have gained acceptance and that are still adopted even when technological limitations are no longer responsible for them.³³

31. This term is used to designate the professional agents involved in the making of movable type, and includes punch-cutters, typefounders and compositors.

32. See Geoffrey Roper, 'Early Arabic Printing in Europe', in *Middle Eastern Languages and the Print Revolution: A Cross-Cultural Encounter: A Catalogue and Companion to the Exhibition* (Westhofen: WVA-Verlag Skulima, 2002), 142. The term has been previously used by Fiona Ross in the context of Bengali letterforms, see *The Printed Bengali Character*, 107. Thomas Milo, academic linguist and founder of DecoType, uses the term 'Eurabic' to indicate the European attitude towards the Islamic script (See Thomas Milo, 'The Rôle of Dutch Arabic Typography in Middle Eastern Printing', *AtypI* conference 2011, accessed 14 September 2016, https://www.academia.edu/1817385/Arabic_vs._Eurabic_-_Part_1_The_rôle_of_Dutch_Arabic_Typography_in_Middle_Eastern_Printing).

33. These conventions are still referred to as typographic shortcomings in this thesis. For instance, the practice of mixing letterforms belonging to different calligraphic styles started with the earliest Arabic foundry types and is widely adopted in current Arabic type design. This practice has no place in traditional Islamic calligraphy but it is a typographic convention established over time. Moreover, it is not explicable by technical constraints, but rather a product of misinformation that has gained acceptance. This issue is discussed in greater depth in the following chapters.

1.2 Framework overview

1.2.1 Approach

The volume of written literature favouring the historical and bibliographical aspects of Arabic printing suggests that there is a significant amount of repeated and factual information, which remains attached to what is known of the printing history, without becoming critically valuable with regard to the development of printing types.

The proposed approach is to make the Arabic types the focus of the research, to build knowledge through their analysis, and to shape links between their graphical appearance and the factors that were influential in the process of their design and production. Furthermore, to assess the adaptation of Arabic characters in the transition from handwritten letterforms into type by comparing approaches of different type-makers and printers; to address, where possible, questions regarding the technical aspects of punch-cutting, typefounding, and methods of composition of the printed Arabic characters; and to acknowledge and discuss the strict relationship between type-making technology and typeface design.

The present study is the first to provide a critical and detailed assessment of Arabic foundry types and to shed light on the evolution of Arabic typeforms informed by rigorous research and through a systematic consultation of primary sources. It is hoped that this analytical approach provides a balanced perspective and an insightful evaluation of the design and production of Arabic types in the hand-setting era and that the new material and findings presented in this research provide an original contribution to the knowledge of Arabic type-making history.

The methodology used to conduct this analysis is presented in detail in Chapter 4. First, it is important to cover other aspects of forming a framework, including the approach to archival research, the identification of relevant sources and the preparatory work to collect the material necessary for the analysis.

Due to its research-based nature in archives, this study is bound to be shaped by the available sources.¹ As Fiona Ross observed during a recent *Granshan* conference, reliable resources can be elusive and scarce. However, it is important to know how to make the best use of what is to hand, as different information can be gathered from various sources. While type histories provide the context for the deeper understanding of the evolution of printed characters, primary source materials like key extant printed books, correspondence, case lays, fount synopses and actual types are vital records to support the investigation; they are also highly instructive to elucidate design decisions that influenced the development of typeforms and their use, and consequently the visual appearance of books, periodicals and newspapers.²

While the present study certainly draws on a variety of sources, the analysis of the Arabic types is primarily informed by the observation and close examination of the

1. It should be stressed that the availability of sources is not strictly determined by what is known to exist but also by what is accessible at the time of the research. Additional material might become available in the future (i.e. discovered or accessible) adding information that may complement this study.
2. Fiona Ross, 'Thoughts on the Use of Resources to Support Effective Typographic Communication in Vernacular Scripts', in *Granshan: Global Design in Practice* (Reading, 2015). See also Fiona Ross, 'Aspects of Typographic Communication. Notes on the Typeforms of South Asia', in *Honoris Causa* (London: Allen Lane, 2015).

printed artefacts, mainly because they outnumber other primary sources available (some of which have been mentioned above).

Regarding the determination of the Arabic type case studies, a selective approach was necessary, for which the methodology provided guidance. The relevance of the chosen typefaces might differ in nature (e.g. the type may be a 'first' of its kind, a model followed by others, or introduce a solution to a particular design issue or technological constraint), bringing different contributions to the discussion. However, they are part of the same narrative, which aims to assess the adaptation of letterforms to given constraints within the same technology and evaluate the varying approaches to solving similar typographic problems.

The chapters dedicated to the analysis of the typefaces (Chapter 5 to Chapter 9) follow a chronological order to allow the progression of typeforms (e.g. improvements and setbacks) to emerge as it unfolded, and to inform the correct appraisal of individual events (e.g. crediting innovations). However, the identification of common threads has facilitated the grouping of specific types or the isolation of the ones that required a separate review. The adoption of a thematic approach for the analysis was instrumental in addressing and focusing on the most important issues and to steer the discussion away from being overly descriptive. Finally, it should be pointed out that the grouping of typefaces does not necessarily imply that the type-makers adopted a similar strategy or technological solutions: these are investigated individually, although the occurrence of shared approaches is identified and mentioned as part of the evaluation. Furthermore, the level of detail required in the analysis does not allow the discussion of different types in parallel. However, effort has been made to maintain a consistent approach throughout the thesis.

1.2.2 Preparatory work

Accessing and gathering primary sources was a key element of this study: therefore, a first critical step was identifying the most significant material for the research, and selecting what was essential. One of the main challenges was certainly the varied location of primary sources, due predominantly to the diverse provenance of the people involved in the 410 years of Arabic printing history that is the object of this study. Secondarily, most of the relevant items do not belong to recent printing history and, as rare material, are housed in special collections (generally more difficult to access and under stricter rules).³ Moreover, this study investigates individuals and printing houses whose history has been recorded in a fragmentary manner, and whose primary sources are not assembled in specific archives. There are some exceptions: the Archivio di Stato in Florence houses documents regarding the activities of the Typographia Medicea, the most important Oriental press from the end of sixteenth to beginning of the seventeenth century.⁴ Regarding printing houses of later centuries, i.e. the eighteenth and nineteenth, the French Imprimerie Nationale holds a dedicated archive for its punches and matrices (Cabinet des Poinçons, CDP) in the

- 3. Particularly in terms of taking pictures. Additional problems are due to the cataloguing system, especially because libraries use different ways of transliterating Arabic, which makes it difficult to find items. Finally, it is not uncommon to have them misplaced or wrongly catalogued: for instance, the library that owned the only surviving copy of Paganini's Venice *Qurān* in Italy, was not aware of possessing this item; only through the research of Angela Nuovo was it possible to retrieve it.
- 4. Other early Arabic types produced in the same timeframe were isolated initiatives of individuals or smaller printing presses with much more limited resources, and a less marked interest for non-Latin publications.

premises of Douai; the records of the ABCFM (American Board of Commissioners for Foreign Missions) are housed in the Houghton Library, Harvard University; the archives of the CSM (Church Missionary Society) Arabic printing press in Malta are available at Birmingham University Library.

Primary sources to consult consisted mainly of Arabic printed books within the period under research, which exist in abundance. On the other hand, there is, to date, scant original material to provide additional first-hand information about specific Arabic types: these include, for instance, personal records of the people involved in type-making and evidence regarding their working methods.⁵ Furthermore, there are few surviving Arabic punches, matrices or cast metal type.⁶ Amongst the material examined first-hand during this research are Arabic punches and cast types from the *Typographia Medicea* housed at the *Biblioteca Medicea Laurenziana* in Florence;⁷ Arabic punches and matrices from the *Typographia Medicea*, *Savary de Brèves* and *Sacra Congregatio de Propaganda Fide*, in the *Cabinet des Poinçons* of the *Imprimerie Nationale*.⁸ Cast Arabic metal type from the Oxford University Press was also used for this study, some of which is privately owned by the Jericho Press and the University of Reading.⁹ In some instances, and despite strenuous efforts, additional extant material or known archives were inaccessible during the research for various reasons; this allows room for further future research, to add to the findings of this study. Arabic punches belonging to the *Tipografia Poliglotta Vaticana* are known to survive in Rome;¹⁰ the St Bride Library in London holds more cast Arabic metal type from the OUP;¹¹ the archive of the Brill company in Amsterdam could potentially hold information regarding its Arabic types in the period of interest for this research.¹²

- 5. Significant information comes from the personal diaries of Giovanni Battista Raimondi, scientific director of the *Typographia Medicea* (see § 6.1). Moreover, the autobiographical memoir of the American punch-cutter Homan Hallock gives some insight of his Arabic type-making process and the personal papers of Eli Smith of the ABCFM contain evidence of an innovative technical solution for the vocalisation of Arabic (see § 8.4.2). A different kind of evidence is provided by the smoke proofs of the *majribi* punches cut by Franciscus Raphelengius, contained in a manuscript that possibly served as model for one of his Arabic types: their analysis allows considerations on the design process, by comparing them with the final printed characters (see Lane, Breugelmans and Witkam, *The Arabic Type Specimen*).
- 6. See also the information provided in James Mosley: 'The Materials of Typefounding', Typefoundry, accessed 9 September 2016, <http://typefoundry.blogspot.co.uk/2006/01/materials-of-typefounding.html>.
- 7. No matrices have been found during the author's visit to the Laurenziana library, despite suggestions that they might possess some, see Vervliet, 'Cyrillic & Oriental Typography in Rome', 456 and the unpublished work of Charles Whitehouse, *Stamperia Medicea. Material Now Kept with the Biblioteca Laurenziana*, Florence, 1985–86.
- 8. See also the publication: *Les Caractères De L'imprimerie Nationale* (Paris: Imprimerie Nationale, 1990).
- 9. Two sizes of Arabic were acquired by the Department of Typography and Graphic Communication in 2016 from J. F. Coakley, owner of the Jericho Press, based in Ely, near Cambridge, UK. Another OUP Arabic fount remains at his press, see § 7.2.2.
- 10. See § 7.2.1.
- 11. See Appendix 105.
- 12. According to A.J.M. Vrolijk (curator of Oriental Manuscripts and Rare books of the University Library of Leiden) the Brill company donated its archive to the Special Collection of the University of Amsterdam in 2006, e-mail message to author, 13 May 2016. The archive is still not completely accessible and is far from complete. It is not clear what it might contain: an online link to the collection is available at Amsterdam Universiteit, 'Inventaris Van Het Archief Van De Uitgeverij

Another branch of relevant primary sources for this study is a selection of Arabic manuscripts. These are, however, a more unreliable territory to be approached with some caution and strict criteria, as will be discussed. In this thesis, Arabic manuscripts are referenced either as materials that provide an understanding of calligraphic or chirographic¹³ practice in line with the requirements of the Arabic script, or in relation to a particular Arabic printing type under analysis (e.g. if the manuscript was the model for the type or if it contains a handwritten version of the same text of the printed book).¹⁴

Field trips and image database

The initial stages of the research were dedicated to scanning Arabic type production within the time frame to identify the relevant primary sources; this enabled the identification of the main players in the field and the compilation of a list of types worthy of further investigation.¹⁵ At a second stage, field trips were essential for the consultation of the original material. Unique sources available at a single location were prioritised (e.g. the Venice *Qur'ān*, selected Arabic manuscripts and remaining punches and matrices of Arabic types), whereas sources available in multiple libraries (mainly printed Arabic books) were accessed at the most convenient location. Material not available at the repositories/archives visited in the UK or abroad was loaned/requested, where possible, from various other libraries.

Visits to the archives were also essential for photographing the original artefacts, to build a database of images which could be conveniently consulted without repeated visits to the repositories.¹⁶ Many documents required for the research have not yet been digitised, and the quality of what is available online is not satisfactory for the purpose of this work.¹⁷ Therefore, it was important to use a camera with a macro lens and a tripod, whenever possible, to take high-resolution pictures of the originals.¹⁸

Brill (1883-2003)'. Dpc.Uba.Uva.Nl, 2017, accessed November 12, 2017, <http://dpc.uba.uva.nl/inventaris/ubainv389>. Additional Arabic types, punches and matrices were available at the Stichting Museum Enschedé in Haarlem, now permanently closed. Some of their Oriental types were used to hand-set the work of Charles Enschedé, *Typefoundries in the Netherlands from the Fifteenth to the Nineteenth Century* (Haarlem: Stichting Museum Enschedé, 1978).

13. Chirography in this thesis refers to writing by hand which is not particularly intended for decorative purposes. This term is used as distinguished from handwriting, which refers to the individual style of a person. This is discussed more in depth in Chapter 2.
14. There is a large amount of Arabic manuscripts available (e.g. grammars, dictionaries, language studies, or other texts related to religion, history, poems and science), which are of negligible interest for this study unless a connection with a particular printed text can be established. Only in few instances was it possible to cross-reference the same Arabic text in a manuscript and in the printed book, which also allowed a direct comparison of the letterforms: these were exceptions, because usually there is no recorded reference to the original manuscript (if there was a specific one) used as a model for print. See Chapter 2, where this is discussed in greater depth.
15. The list of selected types was often reviewed and validated also through their later assessment. The amount of sources found regarding specific types was also influential in making more informed judgments.
16. Especially for the sources available in remote locations, only a single visit was possible throughout the duration of the research, often limited to a few hours. The database of images enabled a more thorough evaluation of a type, allowing more time to answer specific research questions arising from the material.
17. Some libraries' digitised collections or services like Google Books provide low resolution scans that are not reliable for the analysis; nonetheless, they have been used at times when no other options were available.
18. This was the author's preferred set-up. The lens used is a 50mm compact macro lens (with fixed

It should be stressed that the use of this method for photographing the primary sources has enabled a kind of analysis that would not have been possible relying exclusively on secondary sources or reproductions; this study not only contributes to bringing together a variety of sources but also provides for the first time original and high-quality images. Having trustworthy pictures for each source – taken as a single controlled set – enables a more accurate and in-depth analysis, required by the nature of the research. The possibility to magnify the images enabled a greater scrutiny, and supported the assessment of types even at small point sizes. However, it should also be noted that the conditions of access to the primary sources varied according to the requirements and circumstances of individual libraries, which at times could not be overcome.¹⁹ Similarly, the conditions for photography were not always ideal, therefore a degree of variability has to be expected: for instance, being able to photograph the material from a directly vertical angle was an essential condition for the analysis – to avoid distortions on the image – which was not possible in some cases.²⁰ Only in exceptional cases, was it allowed to photograph the entire source, whereas generally only a few pages had to be selected. This also motivated the decision to photograph full pages instead of portions of text or details:²¹ considering the variety of issues to be assessed in the analysis of Arabic types, it was indeed preferable to have lengthier text, which facilitated the identification of features and their more accurate evaluation, providing more examples for comparison.²²

The collection of high-quality images enabled the analysis of types by providing a solid starting point for their assessment. Direct observation of primary sources was indeed a critical tool to answer specific questions arising from the extant material and to fill gaps in the historical narrative. On the other hand, interpretation and guesswork were required when sufficient evidence was lacking. Notwithstanding such problems, to critically evaluate the Arabic type it was necessary to establish a methodology to ensure a systematic approach, which is presented later in the thesis.

focal length shooting), which provides sharp and non-distorted enlargements of small objects. The tripod is used to offer the support and the stability needed for macro photography; moreover it improves the framing of the image allowing adjustable distance between the object and the lens. It is worth noting that without a tripod a macro lens is impossible to use.

19. Especially in terms of permissions in using of the preferred set-up: the tripod is generally not welcomed in libraries as it is considered a tool for professional photography (which means images good enough to be used for publications). At times alternative options had to be used (e.g. taking pictures with a standard camera or a mobile phone; not taking pictures at all and resorting to whatever was supplied – if already digitised – or in some cases purchase images from the libraries' photographic services).
20. It is worth recalling that most of the items were old or rare material, often fragile and in need of support on pillows or stands: this compromised the position of the book for the photographs, held in an inclined and semi-opened position instead of lying flat on the support's surface.
21. Images of details would have been too limiting for the required analysis of the founts and also more time-consuming in terms of taking pictures. For instance, if the focus of the research was the design of a particular letter (depending on the script, also the basic character set), then it would have been more appropriate to collect detailed samples. The connecting and dynamic nature of the Arabic script implies that even in that scenario, the amount of details needed increased and was more difficult to establish, because each letter changes shape according to the position in the word and to which letters is connected before and after.
22. For instance a combination of letters can be mistaken for a ligature: a change in the pressure of printing can easily affect their appearance in different parts of the text and the spread of ink can contribute to make them look as a single sort rather than two positioned next to each other. Only the comparison of the same combination recurring in different pages or portions of text can validate the assessment.

1.2.3 Scope

The historical scope of the research covers the period from 1514, when the first Arabic movable type was produced in Italy for the printing of the *Kitāb Ṣalāt As-Sawā’i*, up to 1924, when the first and only typeset Qur’ān approved by a Muslim authority was printed at the Būlāq press in Cairo, marking what could be arguably considered the last great achievement of Arabic foundry type.²³ The typeface used for this typographically composed Qur’ān – commonly called the Government Press typeface or the Būlāq type – was the chosen model for the development of one of the first Arabic hot-metal founts produced by the Monotype Corporation, Series 549, which appeared in 1947.²⁴ It seemed, therefore, appropriate to conclude the research with a typeface that bridges hand-set technology and mechanical composition.

As already mentioned, it is not within the scope of this study to cover all existing Arabic founts in the pre-mechanical typesetting era but to investigate the ones that, in this time frame, are noteworthy. Therefore the in-depth analysis prioritised typefaces that best represented the most significant developments, and avoided similar cases unless it was instrumental for particular considerations (e.g. to confirm the establishment of typographic conventions). The scrutiny of the selected typefaces aims to generate ideas around the perception and judgment of Arabic foundry types and to compare and assess them through common criteria.²⁵ Moreover, it seeks to isolate the elements of critical significance in the progression of typeforms (regarding technical or aesthetic innovation) and likewise, to separate the elements that hindered such improvement, making these types more or less successful in relation to their intended use and purpose. The evaluation of types has to also take into account other contextual factors, like the background of the type-makers and of the readership, which generated different expectations of typographic products and their reception.

The different lines of enquiry followed in this study intend to address two main research questions: what are the factors that determined the progress towards a *satisfactory* mechanical reproduction of the Arabic script? To what extent, and to whom, is the departure from calligraphic manuscript models to facilitate typographical composition *acceptable*?²⁶

The assessment of the Būlāq type serves as a measure against which to evaluate the answers to both these questions as it marked the formal acceptance of a particular typeface – and therefore its typographic representation of the Arabic script – as finally suitable for the Holy text, after decades of objection. Therefore the printing of the Fu’ād Qur’ān with a foundry type formally represented the culmination of the typographic developments of hand-set Arabic.

23. Also known as the *Fu’ād Qur’ān*, this edition was authorized by the Al-Azhar mosque-university of Cairo. Originally government-sponsored as a standardised edition for religious education in schools, it became widely distributed and accepted to the current day as the official Qur’ānic text.

24. The first Arabic type developed by Monotype was Series 507, whose first trial proof was printed by May 1938. Primarily conceived for the Indian market and the Urdu language, Series 507 was rejected by Monotype’s Egyptian client al-Maaref, who suggested that a new typeface more suitable to Middle Eastern typographic preferences was needed. The first trial of the new Arabic typeface, Series 549, was printed in April 1946, then manufactured and delivered to clients in Egypt by the summer of 1947. See Nemeth, ‘Arabic Type-Making in the Machine Age’.

25. The criteria are introduced in Chapter 4.

26. The second research question was adapted from a remark made by Geoffrey Roper, bibliographical consultant and print historian, with regard to the visual features to be examined when studying early Arabic printed books. See Geoffrey Roper, ‘Arabic Incunabula’, *L’Arabisant* 21 (1982): 22.

It should also be stressed that the underlining thread throughout the assessment of the Arabic types in this thesis is to understand the concept of *quality* in a typeface and how to gauge it. While this study tries to address it in the scope of Arabic foundry types, the question applies beyond the hand-setting era, and it is certainly pertinent to current practice.

Throughout history – from handsetting to hot-metal to photocomposition and the digital age – the changes in the technologies of making type have given increasing freedom to the representation of the Arabic script from its past constraints. In addition, this has constantly shifted the boundaries of what can be considered acceptable in light of new technological possibilities. In this context, it seems pertinent to observe that questions around the appearance and execution of certain features in Arabic foundry types reflect similar issues in subsequent Arabic type design. Furthermore, it seems appropriate to draw a parallel between type-makers of foundry Arabic types and today's type designers of Arabic typefaces: firstly with regard to the approach to the transition from handwritten letterforms into type; secondarily, with regard to the identification of decisions in design in relation to the process of type-making.

Having no precedents, the pioneers of Arabic typography were the first to face the task of adapting the Arabic script to a medium that departed from writing. Equally, they had to devise, for the first time, solutions within the constraints of particular punch-cutting, typefounding and typesetting technologies but at the same time reproduce the script in accordance to the models that they had at hand. In resolving this predicament, they could not rely merely on crafting skills, but had to acknowledge the need of script-related resources (either in the form of samples of Arabic manuscript practice or advisors versed in the script or language) if they strived for optimal results. Disregarding one of these aspects would contribute to produce sub-standard typographic representations of the script. It is clear that the faults would be evident to those knowledgeable in Arabic, affecting the reception of a particular type, but overlooked by those that were not. However, with regard to the type-makers in particular, it should be added that certain faults of their Arabic types may have been the result of intentional compromises to facilitate the production processes, even though they were aware of departing from the desirable alternative. This motivates the importance of establishing the nature of the shortcomings through the analysis of types; and of understanding the technologies of type-making to identify those instances when a cause-effect relationship of this kind might have occurred. Similarly, it is important to identify those instances where ill-informed decisions might have contributed to the shaping of characters that gained acceptability and became conventional typeforms, by examining the development of Arabic typography throughout the centuries.

The type-makers of Arabic foundry types that succeeded the pioneers operated along similar lines of those described, with the exception of having the Arabic typographic models of their predecessors as reference to potentially influence their work. Current type designers of Arabic operate in similar circumstances and are familiar with the same processes, but apply them in a different technological environment. It does not seem inappropriate to suggest that researching past practices is key to understand current ones and, most importantly, that conventions established in different technological circumstances and originated in the lack of knowledge might still inform the judgment of current practitioners, thus influencing the Arabic typeforms of today.

It is evident that investigating the origins of Arabic typography is paramount to develop these lines of enquiry.

1.3 Cultural and political context of early Arabic printing

1.3.1 Book printing, funding, market and trade

This research has its roots in the centuries that bridge the Middle Ages and the beginning of the Modern era.¹ The period from the early fifteenth century to the seventeenth century was full of significant changes that affected the balance of power from the West to the East on political, religious and cultural grounds, amongst others. European politics became dominated by religious conflicts; the economy was transformed by the opening of new trade routes, and the Protestant Reformation triggered a cultural change that led to growth in literacy and major revolutions in astronomy and science. All of these developments had a substantial influence on the production and distribution of early Arabic types, therefore it is important to investigate the context in which they emerged.

The introduction of movable type in Europe in the fifteenth century sustained the spread of knowledge across Europe, having devotion and learning as the driving forces. Religious works amounted to nearly half of all printed book production, with literature, law and scientific subjects following but in much lower proportion.² The impact of printing and book culture has been widely investigated by historians, although different scholarship approaches failed to reach an agreement on whether the shift from scribal to print culture was an *evolutionary* process or, as stated by Elizabeth Eisenstein, a *revolutionary* one: her theory is still constantly re-evaluated and challenged.³ Regardless, historians agree in recognising that paper represented an indispensable precondition for the printed book, giving impetus to the invention of printing.⁴ Moreover, it has been observed how the introduction of paper to Europe served as a bridge between Muslim and Christian cultures:⁵ an interesting consideration which highlights the contact between these two groups in the history of printing, especially in light of later developments.⁶

According to French historians Febvre and Martin, by 1480 the printed book was 'in universal use' in Europe. In giving a measure of the spread of printing, they report that by that date printing presses were operating in more than 110 towns: around

1. The Middle Ages is generally defined between the fifth and fifteenth centuries, while the early modern period began approximately in the early sixteenth century.
2. See Lucien Febvre and Henri-Jean Martin, *The Coming of the Book: The Impact of Printing 1450–1800*, 3rd ed. (London: Verso Books, 2010), 249. It might be worth recalling here that by 1500 the majority of European countries had universities.
3. According to Eisenstein the printing press was 'an agent of change' that resulted in a 'communication revolution'. See Elizabeth L. Eisenstein, *The Printing Press as an Agent of Change: Communications and Cultural Transformations in Early-Modern Europe* (Cambridge: Cambridge University Press, 1979) and Sabrina Alcorn Baron, Eric N. Lindquist, and Eleanor F. Shevlin, eds., *Agent of Change: Print Culture Studies After Elizabeth L. Eisenstein* (Amherst and Boston: University of Massachusetts Press, 2007).
4. See Febvre and Martin, *The Coming of the Book*, 30.
5. The Chinese knowledge of paper and papermaking technology was acquired in the eighth century by Muslims in West Asia and transmitted to Christians in Spain well before the year 1000, and to Sicily by the late eleventh century. See Jonathan M. Bloom, *Paper Before Print: The History and Impact of Paper in the Islamic World* (New Haven and London: Yale University Press, 2001).
6. By supplying paper to Europe, Muslims fuelled the printing industry (including that of Arabic books), which later Christians tried to export to Middle Eastern territories.

fifty were in Italy; around thirty in Germany; nine in France, eight in Spain and Holland; five each in Switzerland and Belgium; four in England, two in Bohemia and one in Poland.⁷ In terms of production, 'by the close of the 15th century, about 50 years after printing began, at least 35,000 editions had been produced, amounting, at the lowest estimate, to 15 to 20 million copies'.⁸ numbers made possible by paper, as print runs of individual editions in the mark of hundreds and thousands would have been impossible depending on parchment alone.

Amongst the most important centres of interest in this period, Venice was certainly the capital of printing, continuing to dominate the trade at the turn of the sixteenth century, and attracting many key figures for the production and commerce of the book. Many factors contributed towards this status: its political situation and wealth; the geographical position at the head of the Adriatic (favourable to the trade between East and West); and the intellectual and cultural liveliness and the access to quality paper.⁹

The printing industry continued to grow for the first two centuries from its inception. Particularly in the first fifty years of the sixteenth century, the book trade was prosperous and publishing was an international business: in this context, the printing of the first books with Arabic movable type took place in Italy, with all the implications that are discussed throughout this thesis.

To better understand what kind of work was being undertaken by the presses, it is important to consider who was financing and commissioning the books, and in support of what needs they were being produced. Printers were usually mere craftsmen, with specialised skills but limited economic means. The capital needed to set up an adequate business had to be found elsewhere. Rich patrons, churchmen, states and municipalities became the primary sources of finance. These were willing to support especially the main and more established presses; however, in return, they were guaranteed a great deal of control over the books printed and distributed to the public. It was clearly important to publish books with a market and in large demand, to sell enough copies to make a profit, a shared concern of printers, booksellers and publishers. For this reason, liturgical and theological works represented the main production, as popular devotion involved the masses. Nonetheless, educational works to supply students and scholars were also commonly published.

The background of the first Arabic printed books of the sixteenth century was not different from the one described above, with some additional challenges. Arabic books, of both religious and secular matters, had a very limited audience in the Christian Europe of the Renaissance in terms of people who could read the script to either broaden their scholarly knowledge or support their faith. Hence their most reliable market – Arab Christians living in the Middle East and possibly Muslims willing to convert – had to be reached via missionary routes. However, merely entering those territories was not a guarantee of success for European produced books, as many other factors influenced the demand for these books.¹⁰

7. Febvre and Martin, *The Coming of the Book*, 182.

8. Ibid., 186.

9. After Fabriano in the early fourteenth century, papermakers spread to 'Voltri, Padua, Treviso and Genoa. They soon established two other major centres of production, in the region of Liguria around Genoa, and around Lake Garda, then part of the Venetian Republic'; see Febvre and Martin, *The Coming of the Book*, 31. The first Arabic books printed in Italy came out of the presses of Fano (close to Fabriano), Genoa and Venice, three cities close to paper mills and with sea access to trade.

10. For instance, the local mindset towards printing technology and the quality of the Arabic types compared to the expectations of the readership, discussed later in the thesis.

1.3.2 Migration of communities

As already mentioned, the political and religious turmoil of the fifteenth and sixteenth centuries was significantly influential in the development of the printing industry, in more ways than the scope of this study allows for discussion. In the interests of this research, it suffices here to highlight the movement of ethnic communities that took place following certain historical events and to comprehend the consequences of their resettlements.

The fall of Constantinople to the Ottomans in 1453, and the rise of the Muslim world in the European mainland, was responsible for the migration of Byzantine immigrants towards Europe. This continued the process of cultural influence already exerted on the Italian Renaissance through the translations into Latin of classical Greek authors and a variety of other works (e.g. Christian and pagan literature). Italy and Venice, in particular, gained a healthy community of scholars, which brought with them not only precious knowledge of classical Greek but also 'whatever manuscripts they were able to carry on their persons'.¹¹ Amongst the varied community of Greek exiles, many provided invaluable contributions as teachers, editors for the press and scribes – who earned a living copying manuscripts and assisting in the preparation of texts for printing – making Venice at that time the greatest centre of Greek scholarship and Greek printing.¹²

This migration of communities took place also from the West to the East, in particular when Jewish traders were encouraged to move from Europe to Istanbul and set up business, in a bid by Mehmet II – the sultan who conquered the city – to resettle 'his depopulated and ruined new capital, Istanbul, with a population possessing skills and financial resources'.¹³ His policies were successful, as a large community of Jews settled there making a significant contribution to many trades and industries in the Ottoman Empire. Sephardic Jews in particular, following the expulsion from Spain in 1492, established a Hebrew printing house in Istanbul in 1493, being the first to introduce movable type in the Islamic world.¹⁴ Several other printing houses were founded in the early sixteenth century, although the centre of Hebrew printing in that century was in Europe, in Venice.¹⁵

Similar circumstances occurred for Armenian printing: after the first books from cast-type were printed in Venice between 1511–2 and 1513–4 by Hakob Meghapat, the Armenian community relocated to Istanbul, following the deterioration of the relationship between the Armenian Apostolic Church and the Roman Catholic Church and the effects of the Inquisition's censorship. Like the Sephardic printers, Armenians found in Istanbul a desirable location to create a permanent residence, offering freedom to practise their religion and the legal autonomy from Islamic law.

11. Deno John Geanakoplos, *Greek Scholars in Venice: Studies in the Dissemination of Greek Learning from Byzantium to Western Europe* (Cambridge: Harvard University Press, 1962), 280.

12. Ibid. In this environment Aldus Manutius established the Aldine Press in 1494, making large use of the Greek community to assist him in the production of his renowned editions of the Greek classics.

13. Avigdor Levy, ed., *Jews, Turks, and Ottomans: A Shared History, Fifteenth to Twentieth Century*, 1st ed. (Syracuse, New York: Syracuse University Press, 2002), 4.

14. See Rachel Simon, 'The Contribution of Hebrew Printing Houses and Printers in Istanbul to Ladino Culture and Scholarship', *Judaica Librarianship* 16, no. 1 (2011).

15. See Ittai Joseph Tamari, 'Notes on the Printing in Hebrew Typefaces from the 15th to the 19th Centuries', in *Middle Eastern Languages and the Print Revolution: A Cross-Cultural Encounter: A Catalogue and Companion to the Exhibition* (Westhofen: WVA-Verlag Skulima, 2002).

In 1567, the Armenian printing office established in Venice by Meghapat's successor Abgar Tokhatetsi in 1565, resumed activity in Istanbul.¹⁶

It is thus clear that typography and printing reached the Middle East only a few decades after Europe, but it was allowed only in Hebrew, Greek, Armenian and other non-Arabic scripts.¹⁷ Printing in their own languages, these minorities were also allowed to produce religious texts, otherwise expressly forbidden even after 1727, when the firman of the Ottoman sultan lifted the ban finally granting the Müteferrika Press licence to print books in Ottoman Turkish. Nonetheless, and somehow ironically, the first Arabic printed books to find their way to the Middle East were mainly Christian religious material, supplied from European presses to the Arab Christians. During and beyond the years when the printing industry reached its peak in Europe, books in the Muslim world remained manuscripts, maintaining the scribal tradition until the eighteenth century, when the first Muslim press began to operate in Istanbul.

1.3.3 The drive for printing Arabic books in Europe

Development of Arabic studies

In order to contextualise the production of Arabic printed books in Renaissance Europe, it is essential to discuss the reasons that prompted the development of Arabic studies: this also allows understanding of the genre of Arabic books that were printed and sought after, the readership and the market for which they were produced.

Historian Karl Dannenfeldt points out that the knowledge of Arabic in the late fourteenth and early fifteenth centuries was confined to those wanting to access a large body of work of original sources in their fields (e.g. medical doctors and philosophers), and to those involved in the trade with the Levant (e.g. Italian merchants and statesmen). Thus, countries like Spain and Italy that came in contact with the Muslim culture developed an early inclination towards the study of Arabic. Furthermore, Italian missionary interests in Arabic-speaking communities partly emerged from the efforts of the Western church to form a union with the Christian churches of the East.¹⁸

The involvement of humanist scholars added the philological interest for the Arabic language. In particular, the northern Renaissance scholars became interested in the study of Arabic to elucidate the meaning, origin and etymology of 'the more obscure words in the Hebrew language' – as Dutch Orientalist Thomas Erpenius pointed out in his public orations on the value of Arabic as a subject for study.¹⁹

16. After Abgar's printing office there were no other Armenian printing presses in Istanbul for a century; the next stage of Armenian printing took place in Rome from 1579 with Robert Granjon's work. See John A. Lane, *The Diaspora of Armenian Printing, 1512–2012* (Amsterdam, Yerevan 2012: Special Collections of the University of Amsterdam, 2012).

17. See Geoffrey Roper, 'Arabic Incunabula': 20.

18. Karl H. Dannenfeldt, 'The Renaissance Humanists and the Knowledge of Arabic', *Studies in the Renaissance* 2 (January 1955): 101–102.

19. Robert Jones, 'Thomas Erpenius (1584–1624) on the Value of the Arabic Language', *Manuscripts of the Middle East* 1 (1986): 20–21. Erpenius gave the first oration in Leiden in 1613 in occasion of the inaugural lecture as professor of Arabic, and the second in 1620. Historian Alastair Hamilton warns that some of Erpenius' arguments for studying Arabic during his orations repeated 'traditional commonplaces', (e.g. the conversion of Muslims), whereas a high portion of his publications showed didactic purposes, see Alastair Hamilton, 'Arabic Studies in the Netherlands in the Sixteenth and Seventeenth Centuries', in *Philologia Arabica. Arabische Studien En Drukken In De*

Many non-Jewish scholars, committed to the intensive study of Hebrew grammars and literature, made a religious use of Arabic for the understanding of the Hebrew words of the Old Testament and other Christian literature and Rabbinic writings (e.g. the Kabbalah).²⁰

The pioneers of Arabic studies in Europe consisted of two generations of scholars: the first generation of Orientalists in the early sixteenth century included Agostino Giustiniani and Teseo Ambrogio degli Albonesi in Italy; the German Johann Albrecht Widmanstetter; the Flemish Nicolas Clenardus and the French Guillaume Postel. A second generation of Arabists in the following century included Franciscus Raphelegius, Thomas Erpenius and Joseph Justus Scaliger in Leiden; Isaac Casaubon, Etienne Hubert, and François Savary de Brèves in Paris; William Bedwell in London; Ruthger Spey and Jacob Christmann in Heidelberg; Sebastian Tegnagel in Vienna; and Giovan Battista Raimondi in Rome and Peter Kirsten in Breslau.²¹ The names of these scholars are important, as they recur in connection with the collection of Arabic manuscripts²² and with the history of the first Arabic types produced in Europe. Through their efforts, the learning of Arabic in Europe progressed and became increasingly widespread with the circulation of their works.

It should be pointed out that early scholars interested in learning Arabic faced considerable limitations: Arabic manuscripts were difficult to access, and the production of Arabic printed books was slowed down by the lack of Arabic types. The shortage of competent teachers forced many Orientalists to be self-taught; furthermore, ‘concerted efforts had to be made to produce dictionaries, vocabularies, and grammars; manuscripts had to be collected at great expense from far places, libraries established, and fonts of type founded’.²³

Arabic studies in Europe were first associated with a school established in Seville in 1254; following the Council of Vienna’s recommendation in 1311, chairs for the study of Greek, Hebrew, Syriac and Arabic were to be established in the Universities of Paris, Oxford, Bologna and Salamanca. However, the lack of Arabic teachers and students turned these into missed opportunities until a much later date: in 1530 Arabic was still not taught in Paris, nor in Salamanca in 1532, as Nicolas Clenardus’ unsuccessful travels in search of a professor of Arabic testify.²⁴

Clenardus’ ten years of hardships in the quest of Arabic knowledge exemplify the difficulties of learning Arabic in sixteenth-century Europe.²⁵ Failing to find a teacher, and having received a copy of the *Psalterium* published in Genoa in 1516, Clenardus set out to teach himself Arabic through the comparative use of Hebrew, Greek and Latin, of which he had knowledge: ‘after much hard labor learned the consonants, drew up a vocabulary and even a kind of grammar’. In Spain, Clenardus received his first lesson of Arabic by a professor of Greek who knew the language and had access to the first Arabic grammar – the one published by Pedro de Alcalá in 1505. During a later trip to Portugal in 1533, Clenardus continued his Arabic studies with

Nederlanden in De 16e En 17e Eeuw, edited by Francine De Nave (Antwerpen: Museum Plantin-Moretus, 1986).

20. See Dannenfeldt, ‘The Renaissance Humanists’.

21. Robert Jones, ‘Piracy, War, and the Acquisition of Arabic Manuscripts in Renaissance Europe’, *Manuscripts of the Middle East* 2 (1987): 97.

22. See following section.

23. Dannenfeldt, ‘The Renaissance Humanists’: 117.

24. Ibid., 105. It is reported that even ten years later, in 1543, there were only three students of Arabic at the University of Salamanca.

25. Reported here as narrated by Dannenfeldt, in the work cited above.

the help of a physician, 'well versed in Arabic and Arabic medicine, but completely ignorant of Arabic grammar' thanks to his progress he arranged and also completed an Arabic dictionary. Before heading back to Louvain – where he had the intention to start teaching Arabic and to set up an Arabic press – he furthered his knowledge of Arabic thanks to a slave that he acquired in Grenada. On the other hand, he failed to secure Arabic manuscripts due to the Inquisition, thus resolving to travel to Morocco in 1540–41; the trip was successful, but on the return journey to Granada, the manuscripts were stolen. Clenardus planned a new trip to Africa, but died in 1542 before accomplishing this; his Arabic writings, including the grammar and the dictionary, were also lost.

Arabic printed texts for export and Europe

It is clear that the market for Arabic printed books in sixteenth-century Europe was too limited to motivate printers to undertake any substantial economic investment for their production. A bigger drive was necessary to justify the efforts and the costs for such undertaking, as much as a wider potential readership to secure sales. The motivation came from the Roman Catholic Church that financed, through some of its Popes and bishops, most of the Arabic printing initiatives in Italy. The most significant venture was indeed pursued by Pope Gregory XIII with the establishment of the *Typographia Medicea*: he dreamed of bringing within the Church non-Roman Christians, especially those in the Middle East and the Slavic countries, and to produce works of a religious nature to be exported and disseminated to both Christians and Muslims by Jesuit missionaries.²⁶

As print historian Geoffrey Roper pointed out, the Arabic printed books destined for export in the Middle East usually contained text exclusively in Arabic. On the other hand, bilingual and polyglot publications or books issued with title pages, prefaces, translations, notes in Latin – or any other European language – indicate that those were primarily intended for use by Western scholars.²⁷ Moreover, Roper identified four principal channels of distribution in the Middle East for Arabic books from Europe: individual travellers (i.e. missionaries, Arab Christians, merchants); embassies and consulates of European powers in the Ottoman Empire; occasional exchange of gifts between European and Arab rulers; agents and book depots, established by missionary organisations in Arab territories.²⁸

As previously mentioned, in the sixteenth century, printed Arabic books for export were mostly of Catholic provenance whereas the Protestant initiative at the time was latent: an appeal to action came from the German Arabist Ruthger Spey in the preface of his 1583 work *Epistola Pauli Ad Galatas*. Spey not only envisioned the production of Biblical works for the conversion of Muslims and their export to Asia and Africa but also expected that this would bring a much greater result than 'by sending several thousand missionaries, who do not know Arabic'.²⁹ Nonetheless, only in the seventeenth century – when the Netherlands became the most important centre for

26. Alberto Tinto, 'Per Una Storia Della Tipografia Orientale a Roma Nell'Età Della Controriforma: Contributi', *Accademie e Biblioteche D'Italia* 41 (1973): 281.

27. Geoffrey Roper, 'Arabic Printing in Malta 1825–1845: Its History and Its Place in the Development of Print Culture in the Arab Middle East', (PhD thesis, Durham University, 1988), 48.

28. Ibid., 43–44.

29. Ibid., 48. The appeal was particularly addressed to Protestant Germany, although he also included the Christian princes of Europe.

Arabic studies³⁰ – did the Protestant project begin to materialise, especially with the printing press of Thomas Erpenius established in Leiden in 1613.³¹

The ‘supremely unrealistic belief’ to convert Muslims ‘by presenting them with a few well chosen and incontrovertible Christian tenets translated into Arabic’³² was originally cherished by Guillaume Postel – known as the father of Arabic studies in Europe.³³ He also established the method for teaching and learning Arabic based on translations of the Scriptures, followed by many later Arabists, including Spey.

Postel’s views were questioned by the French scholar Joseph Justus Scaliger, who initially chose him as his teacher but became gradually dissatisfied with his method. Scaliger developed the new idea that Arabic should be approached as a language in its own right, and not exclusively in association with Hebrew or for missionary purposes. Moreover, he stressed the necessity of reading the Qur’ān to master Arabic, and as many varied texts as possible in other fields. Postel’s method was indeed very limiting not only for the knowledge of the Arab culture, but it had resulted in a limited vocabulary, inadequate to tackle the requirements of the newly established commercial and diplomatic relations between the Netherlands and the Ottoman Empire and Morocco.³⁴

The situation called for the establishment of a chair for Arabic teaching at the University of Leiden, for which Erpenius was appointed in 1613.³⁵ Furthermore, it spurred the production of educational tools for Arabic learning which until then were extremely limited – like grammars and lexicons – that were particularly needed. Amongst the important works produced in this period worth mentioning is Erpenius’ *Grammatica Arabica* published in 1613, which ‘was to remain the standard manual for the study of the language for two centuries’, and the *Lexicon Arabico-Latinum* of Erpenius’ successor Jacob Golius published in 1653, which ‘was to remain unsurpassed until the nineteenth century’.³⁶ By the end of the seventeenth century, a number of secular Muslim works were also printed, offering a broader view of Arabic literature and a more varied offer of Arabic texts than the Christian-related works, for those willing to study the Arabic language.³⁷

1.3.4 Arabic speakers and manuscripts in 16th-century Europe

The historical events of the sixteenth century were also responsible for the developments of Arabic printing, and provide critical information for the evaluation of the context in which the first Arabic types were produced. The Christian-Muslim

30. At different times also Germany, England and France had the monopoly in the field of Arabic studies, see Hamilton, ‘Arabic Studies in the Netherlands’, cvii.

31. Like the Catholics, also the Protestants were interested in approaching the Eastern Churches (Orthodox, Nestorian, Melkite, Maronite, Jacobite and Coptic Monophysite Christians), in order to make them their own allies. See G. J. Toomer, *Eastern Wisedome and Learning: The Study of Arabic in Seventeenth-Century England* (United Kingdom: Oxford University Press, 1996), 15.

32. Hamilton, ‘Arabic Studies in the Netherlands’, xciv.

33. Toomer, *Eastern Wisedome and Learning*, 26. He was the first lecturer for the formal instruction of Arabic at the Collège de France in 1538.

34. Hamilton, ‘Arabic Studies in the Netherlands’, xcvi–xcviii.

35. Erpenius was instructed and supported by Scaliger in his Arabic studies.

36. Hamilton, ‘Arabic Studies in the Netherlands’, ci, cv.

37. Ibid., cv.

conflicts contributed to bringing to Europe Arabic manuscripts and members of the Arabic-speaking community that were eventually instrumental for the making of Arabic types. This happened under different circumstances than the ones described for the diaspora of Greeks, Jews and Armenians; it was indeed the result of acts of war and piracy carried out by Christian soldiers. Amongst the Muslim captives introduced to Europe there were Arabic-speaking North Africans and Qur'ān-educated Turks, whose knowledge of the language was highly valued and sought after by European Orientalists:

At a time when the opportunities for meeting anyone with a knowledge of Arabic were extremely limited, and the chance of being able to employ someone who could make a reliable copy of an important Arabic text was even more remote, news of the arrival of a Muslim captive at a European court was the cause of excitement among Arabists.³⁸

Often forced to renounce their faith and be baptised, most of these captives became known with their new names: as Christians their work could also be published and therefore reach a much wider European audience.³⁹ The most famous was perhaps Leo Africanus,⁴⁰ renowned throughout Europe for his editions and translations, who also collaborated with various Orientalists as a teacher and scribe. Amongst others, Turkish captives Paul Willich and Darwîsh Ibrâhîm: the first taught Arabic in Germany and the second was employed as a scribe in Vienna.

The diversity of the provenance and background of these Arabic speakers provided them with varying skills and expertise. The Turkish assistant of Savary de Brèves, Ḥusayn of Buda, was recognised for having outstanding abilities as a linguist and mastery as a copyist; thanks to his good reputation, he collaborated with other important names of Arabic type-making and Arabic studies of the time, like the Typographia Medicea and the Hubert brothers.⁴¹ On the other hand, some are known for lesser merits: Domenico Sirleto's knowledge of literary Arabic 'is revealed as anything but perfect', which reflected in his works as scribe and teacher; and Clemente Rubino reportedly 'made very poor copies of a few manuscripts'.⁴²

Not all Arabic-speakers who reached Europe were captives: there were also visitors from the Eastern churches of the Levant, like the Patriarch of the Syro-Jacobite Church in Antioch, Ignazio Na'matâllah, who played an important role for the Typographia Medicea; and other Muslims, like the Moroccan emissary, Aḥmad ibn Qāsim, who helped Étienne Hubert, Thomas Erpenius and Jacob Golius with their Arabic studies.⁴³ Another group of Arabic speakers that made important contributions to Arabic studies in Europe were a number of converts to Catholicism who joined the Neophyte and the Maronite Colleges opened in Rome by Gregory XIII in 1577 and 1584 respectively. The large number of people offering knowledge of Arabic certainly favoured the development of Arabic printing in the city and worked to the advantage of the Typographia Medicea, which employed many at its service.

With regard to Arabic manuscripts, it seems that a considerable number had reached Europe already in the fifteenth century: in the second half of the century the Vatican Library received about fifty-seven Arabic manuscripts – possibly as a gift

38. Robert Jones, 'Learning Arabic in Renaissance Europe (1505–1624)', (PhD thesis: School of Oriental and African Studies, 1988), 64.

39. *Ibid.*

40. His Muslim name was al-Ḥasan ibn Muḥammad al-Wazzān al-Zayyātī (or al-Fāṣī).

41. See Jones, 'Learning Arabic in Renaissance Europe', 120–23.

42. *Ibid.*, 89–90. They were both members of the Neophyte College in Rome.

43. Jones, 'Learning Arabic in Renaissance Europe', 98–120.

by the legation of the Coptic Patriarch John XI – which formed the basis of its Oriental collection.⁴⁴ A much larger amount was available in Spain, historically a Muslim land; but in 1499 about 5,000 Arabic manuscripts were burned in the public square in Granada, following the policy of eradication of Islam promoted by the Catholic Reconquista.⁴⁵

According to the scholar Robert Jones, the European acquisition of Arabic manuscripts in the sixteenth century progressed irregularly due to a variety of circumstances.⁴⁶ Some were brought from Muslim visitors from North Africa and the Near and Middle East: it is known, for instance, that the already mentioned Patriarch Ignazio Na'matāllah arrived in Italy in 1577–8 with a personal library of Arabic and Syriac manuscripts and the Maltese priest Leonardo Abel had a collection of 150 Arabic works in 1604; they both collaborated with the *Typographia Medicea*, which largely benefited from the manuscripts and later received them in donation.⁴⁷

A number of Islamic manuscripts 'were taken as spoils of war and as pirates' booty': these were mostly devotional works, like Qur'āns and prayer books, appropriated by Christian forces from Muslim prisoners and hostages or from *madāris*⁴⁸ or mosque libraries.⁴⁹ A series of conflicts on land and at sea with the Ottomans provided European libraries with large collections: the most notorious case was the appropriation of the entire library of Sultan Mawlāy Zaydān – found by Spanish pirates on board a Muslim boat off the west coast of Morocco around 1611 – amounting to some three or four thousand Arabic manuscripts; these were later deposited in the library of the royal monastery of San Lorenzo at the Escorial.⁵⁰ The siege and sack of Tunis in 1535, the battle of Lepanto in 1571, the conflicts with Ottoman troops in Hungary in 1593 and the siege in Malta in 1620 can be cited as additional examples: many of the Arabic and Turkish manuscripts obtained during those historical events can be now found in a variety of European libraries, like the National libraries of Paris and Vienna; the University libraries of Oxford and Leiden; the Vatican library, and the Palatine library of Heidelberg.⁵¹

Nonetheless, not all the Arabic manuscripts in Europe were the result of battles and acts of piracy. Renaissance Arabists played also an important role and contributed to the collection of manuscripts, particularly the few who ventured abroad in various circumstances to further their knowledge. Amongst the most influential manuscripts of this kind were those acquired by Guillaume Postel during his visits to the East; despite being few, the selection of texts in his collection attracted the interest of many European Arabists of the late sixteenth and early seventeenth centuries,

44. *Ibid.*, 40.

45. This was due to the conflicts between Christian and Islamic states, and the policy of eradication of Islam in all aspects by the hands of the Inquisition. See Toomer, *Eastern Wisedome and Learning*, 17.

46. Jones' works are extremely insightful both with regard to the presence of Arabic speakers in Europe and the circumstances in which Arabic manuscripts arrived in Europe, particularly in the sixteenth century. Acknowledging his works for a more detailed account, it suffices here to report the most significant events to inform the discussion in the following chapters.

47. Jones, 'Learning Arabic in Renaissance Europe'. Na'matāllah donated his entire collection to the *Typographia Medicea* press as the basis for its library; only some of Abel's manuscript passed to the Medici, and others to the Vatican Library.

48. Plural of *madrasah*, Arabic term designating any type of educational institution, whether secular or religious.

49. Jones, 'Piracy, War, and the Acquisition of Arabic Manuscripts': 96.

50. *Ibid.*, 103. There are different accounts of this event, one of which reports that the Sultan's library consisted of seven thousand eight hundred books. During the fire of 1671, over half of the Arabic manuscripts at the Escorial were lost.

51. *Ibid.*

who 'either consulted, borrowed, or copied them', providing sources for their publications.⁵² Worthy of mention are also the manuscripts that François Savary de Brèves brought from Constantinople when he returned to Europe in 1608, after spending twenty-two years in the Near East: 'une bonne centaine, ce qui représentait alors, et de loin, la plus importante collection de manuscrits orientaux en France'.⁵³

It should also be noted that some Arabists contributed to the accumulation of manuscripts without leaving Europe, by entrusting diplomats, travellers and missionary agents to find and acquire some on their behalf.⁵⁴ Occasionally, it was possible to buy manuscripts in the West, especially in Venice, from a number of dragomans and merchants from whom European Orientalists could also learn the rudiments of Arabic and Turkish: it is known that Thomas Erpenius 'acquired some books in Arabic script' from a Venetian nobleman.⁵⁵

Finally, as Jones points out, it is important to question the relevance of the Arabic manuscripts accumulated in Europe to the development of Renaissance Arabic studies.⁵⁶ The shortage of people in Spain who could exploit the sources at the Escorial library meant that such a large collection was virtually inaccessible; whereas many of the manuscripts taken from Malta and brought to the Vatican library – mostly Muslim devotional texts – were of little interest in a time when Arabic printing in Rome was restricted to Christian Arabic texts and language primers. There is sparse evidence of European scholars using plundered Arabic manuscripts for their works; however, it seems clear that the Qur'ān was the most coveted text by pioneering Arabists, not only in the interests of preparing translations, but mainly because its fully vocalised text was an invaluable language primer.⁵⁷

Even more important for this study, although difficult, is to establish which manuscripts were directly connected with printed Arabic editions and, specifically, establish which ones were influential for the making of Arabic types. Some considerations in this regard are presented in Chapter 2. Meanwhile, it seems appropriate to give an overview of the development of the Arabic script, in order to lay out the basis necessary for the following discussion.

52. During his second trip to Palestine and Syria via Istanbul in 1549–1550, Postel acquired 10 manuscripts in Arabic, 1 in Ethiopic and 4 in Syriac: in the possession of by the Palatine Library of Heidelberg since 1555, they were later moved to the Vatican Library in 1622–1623. More manuscripts accumulated by Postel exist in other libraries. See Jones, 'Learning Arabic in Renaissance Europe', 33.

53. 'About hundred, which represented then, and by far, the largest collection of Oriental manuscripts in France', approximate translation by the author. See Gerald Duverdier, 'Les Impressions Orientales En Europe Et le Liban', in *Le Livre Et Le Liban Jusqu'à 1900: Exposition* edited by Camille Aboussouan (Paris: Unesco, 1982), 210.

54. Giovanni Battista Raimondi, Italian Orientalist and director the Typographia Medicea, dispatched abroad the agents Giovan Battista Britti and the Vecchietti brothers with this very task.

55. See Jones, 'Learning Arabic in Renaissance Europe', 39.

56. Jones, 'Piracy, War, and the Acquisition of Arabic Manuscripts': 103–04.

57. *Ibid.*, 105.

1.4 Development of the Arabic script

The Arabic script, whose earliest reference is historically known as *Jazm*, is a descendant of the North Semitic alphabet.¹ Its exact origins are still debated, although most scholars today agree that this system of writing had evolved during the 4th century from a type of Aramaic script used by the Nabateans, semi-nomadic tribes living in the Sinai peninsula and centred around the city of Petra, in southern Jordan.² Like most Arab nomads, they relied on oral tradition for communication and for the transmission of literature, which at the time mainly consisted of poetry; the primary evidence of the written language of the period has survived in the form of inscriptions.

According to historian Sheila Blair, there is no doubt that Arabic was ‘written in Arabia by the time of the Prophet Muhammad’: references to writing exist even before the advent of Islam in the seventh century, although the development of the Arabic script can be traced from the early seventh century onwards, through dated papyrus fragments and graffiti on stone with Arabic writing.³ These, in particular, serve as evidence of the everyday style, a free-flowing style used for transactions of daily life. In this early period, the written form of the Arabic script was also represented by a more formal style used for institutional purposes, and eventually for the writing of the Qur’ān. Since no dated manuscripts of the Qur’ān from this period survive,⁴ monumental inscriptions and numismatics provide evidence of this formal style.⁵

The Qur’ān, originally revealed and transmitted orally, was compiled and collated into a written record only after the death of the Prophet. A codified redaction of the Qur’ān is attributed to the third Caliph ‘Uthmān in 651; later copied in four or five identical editions, it was sent to the major Islamic provinces as a standard for all the subsequent copies of the Qur’ān.⁶ The earliest extant fragments of Qur’ān manuscripts – also known in Arabic as *maṣāḥif*⁷ – are written on parchment sheets in various rectilinear styles, generally designated with the term *kufic*. The appropriateness of the term is debated, and according to Blair ‘it should be taken not as the name of a specific script used at a certain time or place, but as a general rubric for

1. The *Jazm* script is considered influential in the development of several calligraphic variants, traditionally referred to with a name relating to their locality, such as *Makkī* of Mecca, *Madānī* of Medina. The *Kufic* style also derived its name from Kūfah, where it developed. See Yasin H. Safadi, *Islamic Calligraphy* (London: Thames and Hudson, 1978), 8–9.
2. The Nabatean hypothesis has been questioned by a more recent one, which traces the origins of the Arabic script in the Syriac alphabet. For a more in-depth analysis see Sheila Blair, *Islamic Calligraphy* (Edinburgh: Edinburgh University Press, 2008) and Nabia Abbott, *The Rise of the North Arabic Script and Its Qur’ān Manuscripts in the Oriental Institute* (Chicago: University of Chicago Press, 1939).
3. Blair, *Islamic Calligraphy*, 80.
4. Ibid., 105. According to Blair, there is no absolute method for dating any Qur’ān manuscript before the ninth century, like the fragments copied on parchment or paper discovered in 1972 in the Great Mosque at San’ā in the Yemen. However, several scholars have compiled lists of dated early Qur’ān manuscripts; according to Blair the best is that by François Déroche, ‘Les Manuscrits Arabes Datés Du IIIe/IXe Siècle’, *Revue des Études Islamiques* LV–LVII (1987–89): 343–79.
5. The style used for every day documents was not ‘carefully and consistently executed according to a specific standard’, and related more to ordinary handwriting than to calligraphy, see Blair, *Islamic Calligraphy*, 84–94.
6. Safadi, *Islamic Calligraphy*, 9.
7. Singular, *muṣḥaf*.

the angular style used in early Islamic times to transcribe the Koran.⁸ It is generally considered that the round (or cursive) styles – used by scribes in early Islamic times for correspondence and to transcribe non-Qur'ānic texts – replaced kufic in the late ninth or early tenth century for copying the Qur'ān, although different opinions exist.⁹

The transition from angular to round styles is not the only point debated by scholars; more questions are open regarding the standardisation of the round styles, and various reasonings have been put forward to explain why these were transformed from chancery hands into calligraphic styles worthy of being adopted for transcribing the Qur'ān and other important texts.¹⁰ It is not within the scope of this study to illustrate the process of refinement of the round styles; furthermore, there is extensive literature covering this matter. It will suffice to say that a formal standardisation took place in order to discipline the over twenty cursive styles that by the late ninth century were in common use.¹¹

The Abbasid vizier Ibn Muqla (d. 328/940) was credited with devising a new method (*ṭariqah* in Arabic) of writing – the *al-ḥaṭṭ al-mansūb*¹² – by using two systems that could be applied to formalise the round styles.¹³ One was based upon circles into which letters or parts of the letters would be inscribed, and the other was based upon the dot (*nuqṭa* in Arabic)¹⁴ as a unit of measurement: the size of letters was linked to the width of the nib of the pen, and therefore they would expand and contract appropriately as the nib changed sizes. The circle system was soon forgotten and now survives primarily as described in a history of the Seljuk Empire entitled *The Rāhat-Uṣ-ṣudūr Wa Ayat-Uṣ-Surūr* by Muḥammad ibn 'Alī Rāwandī, presented to the Seljuk sultan of Rum in 1207 (Figure 1.1).¹⁵ On the other hand, the nuqṭa system survived and is still used universally as the fundamental principle by which letters are proportioned (Figure 1.2).¹⁶

A later contribution to the standardisation is attributed to Ibn al-Bawwab (d. 413/1022), who 'revised and refined (the method of Ibn Muqla) and vested it with el-

8. Blair, *Islamic Calligraphy*, 104.

9. Scholar Estelle Whelan suggested that the use of these styles was simultaneous rather than successive, and it was related to calligraphers coming from different social groups. Religious scholars, members of the *ulamā*, were copying Qur'ān manuscripts in kufic on parchment, whereas scribes from secretarial class were not devout scholars, and wrote in round script (or cursive hand) on paper. See Blair, *Islamic Calligraphy*, 125.

10. Ibid.

11. Ibid., 17.

12. Literally, *ḥatt*=calligraphy and *mansūb*=related, in a wider meaning 'proportioned writing'.

13. No manuscript from Ibn Muqla's hand is known to exist. A treatise referred to by the title *Risāla fi al-ḥaṭṭ al-mansūb* attributed to Ibn Muqla survives in two known locations: Tunis, Bibliothèque publique (ms. Or. no. 672); and Cairo, Dar al-Kutub, no. 14. The treatise is a prose text that contains information about the preparation of the ink, the cutting of the reed pen, the letter-shaping and proportions. In the Cairo manuscript there are also additional 'drawings of letters that show their relationship to the circle and the number of dots making up particular letter dimensions and lengths'. It cannot be said if these are later additions. See David J. Roxburgh, 'On the Transmission and Reconstruction of Arabic Calligraphy: Ibn Al-Bawwab and History', *Studia Islamica*, no. 96 (2003): 47.

14. Plural, نُقَاط (nuqāṭ) or نِقَاط (niqāṭ).

15. Blair, *Islamic Calligraphy*, 211–12.

16. It is important to note that although the nuqṭa system is universal, the specific measurements expressed in dots change according to the specific calligraphic style. Moreover, different calligraphers may use different measurements (even for the same letter in the same style). Dr. İrvin Cemil Schick, scholar of Islamic art and calligraphy, e-mail message to author, 21 March 2016.

egance and splendor'.¹⁷ In the words of historian D. Rice, Ibn al-Bawwab maintained the systematised and proportioned alphabet of Ibn Muqla but achieved a 'gracefully flowing' style that was not geometric or mechanic.¹⁸ Nonetheless, the only surviving work is his hand is a famous Qur'an housed at the Chester Beatty Library, dated 391/1000–1,¹⁹ which by general acceptance is also the earliest surviving Qur'an to use round styles (Figure 1.3).²⁰ Moreover, a treatise on penmanship named *Rā'iyā Fi Al-Khatṭ* is also attributed to Ibn al-Bawwab, although it is a poem on writing more than a didactic guide to his method.²¹

The third great calligraphy master – after Ibn Muqla and Ibn al-Bawwab – was Yāqūt al-Musta'simī (d. 698/1298), who 'brought new consistency, fluency, and elegance to the art'²² and radically changed the method of Ibn al-Bawwab; he cut the nib of his *calamus* obliquely, obtaining thin and thick stroke contrast 'deemed to be more elegant'.²³ He also codified the rules of the major round (or cursive) styles that developed from the well-balanced and proportioned styles, known as *al-aqlām al-sittah* (the Six Pens, or calligraphic styles): *thuluth*, *naskhī*,²⁴ *muhaqqaq*, *rayḥānī*, *riqā'* and *tawqī'*.²⁵ The style of Yāqūt al-Musta'simī dominated the Six Pens until a succession of Ottoman master calligraphers developed his work with their personal take. The first to replace it was Shaykh Hamdullāh (d. 926/1520), who succeeded in creating a new original style around 1485;²⁶ this prevailed for more than 150 years, continued by Derviṣ Ali (d. 1084/1673) and his pupil Kayiszāde Hāfiẓ Osman (d. 1110/1698). The latter eventually developed his own style that replaced Shaykh Hamdullāh's towards the end of the seventeenth century, inspiring a younger generation of calligraphers. However, in the nineteenth century, the two incomparable calligraphers Kādiasker Mustafa İzzet Efendi (d. 1293/1876) and Mehmed Sevki Efendi (d. 1304/1887) interpreted Hāfiẓ Osman's style differently, and became the most prominent representatives of two different schools of calligraphic practice, which persist down to the present.²⁷

17. Blair, *Islamic Calligraphy*, 161.

18. D.S. Rice, *The Unique Ibn Al-Bawwab Manuscript in the Chester Beatty Library* (Dublin: Emery Walker, 1995), 86.

19. According to Blair there are six manuscripts with colophons naming Ibn al-Bawwab, of which the Qur'an codex at the Chester Beatty Library is the most famous, see Blair, *Islamic Calligraphy*, 162.

Note that the name on the Qur'an manuscript is 'Ali ibn Hilal, commonly known as Ibn al-Bawwab.

20. Although there is not accordance amongst scholars on the naming of the styles used in this Qur'an.

21. Only the introduction survives. See Roxburgh, 'On the Transmission and Reconstruction of Arabic Calligraphy': 47.

22. Mohamed Zakariya, 'History & Development of Calligraphy', accessed 6 October 2016, <http://mohamedzakariya.com/history/arabic-islamic-calligraphy/>.

23. However, see § 2.1 for a discussion regarding the term elegant. Ibn Muqla also preferred the reed pen cut at an angle: in his treatise, he recommends that the right part of the pen is a little higher than the left. See Hassan Massoudy, *Calligraphie Arabe Vivante* (Paris: Flammarion, 1998), 28.

On the other hand, it is known that Ibn al-Bawwab 'favoured a calamus whose nib had been cut absolutely straight. By this means he obtained strokes of unvarying width', see Rice, *The Unique Ibn Al-Bawwab Manuscript*, 86.

24. In this thesis spelled henceforth as *tulut* and *nash*.

25. These (and other types of writing widely used like *mağribi* and *nasta'liq*) are often referred to as *scripts*. Nonetheless, to avoid confusion, in this thesis they are designated as styles whereas the word script is used exclusively to indicate Arabic as a writing system.

26. 'This accomplishment promoted him to the position of spiritual founder (*pīr*) of Turkish calligraphy'. See Uğur M. Derman, 'The Art of Calligraphy in the Ottoman Empire', in *History of the Ottoman State, Society & Civilisation*, edited by Ekmeleddin İhsanoğlu (İstanbul: IRCICA, 2003).

27. See Derman, 'The Art of Calligraphy' and from the same author, *Eternal Letters* (Sharjah, U.A.E.: Sharjah Museum of Islamic Civilization, 2009).

The process of standardisation of the Arabic script did not happen only formally with the evolution of calligraphic styles as discussed earlier, but it also influenced functional aspects of the script. Firstly, the consonants that shared the same base-form, or *rasm*, were differentiated with a system of dots placed above, below or within a particular letter (al-Hajjāj's system of letter-pointing, Figure 1.4).²⁸ Secondly, a system of *diacritical marks* was devised to represent elements of the speech that did not have a symbol, referred to as *taškil* (vocalisation). The original system of Abū l-Aswad (d. 688 A.D.) used coloured *diacritical dots* for the vowels; it was later replaced with the system of al-Khalil (d. 786 A.D.) of eight new diacritical marks, to avoid confusion when used simultaneously with Hajjāj's system of letter-pointing (Figure 1.5).²⁹ The systems of Hajjāj (d. 714 A.D.) and al-Khalil were later merged into a system that with little modifications is universally used today.³⁰

Features of the Arabic script

Arabic is the most widespread example of a consonantal script, known in linguistics terminology as an *abjad*.³¹ It contains symbols for consonants only, with the exception of *ال* (alif), *و* (wāw), and *ي* (yā'), which represent the three long vowels required in writing (ā, ū and ī respectively).³² As mentioned earlier, the original system of 18 characters derived from Aramaic and used to record sounds, was expanded to the current 28 with the help of diacritic dots.³³ Moreover, it was adapted for writing languages other than Arabic, to provide for a different phonemic range: Persian, for instance, requires four additional letters for *پ* (pe) *چ* (če) *ژ* (že) *گ* (gāf).

As a consonantal language, Arabic can be written omitting the short vowels, although they exist as sounds. The vowel diacritics (*harakāt*) placed above or below the letters aid the correct reading of a word, although they are rarely used in everyday books and newspapers. Full vocalisation is maintained for poetry and religious texts like the Qur'ān, where strict rules apply for the correct recitation (*taqwīd*) and the correct reading, to ensure that no meaning of the sacred text is changed (Figure 1.6). Moreover, full vocalisation is also found in books for learners of the Arabic language, including children's books. The unvocalised word in Arabic can carry different meanings depending on the vocalisation. The reader has to rely on the context to decide which reading is correct, making this an arduous task for beginners, who have to infer not only the short vowels but also other orthographic signs (e.g. *šaddah*, which indicates the consonant doubling):

28. Safadi, *Islamic Calligraphy*, 13–14.

29. Ibid. The eight marks indicated the short vowels *fathah* (a), *dammah* (u), *kasrah* (i); the *hamzah* (a glottal stop), the *maddah* (vowel prolongation), the *šaddah* (doubling of consonant), the *sukūn* (vowelless) and the *waṣlah* (joining). In this thesis, the term diacritical marks refers to the vowels and other signs for reading, while the term diacritical dots is used to indicate the dots exclusively. In other sources (like Blair, *Islamic Calligraphy*) the term diacritical marks is used to indicate both.

30. The system of placing vowel marks above and below the letter and the use of diacritical points to distinguish letters otherwise identical had been both adapted from Syriac. See R. F. Hosking and G. M. Meredith-Owens, eds., *A Handbook of Asian Scripts* (London: The Trustees of the British Museum, 1966), 17.

31. 'A type of writing system that denotes only consonants', Peter T. Daniels and William Bright, *The World's Writing Systems* (New York: Oxford University Press, 1996), xxxix.

32. Ibid., 561. According to this source, the common designation of Arabic as consonantal is incorrect, because the consonant elongation is not represented, whereas the long vowels are.

33. For the Arabic abjad see the 'Scheme of Transliteration' in this thesis, xxi. Adapted from Daniels and Bright, *The World's Writing Systems*. The transliteration system of the Deutsche Morgenländische Gesellschaft (DMG) is used in this thesis (except a is used for alif).

علم	<i>'ilm</i>	knowledge
علم	<i>'alam</i>	flag
علم	<i>'allama</i>	taught
علم	<i>'alima</i>	he found out
علم	<i>'ulima</i>	understood

The process of deriving meaning from context is facilitated by a system of roots, common to other Semitic languages: each root (a sequence of three, or sometimes four consonants) pertains to a semantic field with a wide array of potential meanings, depending on grammatical transformations according to regular patterns. As in the example below, the root *k-t-b* ك-ت-ب is related to writing (كتب *katb*); most words that have to do with this meaning are derived from that root, through modifying patterns of vowels, and sometimes also adding certain consonants:

مكتبة	<i>maktabah</i>	library/bookstore
مكتب	<i>maktab</i>	desk/office
مكاتب	<i>makātib</i>	desks/offices
مكتوب	<i>maktūb</i>	written
تكتب	<i>taktabu</i>	she writes
نكتب	<i>naktabu</i>	we write

In the development from Aramaic, the Arabic script did not maintain a monumental form, with letters separated from each other, but used only a cursive form, in which the letters connect when written in sequence.³⁴ This connection between letters is of two kinds: horizontal (right-to-left) and vertical (top to bottom); this feature is present in all major calligraphic styles of the Arabic script, from the oldest kufic to nash (Figure 1.7).³⁵

Although Arabic is generally described as a connected script, the joining of letters is inconsistent. All the letters connect on both sides to what precedes and follows, except for six letters – ا (alif), د (dāl), ذ (dāl), ر (rā'), ز (zā') and و (wāw) – that can only be connected on the right side with the preceding letters. This behaviour causes breaks in the image³⁶ of a word (Figure 1.8).

Another characteristic of the Arabic script is that it is bi-directional: while the text runs from right-to-left, the numerals are written left-to-right. Moreover, there is no distinction between capitals and lowercase letters. Nonetheless, the shape of letters varies depending on their position in a word (initial, medial, or final); whether they connect with other letters (from both sides, one side or if they stand isolated)³⁷ and according to the type of connection that they form with the neighbouring letters (preceding and following) (Figure 1.9). The high adaptability of letterforms is a vital feature of the Arabic script and is discussed in greater depth in the following chapters.

34. Arabic is semi-cursive script, but is generally referred to as cursive because the majority of letters connect.

35. Thomas Milo, 'Arabic Script and Typography. A Brief Historical Overview', in *Language Culture Type. International Type Design in the Age of Unicode*, edited by John D. Berry (New York: ATypI Graphis, 2002), 114.

36. The term image means in this context the graphic representation of the word in a particular script.

37. The term unconnected is also used in this thesis to indicate the isolated position of a character.

2 ARABIC MANUSCRIPTS: A MODEL FOR PRINTING

With the birth of Islam, the Arabic script was adopted by virtually all people who embraced this faith, by birth or conversion, regardless of national boundaries;¹ in this sense, the writing system belongs to the religion,² rather than the language.³ The visual form of Arabic is closely bound to its calligraphic tradition, rooted in the need of recording and preserving the accuracy of the Sacred Word. As the vehicle for the revelation, Islamic calligraphy⁴ was invested with significance beyond communication; eventually, it developed not only as an artistic form of writing but as 'the supreme art of the Islamic world'.⁵

The art of penmanship was so important that treatises on the principles of calligraphy appeared as early as the ninth and tenth centuries, mostly containing advice and remarks on the aesthetic and technical aspects of writing.⁶ From these early Islamic sources were also extracted classical Arabic metaphors on calligraphy, the reed pen, and the importance of vocalising the text, by famous philosophers, calligraphers, statesmen and others; these often occur in contemporary literature.⁷

The development of Islamic calligraphy manifested through the evolution of a diversity of styles, each with their own features. The tools employed in calligraphy –  (qalam, the pen) – their requisites and use dictated the appearance of the written script and the peculiar characteristics of each style.⁸

1. Derman, *Eternal Letters*, 8.

2. Although, as seen in § 1.4 the Arabic alphabet historically predates Islam.

3. For instance, a non-Muslim person living in a Christian environment in the Middle East would write his language (Arabic) with Syriac letters and not Arabic letters. To this day there is an expression in Lebanese dialect saying 'you are talking Karshuni' meaning 'I don't understand what you are saying (= you are talking Arabic with Syriac letters)'. Thomas Milo, personal conversation with the author, 28 March 2015. The idea that scripts follow religions not languages was originally noted by David Diringer, *The Alphabet: A Key to the History of Mankind* (New York: Philosophical Library, 1948).

4. 'Although the term "Arabic calligraphy" is certainly apt for the birth and early stages of the art, it is more appropriate to speak of "Islamic Calligraphy" in recognition of the broad scope it gradually acquired'. Derman, *Eternal Letters*, 8.

5. Marcus Fraser and Will Kwiatkowski, *Ink and Gold: Islamic Calligraphy* (London: Published for Sam Fogg by Paul Holberton, 2006), 9. Calligraphy had various applications beyond paper-based work, the most important of which was the use in architecture to adorn mosques and other monumental sites.

6. As seen in § 1.4 with the treatise attributed to Ibn Muqla.

7. See Franz Rosenthal, 'Abū Ḥaiyān Al-Tawḥīdī on Penmanship', *Ars Islamica* 13–14 (1948). Two of these classic metaphors are: 'Calligraphy is a spiritual geometry achieved with material instruments' and 'Calligraphy is music for the eyes'. See Derman, *Eternal Letters* and Mohamed Zakariya, *Music for the Eyes: An Introduction to Islamic and Ottoman Calligraphy* (Los Angeles: Los Angeles County Museum of Art, 1998).

8. According to the style and the calligrapher's preferences (e.g. the way he holds the pen, the orientation of the writing surface) the nib of the reed is cut at a different angle. The angled nib produces a fine line when moving perpendicular from top to bottom, and a thicker one when moving the pen from right to left; altering the angle of the pen to the work, the calligrapher can achieve different subtle effects. Moreover, besides the direct relationship between the size of the nib and the proportioning of the letters, some calligraphic styles require differently-sized reed pens to obtain the desired result (e.g. the shaping of characters in the nasta'liq style requires two pens whose nibs' width are one a third of the other). See Derman, *The Sultan's Signature*, 10 and Massoudy, *Calligraphie Arabe Vivante*, 16–17.

The various calligraphic styles were employed according to the purpose of writing, whether it was for the practical everyday use or more formal requirements. Moreover, the characteristics of individual styles lend some to be better fitted to specific roles at particular times, and to satisfy needs ranging from personal communication to business, to government bureaucracy (state correspondence, finance and chancery), education and religion. Of all the styles, *نسخ* (*nash*, copying) was particularly suited to transcribing long texts and therefore was largely used for the production of manuscripts, whether containing poetry, scholarly or religious work. The remarkable clarity of *nash*'s letterforms made it also the preferred choice for writing the Qur'an, for which that particular trait was extremely desirable.⁹

It is not surprising that *nash* was also the style that was first adopted for the typographic representation of the Arabic script, although it should be noted that this was not necessarily an intentional choice. The earliest Arabic metal types produced in Italy in the sixteenth century bear a closer relationship to the letterforms of *nash* style, nonetheless influences of *تُلْتُ* (*tulut*) and *مَغْرِبِي* (*mağribi*) styles can be noticed.¹⁰ Other calligraphic styles, like *نَسْتَلِيق* (*nasta'liq*) and *رُقَّة* (*ruq'ah*) were also translated into movable types but they appeared much later, in the late eighteenth and late nineteenth centuries respectively.¹¹

The *nash* style, which is the focus of this study, developed in different countries according to local taste¹² but reached its most accomplished form in Ottoman calligraphy, following the contribution of a succession of master calligraphers like Shaykh Hamdullah, Hâfiz Osman, Kâdiasker Mustafa İzzet Efendi and Mehmed Şevki Efendi.¹³ Each calligrapher interpreted *nash* differently, developing a personal way of executing the letterforms (this was also called style or school): the ones that gained more followers became established and gained acceptance, and their works are still admired today as the most refined masterpieces.¹⁴ According to a popular adage in the Islamic world, 'the Qur'an was revealed in the Hijaz; it was best recited in Egypt and best written in Istanbul'.¹⁵

2.1 Authentic Arabic and calligraphic elegance: more than beauty that meets the eye

Islamic calligraphy is relevant not only on historical grounds but more importantly for the crucial contribution in the shaping of the Arabic script and the development of its identity. Calligraphy is often mistaken as guidance solely for the proportioning of the letters, whereas it embodies the most authentic representation of the script as a whole, structurally and aesthetically.

9. It is reported that more Qur'âns have been written in this style than all the others collectively, see Safadi, *Islamic Calligraphy*, 62.
10. As discussed in the methodology for the analysis of types, Chapter 4.
11. The first *nasta'liq* movable type was developed in India and attributed to English Orientalist Charles Wilkins; the first *ruq'ah* movable type was produced in Turkey by Armenian printer Ohannes Mühendisyan.
12. From Iran to India, see Annemarie Schimmel, *Calligraphy and Islamic Culture* (London: Tauris, 1990), 24.
13. These calligraphers are renowned for their mastery in a variety of styles and not exclusively for *nash*.
14. This is also not exclusive to *nash*.
15. Derman, *The Sultan's Signature*, 21.

The nuqṭa system¹⁶ formulates prescriptive rules for balanced, harmonious and disciplined letters, not only individually but also in relation to each other.¹⁷ Nonetheless, these *rules for script proportion* are not sufficient on their own to describe the Arabic script in all its features, particularly in relation to the interaction between adjacent letters and the formation of words. For those, more prescriptive rules are provided, in a system that governs the behaviour of the letters. The *rules for script behaviour* serve as text enhancements for both aesthetic and legibility purposes: on the one hand, they provide the script with alternative forms to enrich the appearance of the text (and thereby avoid repetitions); on the other, they provide solutions that help improve its legibility.¹⁸

As previously mentioned, the calligrapher has a degree of freedom that allows him to develop his own way of doing things (personal style): therefore, while adhering to the system, he has room for personal preference in the execution (e.g. the choice of particular letter combinations or the way they connect). Proportional and behavioural rules of the Arabic script were laid down by master calligraphers over centuries and transferred from teachers to students as benchmarks in practising calligraphy on their path to obtaining the *إجازة* (*ijāzah*, permission), a licence that recognised their competence.¹⁹

For an external observer, the careful observation of Islamic calligraphic works can help to identify patterns and isolate elements that give the Arabic script its characteristic appearance but without script-education it is difficult to fully grasp the underlying and unspoken system of rules.²⁰ Superficial observation perceives primarily the aesthetic qualities of the script rather than the subtleties of its system. A sense of balance, harmony and rhythm can be noticed, but the cause of it might escape the observer: hence words like beautiful or elegant are often used for the description of the Arabic script.²¹ In a more general sense, the system of rules is a guideline for the appropriate and correct way to write Arabic; although it stems from calligraphy, it is ingrained in the culture of Muslim communities as part of the learning process of the Arabic language and writing system. In other words, Muslim educated people

16. See § 1.4.

17. As mentioned in § 1.4, the exact numerical values for the measurements can change among different calligraphers, making them subject to personal preference: nonetheless the system itself is prescriptive.

18. These rules can vary from one style to another. The rule-based system for the shaping of Arabic has been highlighted and extensively discussed by Thomas Milo in his work. The *script grammar* (term adopted by Milo to refer to it) is at the basis of his typographic analysis of the script. See Thomas Milo, 'Arabic Typography', *Encyclopedia of Arabic Language and Linguistics*, 2011, accessed 28 October 2016, http://dx.doi.org/10.1163/1570-6699_eall_SIM_000043.

19. This was achieved when the student was able to perfectly imitate the work of a calligraphy master: receiving the licence would grant him the right to sign his own work.

20. Arabic script-education can be achieved in different ways. Whilst it is part of the schooling system for Muslim educated people, it can be attained by non-Muslims through in-depth study of the script. In both cases, calligraphic training contributes to the understanding of the script as a system and additionally develops the manual skillset for the written execution of the letterforms according to the different styles. Further discussion follows in this section.

21. See for instance the description of the nineteenth-century British Orientalist William Wright in Figure 8.1. Wright uses the expressions 'elegantly printed books' and 'elegant Eastern founts' to describe those books and types that reproduce the Arabic script according to manuscript practice. However, it could be argued that the term 'elegance' is used in this context as if to designate an ornamental feature of handwritten Arabic, thus at surface level, rather than an integral part of the script for its shaping. In other words, Wright confuses the aesthetic appeal of the script with what are essential script rules to validate it; by doing so, he suggests that these can be dismissed, for instance, for the convenience of printers.

(who are not calligraphers) can produce structurally and linguistically correct Arabic text without the aesthetic quality and the manual mastery to make it calligraphic; therefore they have *language and script expertise*,²² but no particular *technical skills* in the manual *execution*.²³ Clearly, all these elements determine the *competence* with which persons who write reproduce the script and consequently impact the overall quality of the manuscript they produce.²⁴

There are no historical sources with a clear step-by-step explanation of the rules, but they can be gathered from the works of master calligraphers; amongst their production, *مَسْقٌ* (*maṣq*, exercise) are probably the most useful for this purpose (Figure 2.1 and Figure 2.2).²⁵ These are calligraphy practice sheets used didactically to teach beginner students the shaping of single and connected letters in different styles: students would practice the letters one by one, then in pairs, until the master was satisfied. The practice of words and sentences was added only at a second stage, to teach more advanced students how to compose the letters into lines, usually using Qur'ān verses, poetry or aphorisms (Figure 2.3).²⁶ It is important to note that *nash* style allows only for a disposition of words arranged along a line and does not lend itself to other kinds of constructed compositions. On the other hand, *tulut* and *jalī* (large) *tulut* styles allow calligraphers more manipulations in terms of composition and arrangements of letters: additional rules apply for these features in particular (Figure 2.4).²⁷

Amongst contemporary sources, manuals of writing for calligraphy students provide similar information about the structure of the Arabic script. The most well-known and widely used today is by renowned Iraqi master calligrapher Hāsim Muḥammad Al-Baġdadi, entitled *قواعد الخط العربي* (*Qawa'id Al-ḥaṭṭ Al-Ārabi*, Rules of Arabic calligraphy), published in 1961 (Figure 2.5). This booklet contains the guidelines for seven styles: *tulut*, *nash*, *nasta'liq*, *diwani*, *jalī diwani*, *ruq'ah* and *ijaza*;²⁸ it is particularly useful for the purpose of this study because it offers a more detailed explanation of the system of rules, by breaking it down with a short title and providing accompanying visuals.²⁹

Amongst the rules illustrated for the *nash* style, there are: the letters that can be stretched (Figure 2.6); variations of *bā'* letterform – and others in the same letter

22. Also referred to in this thesis with the term *knowledge*.

23. The distinction between structure and form and their individual appreciation is important in the evaluation of Arabic manuscripts and Arabic types, and is further discussed in the following section.

24. These highlighted terms are also employed in Chapter 3 when discussing type-makers of Arabic movable type. Thomas Milo defines the skills in execution as *performance*, and the knowledge as *competence*. In the typographic reproduction of the Arabic script, the performance refers to the graphical appearance of the script, the variation tolerable; whereas the competence refers to the correctness of the script, measured with the presence of script grammar. Thomas Milo, personal conversation with the author, 28 March 2015. See also Thomas Milo, 'Arabic Typography'.

25. They generally combine *tulut* and *nash* styles, which were often taught together, while *nasta'liq* was usually studied separately.

26. The lessons on single and double letters were called *mufradāt*, whereas the *murakkabāt* were the more advanced exercises. See Derman, *The Sultan's Signature*, 126.

27. See Derman, *Eternal Letters*, 15.

28. For the *ruq'ah* style, there is another teaching material that is highly regarded amongst Arabic specialists: T. F. Mitchell, *Writing Arabic, a Practical Introduction to Ruq'ah Script*, first ed. (Oxford: Oxford University Press, 1953).

29. The explanation is more explicit for *tulut* and *nash* styles than the others.

group,³⁰ like tā', ṭā', yā' and nūn – in initial and medial position, depending on the connecting letter (Figure 2.7); the practice to design taller teeth³¹ to help legibility and avoid ambiguities when a sequence of toothed letters occurs in the same word (Figure 2.8);³² the closed form of initial ḡim – or ḥā' and ḥā' – to be used instead of the open one when an ascending letter follows – like lām, alif, dal, ḍal, kāf (Figure 2.9); the dip in the connection of the letter lām in initial and medial position, when followed by an ascending letter – like lām, alif, dal, ḍal, kāf (Figure 2.10).

It is worth remarking that in historical sources the Arabic script is segmented in individual letters only if these are represented in their isolated form, otherwise, they always appear in pairs, words or sentences.³³ This practice signifies that the letters have a defined form only when existing on their own, whereas they assume a variety of forms depending on which other letters they are interacting with and the kind of connection they create with one another. The letters are therefore extremely mutable and highly adaptable, features that contribute to the visual richness of written Arabic but that could not be entirely and successfully reproduced in the adaptation of the script to different technologies:³⁴

The result is that the individual letters in a well-written piece of text are in constant motion, like dancers in a polonaise: In the course of the dance, they bow at each other, embrace each other, push each other away, hug each other's neck and fall at each other's feet – and there are some real acrobats among them. Thus well-written Arabic texts feel alive to the readers, whereas mechanically typeset ones feel like graveyards: At their best they are only still photographs of the calligrapher's living, moving polonaise.³⁵

This metaphor highlights the fundamental difference between the static nature of Arabic typeforms compared to the dynamic nature of their written counterparts and also taking into account how this translates in the eyes of the reader.

In investigating the typographic representation of Arabic, it is important to isolate the reasons that caused the shortcomings in the translation of the script into print, to question whether the technological limitations can be solely responsible for the faults that can be found in Arabic foundry types. It seems clear that understanding the structure of the Arabic script – embodied in the calligraphic tradition – is the first fundamental requirement for its proper appreciation and the successful transition from the written medium to the technological approach.³⁶ Acknowledging that the structure – an efficient, rule-based system designed to provide legibility – is

30. With the term letter group is intended the group of letters that share the same base-form without the diacritic dots.

31. Meaning toothed letters with raised strokes.

32. Milo defines this rule with the term *dissimilation*, an 'essential reading aid and design feature'.

It should be noted that the system of dissimilation is also applied in other ways, for instance by stretching the horizontal connection before or after a certain letter (e.g. to disambiguate the letter sīn, when in combination with other toothed characters, instead of raising its denticles). See Milo, 'Arabic Script and Typography', 119.

33. In Hāšim's book letters are occasionally shown individually also in their initial, medial or final forms (only for ṭulūṭ and nash̄ styles). This is part of the effort in breaking down the system of the Arabic script and make it more explicit for the students studying calligraphy.

34. Lithography is the only exception, which also explains the great success of this method of printing amongst Arabic native readers, and the method of choice for the reproduction of the Qur'ān.

35. Eildert Mulder, 'Keyboard Calligraphy', *Saudi Aramco World* 58, no. 4 (2007): 34–35.

36. This thesis focuses on the movable metal type technology, but similar considerations for Arabic type-making can be made also for hot-metal types and current digital type design practice.

part of Arabic script's morphology,³⁷ allows the type-makers to focus on the essential requirements of the script, and most importantly to recognise them as such. Only upon this realisation, it is possible to approach the task of type-making with the necessary knowledge to inform decisions along the process (i.e. devise the methods that can best comply with the requirements, despite the constraints).

A formal breakdown of the calligraphic rules of Arabic proves difficult to find outside writing manuals: nevertheless, two attempts can be found in one sources from the nineteenth century by German Orientalist Hellmut Ritter³⁸ and another from the twentieth century³⁹ by German scholar and typesetter Carl Faulmann. In both their works, the rules are presented as fundamental tools for proofreading and composing Arabic texts.⁴⁰

The typographic image of the Arabic script that originated from the first attempts of sixteenth-century European type-makers inevitably reflected their ill-informed decisions and carried the compromises imposed by inadequate knowledge or technological limitations. In the following chapters, both aspects are discussed to gather which elements can be attributable to one or the other.

This is valuable information not only for Arabic typographic history but particularly relevant to question current Arabic type design practice. The latter largely follows an established typographic approach, which is ultimately rooted in conventions derived from metal type: some of the compromises discussed for Arabic foundry types are indeed still familiar issues in Arabic digital fonts, which are not short of evidence in this regard.

One of the most widespread misconceptions about the Arabic script originated from historical typographic practice, which assigned one individual form for each position of the letter in a word merely for an efficient use of the Arabic type. Consequentially, the four positions of isolated, initial, medial and final⁴¹ turned into the four *definite* forms of each Arabic letter instead of being appreciated as the *minimum* number of forms assignable for each position within the restriction of printing technology, discarding all the other variations possible (Figure 2.11).⁴² This approach was

37. The term morphology in linguistics is defined as the 'study of the internal structure of words'. See Mark Aronoff and Janie Rees-Miller, eds., *The Handbook of Linguistics* (Malden, MA: Blackwell Publishers, 2000), 543. In the context of this thesis, and in relation to the Arabic script, this term is used to indicate the system of rules that govern the formation of words, including the context-driven form variations of letters, and the placement of diacritical marks (dots and vowels for vocalisation).

38. Carl Faulmann, *Das Buch Der Schrift, Enthaltend die Schriftzeichen und Alphabete aller Zeiten und aller Völker des Erdkreises* (Wien, 1880).

39. Hellmut Ritter, 'Über Einige Regeln, Die Beim Drucken Mit Arabischen Typen Zu Bestachten Sind', *Zeitschrift der Deutschen Morgenländischen Gesellschaft* 25, no. 100 (1950): 577–80.

40. Ritter in particular laments the fact that calligraphic rules are ignored or violated by Orientalists and are not mentioned in Arabic grammar books. He recommends 'to make it a habit to obey to these rules when starting writing texts in Arabic script. It will avoid many corrections afterwards', see Ritter, 'Über Einige Regeln', 578.

41. Or two, isolated and final, for those letters that connect only on the left-hand side (alif, dāl/dāl, rā'/zā' and wāw).

42. An example of this misconception is in Lucien Alphonse Legros and John Cameron Grant, *Typographical Printing-Surfaces: The Technology and Mechanism of Their Production* (London: Longmans, Green & Co., 1916), 540: [...] the alphabet has twenty-eight letters, but these require ninety-eight sorts for their representation under various conditions of positions', implying that these were the only required for the representation of the script. For this reason, it is more appropriate to refer, for instance, to the 'form' of a letter in 'medial position', rather than the 'medial form' of a letter: which particular form the letter is going to take depends indeed from the context. See §

used in type-making to replicate the image of particular combinations of letters on individual sorts⁴³ by turning them into ligatures. The latter were in fact an attempt to maintain some of the *morphological behaviour* of the Arabic script (i.e. the internal structure of words and the rules governing their formation, to improve the legibility and enhance the aesthetic), which type-makers could observe in the models, perhaps without understanding why the behaviour was there in the first place. As a result, only random⁴⁴ combinations of letters were selected and others, which could have also been represented as ligatures, were not.

It is worth pointing out that the term *ligature* to indicate these letter compounds in Arabic is slightly misleading, particularly if compared with the use of the term for the Latin script. In the latter, ligatures were historically used to solve some letter pairs that would otherwise collide (i.e. ff, fi, fl, ffi, ffl): for this reason, they were designed on single punches and cast on individual sorts.⁴⁵ It is clear that for the Latin script the practice of joining separate letters into a merged design is an exception; on the other hand, for Arabic, is the rule. Although in Arabic typographic practice the use of ligatures allowed to ‘approximate the desired appearance of authentic Arabic text [...]’, it needs to be understood that this is a technical solution to a technical problem, and not an inherent feature of the Arabic script.⁴⁶

Finally, it is worth noting that the letter combinations designated as ligatures in Arabic typography – included in the character set of a particular typeface – are not always the same but vary according to the personal choice of the type-maker. Being generated by the rule-based system, these letter compounds turned into typographic ligatures capture only some of the possible array of variations that, in manuscript practice, are generated when certain groups of letterforms interact dynamically with each other.

A more recent approach to Arabic type design, developed by DecoType,⁴⁷ puts forward the idea that an authentic typographic representation of the script that captures ‘the spirit of Arabic writing’⁴⁸ is possible, provided that the technology – built around the script’s requirements – is founded on a sound understanding of the Arabic structure. In this way, Arabic is not ‘an *object* that can be adapted at will’, but ‘the *subject* whose integrity needs to be preserved when it is reproduced in digital

3.1 for a more in-depth discussion about variants.

43. The sort is designated as the individual unit or module carrying the design of a character. The term component might also be used in this thesis.
44. Perhaps the most recurring ones, or particular combinations needed to set a specific Arabic text. See § 3.2.
45. To this standard set of ligatures, other pairs are added as required to set different languages, or for archaics and ornamental purposes. In digital fonts ligatures are usually divided between *basic* and *discretionary*; ligatures can be avoided altogether by tweaking the design of the individual letters to avoid collisions. See Robert Bringhurst, *The Elements of Typographic Style*, 3rd ed. (Point Roberts, WA: Hartley & Marks, Publishers, 2004), 50–53.
46. Milo, ‘Arabic Script and Typography’, 123–24. Having clarified the difference, the term ligature is still used in this thesis to designate the discussed letter compounds in the Arabic script. Firstly, for practical reasons; second, because in terms of movable type technology it indicates a single punch or sort carrying two or more letters joined together into a single character.
47. DecoType (DTP) was founded in 1985 by Thomas Milo, along with Mirjam Somers and Peter Somers. It specialises in Arabic typography, offering the most advanced technological tool (*Tasmeem*) for the accurate digital rendering of the Arabic script.
48. WinSoft-DecoType, *Tasmeem Manual*, 2010, accessed 16 December 2017, http://www.decotype.com/pdfs/Tasmeem_Manual.pdf.

form'.⁴⁹ The proposed technological solution is based on the concept of calligraphic pen strokes, rather than complete individual letterforms. Exploiting the repetitive nature of Arabic writing, 'a small set of sub-letter elements' handled by a computer software can provide fully functional fonts with Unicode compliance, which implement the rule-based system that governs the shaping of Arabic in the calligraphic tradition.⁵⁰ DecoType's approach to the Arabic script promotes an analysis of the script that differs from the conventional notions: the synthetic nature of the writing system, in the connection of letters to form words, is favoured over the analytical approach that developed from typographic practice (Figure 2.12). Furthermore, DecoType's concept replicates calligraphic practice, where letters have finished forms only if unconnected, whereas they have a different appearance depending on the connections they form with other letters.⁵¹

49. Thomas Milo, *Arabic Script Tutorial for Unicode Implementation - 2005-2012*, 2016, accessed 16 December 2017, https://www.academia.edu/3660509/Arabic_Script_Tutorial_for_Unicode_Implementation_-_2005-2012.

50. See Thomas Milo, 'Authentic Arabic: A Case Study. Right-to-Left Font Structure, Font Design and Typography', *Manuscripta Orientalia* 8, no. 1 (2002): 57 and WinSoft-DecoType, *Tasmeem Manual*.

51. The DTP Naskh typeface has been chosen to typeset digital examples of the Arabic script in this thesis because 'based on an exhaustive analysis of Ottoman manuscript practice [...] faithfully captures the historical Naskh as it evolved from practical calligraphy', therefore it serves as a useful tool in the analysis of Arabic foundry types. See WinSoft-DecoType, *Tasmeem Type Specimen Book*, 2009, accessed 9 February 2018, <https://www.decotype.com/pdfs/tasmeem48p%20brochure.pdf>.

2.2 Identifying and defining models

The written form of the Arabic script is the starting point of this study, whereas its typographic representation is the focus: the two are strictly related to each other and share the aim of reproducing the script with different media (i.e. writing and printing). The qualitative appraisal of Arabic typeforms, which follows in the next chapters, is validated only in comparison with manuscript practice, for which benchmark models are required.¹ These are identified and selected amongst the variety of resources available and contain either calligraphic or chirographic representations of the Arabic script. The relevance of a particular manuscript is established by its relationship to the printed work or type under discussion as documented in the extant sources; moreover, a particular manuscript may be chosen as a benchmark model of good calligraphic practice or because it fits a specific purpose in the analysis of Arabic types.

Ideally, a type should be compared with the model it was based on (either copied or inspired). However, this happens rarely because either the manuscript has not survived – especially when dating as early as the sixteenth century – or it has not been recorded in the sources. When the comparison with the direct model is not possible, alternative models should be used as reference to support different aspects of the discussion in the evaluation of the typeforms (e.g. proportions, aesthetic preferences, script behaviour). Clearly, calligraphic representations of the script provide the best models in terms of script representation according to different styles, and they should be therefore preferred.² Nonetheless, chirographic manuscripts produced without formal calligraphic training are also informative resources for standard practices of Arabic penmanship.³

Critical assessment of Arabic manuscripts

It is important to note that once the relevant Arabic manuscripts have been identified, they should also be critically assessed in order to gauge their own value as benchmark models: this is particularly significant if they were instrumental in the shaping of the types.

As briefly mentioned in the previous section, the competence of the authors (level of technical skills, language and script expertise) contributed to defining the quality of the manuscripts they produced and has to be taken into account especially when the reproduction of the script is under scrutiny. People producing written texts were designated with different terms: the copyists (in Arabic *nāsīḥ*, *nassāḥ* or in earlier times *warrāq*), ‘who, in the absence of the printing press, routinely transcribed manuscripts, generally produced works that cannot be qualified as calligraphy. Their importance is only as historical documents’.⁴ The profession of scribe embraced people with all levels of education. Paid copyists were employed by authors, scholars or wealthy men who had an interest in producing recorded texts,

1. The use of manuscript models allows an immediate visual comparison of typeforms with their written peers. Furthermore, it supplies evidence of whether the printed source is a valid representation of a given written document, exposing eventual shortcomings that have occurred in the translation of the written word to its typographic image.
2. They should be chosen amongst the work of renowned master calligraphers, some of whom were mentioned in the previous section.
3. Some features, particular letterforms or letter combinations found in Arabic foundry types that are not familiar to Islamic calligraphic practice might indeed reproduce the behaviour of the script observed by the type-maker in chirographic manuscripts.
4. Derman, *Eternal Letters*, 20.

but they also worked in libraries, colleges, mosques, and other religious institutions. Professional scribes might have a very different status in the society according to whom or where they offered their services. It is important to note that only some of them were also specialised calligraphers that could benefit from more privileged positions and that could achieve a certain level of quality in their manuscripts. On the other hand, it should be borne in mind that manuscripts were not necessarily written by professionals, but also by amateurs. It was common indeed that influential scholars, philosophers and prominent authors also made a living as copyists themselves, or that students and other readers made copies for their own use: 'such MSS⁵ often fall well short of the standards of calligraphy, or even legibility, found in those made for sale or on commission'.⁶ A persistent problem with transcriptions was the maintenance of accuracy (i.e. the authenticity and integrity of texts); therefore, the frequent introduction of errors must also be acknowledged in the assessment of manuscripts produced by scribes.⁷ As remarked by Roper, the corruption of texts was an inevitable consequence of scribal culture because 'copyists, however well-educated and trained, were always fallible'.⁸

The calligraphers (*ḥattat*) were a class above the scribes (*kātib*):

These took their studies of script to much higher levels, acquired licences, and left behind genuine masterpieces. And those among them who exercised the greatest creativity are the best remembered today. If their innovations were only welcomed by a small group, they soon faded away [...]. If, on the other hand, they met with general approval and admiration, then such outstanding talents continued to dominate the art for centuries [...].⁹

Islamic calligraphers had higher motives to practise their art besides monetary gain.¹⁰ Ultimately, they were at the service of God, and through the excellence of their work they aspired to receive divine rewards;¹¹ moreover, endless repetition to reach perfection and faithful reproduction were key objectives of their training, and therefore also crucial features of their work.¹²

As discussed in the previous chapter, Arabic manuscripts, including Qur'āns, reached Europe from various locations and through different circumstances. It is difficult to know with certainty the nature of this material, but it is likely that it

5. Abbreviation for manuscripts.
6. See Johannes Pedersen, *The Arabic Book* (Princeton, New Jersey: Princeton University Press, 1984), 43–44 and Geoffrey Roper, 'The History of the Book in the Muslim World', in *The Book. A Global History*, edited by Michael F. Suarez and H. R. Woudhuysen (Oxford: Oxford University Press, 2013), 535–36.
7. Speed was also a component of the scribe's work: in order to reasonably support themselves they had to produce large quantities of pages: 'One of the early scribes could copy up to 100 pages in twenty-four hours', Schimmel, *Calligraphy and Islamic Culture*, 56.
8. Amongst the reasons causing the corruption of texts were unintentional repetitions, omissions, misreading or misplacing the diacritical points but also the difficulties of reading the source manuscript due to 'an unfamiliar variety of script', see Roper, 'The History of the Book in the Muslim World', 536.
9. Derman, *Eternal Letters*, 20.
10. They received salaries for teaching at schools, religious institution or for instance if employed at the Imperial Council of State or at the Imperial Palace Service. Nonetheless, master calligraphers never expected remuneration from their students, to whom they also offered private tutoring at their homes. See Derman, *The Sultan's Signature*, 40.
11. As promised in the *ḥadīt*: 'He who writes the basmala beautifully obtains innumerable blessings' or 'will enter Paradise'. Schimmel, *Calligraphy and Islamic Culture*, 81.
12. As mentioned in the previous section, calligraphy students had to study and practice the work of the master until they were able to make copies as close to the original as possible.

was of different merit in terms of script reproduction.¹³ As for the Arabic manuscripts produced in Europe, these were mostly by the hands of Arabic-speaking and Muslim-educated people, with different abilities as scribes.¹⁴ Their services were particularly sought after by European Orientalists to make copies of original Arabic manuscripts – often borrowed with difficulty and for a limited amount of time – in order to build their own collection. Additionally, European Orientalists themselves wrote manuscripts, especially as part of their studies of the language or in preparation of works to publish.¹⁵ It is difficult to establish whether European printers and type-makers of Arabic movable type had access to good calligraphic manuscripts amongst the vast majority of what seems to have been of scribe level. Different circumstances can be expected for the printers and type-makers of Arabic types based in the Middle East, who were likely to have easier access to manuscripts of higher quality, which would be available in larger numbers.

The access to desirable models, or to the appropriate people able to supply language and script expertise, is considered in this study a crucial factor in the development of Arabic typeforms that ultimately affected their quality.¹⁶ The discussion in the following chapters and the analysis of types provide elements for a better understanding and evidence for the validation of this argument.

Extant sources of Arabic printed works and relative manuscripts

Only a few references have been found in the extant sources that link particular Arabic manuscripts to European printed artefacts from the sixteenth and seventeenth centuries; therefore, only a handful of examples are available, which merits discussing briefly.

The Egyptian manuscript *Al-Bustān Fī Ḥaqā’ib Al-Ard Wa-L-Buldān* of Salāmiš b. Kunduğdī as-Şāliḥ dated 1539 (Figure 2.13)¹⁷ contains the same work later printed by Domenico Basa in 1584–5 in Rome, with the Arabic types of Robert Granjon (Figure 2.14).¹⁸ It is suggested that the aforesaid manuscript was used for the printing of the book based on the fact that it is the only extant work of an otherwise unknown author; no additional evidence is given.¹⁹ Perhaps, it served as a model to follow for the text rather than for the design of the typeface itself, as there is not an obvious correspondence in the letterforms. However, there are some interesting similarities in the shape of some characters and the structure of the script (Figure 2.15).

A similar case seems to be the work *Al-Qānūn Fī Al-Tibb* of Abu ‘Alī b. Sīnā (also known as Avicenna), printed by the Medicean Press in Rome in 1593 with another

13. Therefore, including works that ranged between scribal and calligraphic quality.

14. As seen in § 1.3.

15. See discussion later in the chapter. The works of scribes and Orientalists are indicative of the range of Arabic texts in different styles, produced by people that mostly had no formal calligraphic training.

16. The execution skills necessary for translating the script into movable type are clearly additional factors, and are discussed in greater depth in Chapter 3.

17. The manuscript measures 15×20.5 cm, and it has 41 sheets with 25 lines per page.

18. The *Kitāb Al-Bustān Fī Ḥaqā’ib Al-Ard Wa-L-Buldān/Hortus Mirabilium Terrae Et Civitatum* (Book of the garden of marvels of the earth and of the countries) is the first book printed in Arabic to contain a text from a secular Muslim source rather than Christian, Roper, ‘Early Arabic Printing in Europe’. The name of the book’s author is also spelled Salamesc Ben Kand Ghadi in the catalogue of the BNM and Ahmad ben Ḥaggi as-Şāliḥ in Vervliet, ‘Cyrillic & Oriental Typography in Rome’, 450.

19. See Balagna, *L’Imprimerie Arabe En Occident* and Olga Pinto, ‘Una Rarissima Opera Araba Stampata a Roma Nel 1585’, in *Studi Bibliografici. Atti Del Convegno Dedicato Alla Storia Del Libro Italiano Nel V Centenario Dell’introduzione Dell’arte Tipografica in Italia. Bolzano, 7–8 ottobre 1965* (Firenze: Leo S. Olschki Editore, 1967). See also § 6.1.1.

Arabic type of Granjon (Figure 2.16).²⁰ There are numerous manuscripts of Avicenna's work, but it seems that the one copied by Abū Bakr 'Alī b. 'Alī b. Ahmad al-Nādī (Figure 2.17)²¹ was used as a model for the printed book, due to the similarity in the layout and the nature of the marginal notes in the manuscript.²² Like the previous case of *Al-Bustān*, the comparison of the two documents also highlights some similarities between the written and printed texts. However, for the Avicenna, this is more evident in the size of the characters and in the way words are formed, than in the design of the letterforms. A different manuscript linked to the printed edition is more significant with regard to the shaping of the Arabic typeforms. This document is a copy of the Arabic *Canon* by Giovanni Battista Raimondi, Orientalist and director of the *Typographia Medicea*, and can be identified as an intermediary model that covers the gap between the manuscript copied by Abū Bakr used as reference for the text/layout and the printed edition (Figure 2.18).²³ As discussed in greater depth in Chapter 6, there is indeed a close relationship between the handwriting of Raimondi and the Arabic types designed by Robert Granjon for the Medicean Press.

Another significant case is the manuscript *Psalmorun Liber, Introductione Praemissa Et Precibus Quotidianis Adiectis* (Figure 2.19)²⁴ and the book *Liber Psalmorum Davidis Regis Et Prophetae*, printed in Rome in 1614, with the Arabic types of François Savary de Brèves (Figure 2.20).²⁵ According to Father Alberto Vaccari,²⁶ the text of this manuscript – that he discovered in the Vatican Library – fully conforms to that of the printed book. His detailed analysis highlights the correspondence in the vocalisation, spelling and even mistakes between the two texts, removing any doubt that the book was indeed the published edition of that particular handwritten copy.²⁷ Vaccari also suggests that the Vatican manuscript was the actual text in front of the composer: the handwriting was indeed big and clear enough that it did not need an intermediary copy (*apograph*),²⁸ as routine practice in those early centuries of printing.²⁹ Furthermore, he strongly suggests that the manuscript was the model for the design of Savary's Arabic types.

20. *Al-Qānūn Fī Al-Ṭibb/Libri Quinque Canonis Medicinæ Abu Ali Principis Filii Sīnā Alias Corrupte Avicennæ. Quibus Additi Sunt in Fine Eiusdem Libri Logicæ, Physicæ Et Metaphysicæ. Arabice Nunc Primum Impressi*, by Abu 'Alī Ibn Sīnā. This book is also referred to as *Avicenna* or *Canon*.

21. Concluded in the year 584/1188–9, *nash* style, BML [Orientale 44].

22. It is suggested that these notes denote a work of comparison with another text or provide subdivisions of the text in preparation for the printed edition. See Sara Fani and Margherita Farina, *Le Vie Delle Lettere. La Tipografia Medicea Tra Roma E l'Oriente* (Firenze: Mandragora, 2012), 170–71.

23. This document was identified with reference to Jones, 'Learning Arabic in Renaissance Europe', note 240.

24. The manuscript is a small edition (13×9 cm) of ff.238 in fully vocalised *nash* style, BAV [Vat.ar.584], see Alberto Vaccari, 'I Caratteri Arabi Della *Typographia Savariana*', *Rivista Degli Studi Orientali* 10 (1923): 38.

25. *Typographia Savariana, Liber Psalmorum Davidis Regis Et Prophetæ. Ex Arabico Idiomate in Latinum Translatus*, Romæ, MDCXIV (1614), SOAS [EB63.35/11752/1].

26. He was also a scholar of Biblical sciences.

27. Vaccari, 'I Caratteri Arabi Della *Typographia Savariana*', 40–42. Vaccari reports of a note in the f.15r of the Vatican manuscript, which states that the patriarch of Qannōbin sent it from Lebanon to the Maronite College in Rome to be printed. In other sources it is reported that Savary de Brèves took the manuscript with him from the East, during his trip from Constantinople (via Jerusalem, Egypt, Tripoli and Algier) to return to France. In the foreword of a copy of the *Typographia Savariana*'s psalter in the Bibliothèque Nationale in Paris it is specified that the manuscript comes from Jerusalem, see Balagna, *L'Imprimerie Arabe En Occident*, 56 (also note 19).

28. An *apograph* is a copy or a transcript of a manuscript (called the *antigraph*).

29. Vaccari, 'I Caratteri Arabi Della *Typographia Savariana*', 42. Vaccari adds that if such an apograph

A comparison between the two sources shows a close resemblance between the Arabic handwritten characters and the typeforms,³⁰ but not exact correspondence: this means that some distinctive features of SDB2 that could be ascribed to the reproduction of a specific model are not found in the Vatican manuscript (e.g. the pronounced spur of the instroke of dāl/dal, never seen in previous Arabic types; the variant form of lām followed by ḥā') (Figure 2.21). Furthermore, it is worth noting that the manuscript is not an authentic calligraphic model of the nash style but a sample of Arabic handwriting; in other words, the work of a scribe rather than a calligrapher. The manuscript presents indeed poorly executed forms and with no style consistency to nash as well as the type in the printed edition: they both show irregularities that, however, do not correspond one-to one. Overall, in terms of adherence to a calligraphic style and in the shaping of characters, the type is more satisfactory than the manuscript model, although there are some unresolved issues³¹ (Figure 2.22). This seems to suggest that the type-maker had access to other models for the making of SDB2 – besides the Vatican manuscript – which informed and influenced the final shaping of the letterforms.

Although the type is not a faithful copy of the manuscript's handwriting, it appears to have some common ground, which is reflected in some letterforms more than others (i.e. the triangular head of wāw, the isolated letter ḥā', the ligature formed by a toothed character followed by the final bā' letter group) (Figure 2.23). The type and the handwriting also share other features that seem to link them more closely. Firstly, the use of the dāl/dāl-hā' ligature; secondarily, the use of the form for lam-alif in isolated position also for the final, connected from below to the previous character. However, it should be borne in mind that these features are not unfamiliar to nash calligraphic practice, and therefore could derive from different models (Figure 2.24). Finally, in SDB2 a variant of kāf in initial and medial position presents a very distinctive spur: this element belongs to the nash style (in initial position only) but its form in the SDB2 type is unusual. The Vatican manuscript shows a variant with a similar pronounced spur, which was perhaps copied in the type (Figure 2.25).

Following these observations it can be said that there are similarities between the manuscript's handwriting and Savary's SDB2 type used in the psalter as suggested by Vaccari, but not enough to consider the former as the only model used for the design of the type as well as for the typesetting of the book. Vaccari's explanation for the differences between the handwriting and the type – the medium, the tools and a sort of 'artistic licence'³² – is insufficient: a comparison of corresponding extracts of the text between the two documents (Figure 2.26), in addition to the individual analysis of letterforms, seem to suggest that the type-maker was informed by additional sources that are reflected in his design decisions.

existed, there would have been more differences between the Vatican manuscript and the printed edition of the Psalter and many errors of the first would have also been corrected in the apograph.

30. It is intended of the smaller sized Arabic used for the text (SDB2), rather than the large size used for titles (SDB1).
31. For a more in-depth analysis of the type, see § 6.2.
32. In Vaccari's words 'l'incisore stilizza e perfeziona il suo modello' ('the punch-cutter stylizes and perfects its model', approximate translation by the author); he adds that the similarity between the handwriting and the type is the same between 'il modello e l'imitazione artistica' ('the model and its artistic imitation', approximate translation by the author). See Vaccari, 'I Caratteri Arabi Della Typographia Savariana', 46.

A further case is that of the *Kitāb Taḥrīr Usūl Li-Ūqlīdis*,³³ printed by the Typographia Medicea in 1594 with two more Arabic types of Granjon³⁴ (Figure 2.27), and two manuscripts that have been linked with this Medicean edition. The first manuscript is the *Taḥrīr Usūl Li-Ūqlīdis* completed in the year 698/1298 by an unknown author (Figure 2.28),³⁵ and it is the only text of reference used for the printed edition.³⁶ The second manuscript is the *Taḥrīr Usūl Li-Ūqlīdis* copied by Giovanni Battista Raimondi, Orientalist and scientific director of the Medicean Press, in preparation for the printed edition (Figure 2.29).³⁷ The written letterforms of the second codex bear a close resemblance to the typeforms of Granjon's Arabic types, as shown in a side by side comparison of the same text extracts from the printed book and Raimondi's manuscript (Figure 2.30 and Figure 2.31). Whereas the striking similarities between Raimondi's handwriting and Granjon's types are illustrated more in detail in Chapter 6,³⁸ it suffices here to stress the importance of these three sources as an excellent example of the transition from the original manuscript model to the printed edition through the influence of an intermediary model. Furthermore, the documents show the different nature of the relation between the handwritten models and the printed books: on one hand from the point of view of the content (i.e. as text); on the other, from that of the form/aesthetic (i.e. of the layout and of the letterforms).

A final example of the transition between manuscript and printed book is another work printed by the Typographia Medicea in 1610 (the last published after an extended interruption of the press' activity) entitled *Liber Tasriphi* (Figure 2.32).³⁹ A manuscript of this work written by Raimondi appears to be the last copy preceding the printed edition: it shows a direct correspondence in the layout and, as already mentioned, also in the shaping of Granjon's Arabic types (Figure 2.33 and Figure 2.34).⁴⁰ It is possible that this manuscript indicated the layout for the compositor when typesetting the work. Two additional manuscripts of the *Liber Tasriphi* have been identified but they have a different relationship with the printed work. The first is an earlier preparatory work for the printed edition also handwritten by Raimondi in 1574 (Appendix 2).⁴¹ This codex relates to the Medicean printed edition mainly for containing the same work of Arabic grammar; being copied by Raimondi, it also relates the Arabic typeforms having those been probably modelled on his handwriting. The second manuscript linked to the printed edition was written by the neophyte

33. The title-page of this book wrongly attributes the work to Naṣir al-Dīn al-Ṭūsī: the text of this printed book and of the two manuscripts related to it is indeed different from that of al-Ṭūsī. See Fani and Farina, *Le Vie Delle Lettere*, 182–6.

34. The bigger sized type is designated as RG3, whereas the smaller text type as RG4 (see § 6.1).

35. BML [Orientale 50]. See Fani and Farina, *Le Vie Delle Lettere*, 186.

36. Ibid. As demonstrated by Abdel Kaddous Taha in the publication of Jean Cassinet from 1986.

37. Ibid. BML [Orientale 20]: this manuscript is the apograph of BML [Orientale 50].

38. See § 6.1.4.

39. The complete title in both Arabic and Latin is *Kitāb Al-Taṣrīf Ta ’Līf Al-Šayḥ Al-Imām/Liber Tasriphi, Compositio Est Senis Alemani*, by Izz al-Dīn ‘Abd al-Wahhāb al-Zanḡānī, Romæ, 1610.

40. *Liber Tasriphi*, 1610, BNCF [Magl.III.63]. The manuscript's Arabic text and the Latin translation are both handwritten by Raimondi; the work is dated 13th August 1610, apparently the date of completion. The codex contains a few printed proofs (single sheets bound at the beginning of the volume), including a title-page dated 1608 (Appendix 1), which differs from the final version published in 1610. See Guglielmo E. Saltini, 'Della Stamperia Orientale Medicea E di Giovanni Battista Raimondi', *Giornale Storico degli Archivi Toscani* 4 (1860): 306, 'Codice XXII'.

41. *Kitāb Al-Taṣrīf Al-’Izzī*, by Izz al-Dīn ‘Abd al-Wahhāb al-Zanḡānī, copied by G.B. Raimondi, Rome, 1574, BML [Orientale 34b].

Domenico Sirleto in 992/1584 (Appendix 3)⁴² and was reportedly used by Raimondi as a model for his aforementioned preparatory work. Whereas Sirleto's manuscript also relates to the Medicean printed edition for containing the same work, it does not have a direct link in terms of the layout or the letterforms.

It seems clear that the identification of manuscripts that relate to an Arabic printed edition is not necessarily sufficient to uncover all information about the Arabic types used in it; on the other hand, it is paramount to establish the nature of the relationship. Furthermore, it seems timely to stress the importance of tracking, where possible, the handwritten models of printed works in order to study how the translation of manuscript letterforms into type occurred. This cannot only reveal, potentially, aspects of the process, but be instrumental in informing further considerations about writing and printing – in other words the manual and mechanical reproduction of the script – that are critical for the appreciation of challenges of Arabic type-making. All these aspects are crucial for understanding the discrepancy between manuscript practice and the typographic representation of the Arabic script, and are discussed in the following chapter.

42. *Kitāb Al-Taṣrīf Al-‘Izzī*, by ‘Izz al-Dīn ‘Abd al-Wahhāb al-Zanḡānī, copied by Domenico Sirleto, Rome, 1584, BML [Orientale 96c].

3.1 Manuscript to print: challenges in the translation of the script

In order to discuss the transition of the Arabic script from manuscript to printed form, and the influence that this process had on the evolution of Arabic typeforms, it is essential to highlight some aspects that pertain to the domains of writing and printing¹ letters, which are relevant for a more accurate evaluation. There are indeed considerations to be made within each domain before moving onto comparing the results generated by the two different processes. In the realm of manual reproduction of the script, it is necessary to differentiate between the products of chirography and calligraphy: this allows us to establish some bearings in the broad range of manuscripts.² In the realm of printing, only a good understanding of the technology provides awareness of the limitations that the medium imposed on the letterforms.³ Furthermore, it is necessary to introduce the notion of *variation*, a phenomenon that manifests itself in both domains but that can be variously defined, as discussed shortly, and whose appreciation is indispensable for the study of letterforms.

Different aspects of the relationship between written and printed letters have been discussed by type historians such as Nicolas Barker in his books on the Aldine Greeks.⁴ He identifies two factors that need consideration: 'the first is the change in ductus implicit in the "freezing" of the letter-forms';⁵ the second is that the engraver, in the process of engraving the forms and giving them cohesion, also influences them, by superimposing his own ductus 'on that of the model'.⁶ Finally – in addition to the nature of the original model, the change in ductus and the effects of the new medium – Barker adds one more element to note: 'the choice of forms to adopt' in the rendering of written letters into printed form⁷ (merely, the *fount synopsis*).⁸ Greek, like Arabic, had many alternatives and ligatures to choose from, and their selection can add important information to the story of each type under analysis.⁹

1. Although this study focuses only on Arabic metal type for hand-composition, the author refers to printing as a mechanised reproduction of the script vs. the manual reproduction obtained by means of pen on paper.
2. As already discussed in § 1.3.4 and Chapter 2.
3. See below in this chapter.
4. Barker, *Aldus Manutius*.
5. *Ibid.*, 43.
6. *Ibid.*, 44 and 73. 'A punch-cutter can have a definite and visible personality, which can transcend the model, even if his prime task is not to assert himself but to allow the design of the letters to speak for itself'.
7. *Ibid.*, 44.
8. The *fount synopsis* or character set is defined by all the characters included in a *fount* of type.
9. See § 4.1.2, where the character set is discussed.

3.1.1 Some observations on writing and printing letterforms and the notion of variation

The first observation regarding writing and printing concerns inevitably the men shaping Arabic letterforms.¹⁰ A calligrapher (or a scribe or anyone who writes) and a punch-cutter work in completely different working environments, where different approaches, tools and settings inevitably produce different results (Figure 3.1 and Figure 3.2). The calligrapher has the freedom to make marks on a surface (i.e. his canvas) that are only constrained by the movements of his hand, the properties of the tool and the writing surface. On the other hand, the punch-cutter is not making final marks on paper, but intermediate models that have to be cut according to a very specific technological context. This might be obvious but is nonetheless worth recalling, because it has a great influence on the letterforms: in analysing the products of these men's work, the historical contextualisation of the circumstances in which the forms are created is essential for making informed evaluations that are in line with the conditions of different times.

The second observation regards the comparison of two documents containing the same text in written and printed form that is instrumental to making some observations about the adaptation of the script from one medium to the other. Whereas the manuscript shows the immediacy of the handwritten word, the *ductus*¹¹ of the hand and the constant minute variations of the letterforms, the printed text displays a higher degree of repetition, consistency and conformity due to the constraints of duplicated shapes (Figure 3.3 and Figure 3.4). In Dreyfus' words 'the printed page inevitably lacked the liveliness of a manuscript page, because in printing letters too [in addition to the identical reproduction of the text] are repeated identically'.¹² It should be noted, however, that the use of the term *identical* with regard to typeforms can be misleading. Therefore, the third observation is that the same mark, whether written or printed, cannot be reproduced precisely.¹³ Nonetheless, it is safe to state that if the same mark is repeatedly written on the same page, each one will look *slightly different* from the other, whereas if the same mark is printed repeatedly – from the same metal sort – on the same page, each one will look *similar* to the other.¹⁴

Unintended variation in writing and printing

All these considerations refer to the first kind of variation, that can be described as *unintended* by the means of making marks, and in each domain applies more visibly at the extreme ends of the spectrum (Figure 3.5). Looking at texts produced by casual handwriting and texts printed in sub-standard printing conditions, more variations of the same letterforms can be noticed. On the other hand, looking at texts produced by professionally trained and skilled calligraphers and texts printed

10. Note that many observations that follow also apply to scripts other than Arabic.
11. The systematic movement of the hand that writes. 'The direction, number and sequence of the strokes that work together to create a letter' see Creative Glossary, 'Ductus Definition', 2011, accessed 5 July 2016, <http://www.creativeglossary.com/calligraphy/ductus.html>.
12. John Dreyfus, *Into Print: Selected Writings on Printing History, Typography and Book Production* (London: The British Library, 1994), 140.
13. The processes of writing and printing have both characteristics that influence the repeated reproduction of the same mark on the same surface, which is explained below.
14. This might be more visible to the naked eye in handwriting than in printing: nonetheless, superimpositions of images of typeforms on a macro scale will show variations in letters that look similar on the printed page.

in ideal printing conditions, fewer variations of the same printed letterforms can be noticed. The calligrapher has indeed a higher control of the pen movement and can reproduce the same form reducing its variation to a minimum (although, as said, he cannot make a letter in the same way twice); equally, the printing conditions can be controlled so that the properties of the paper, ink and printing pressure have a minimum impact on the final appearance of the letter.

The unintended variation in the domain of writing can be further explained as follows: whereas in calligraphy the repetition of the same letterforms is more controlled and deliberate, in everyday handwriting this is more casual (i.e. less controlled, unpredictable or unsystematic) and informal (Figure 3.6).

In printing, the degree of unintended variations of the same typeforms is dependent on the printing conditions and is more visible in poorer printing conditions than in ideal printing conditions (Figure 3.7). This means that the differences noticeable in the same letterforms do not necessarily originate from different punches but are the result of other influencing factors in the printing process – like the quality of the ink and of the paper – and in the type-making process notably in relation to the hand-casting techniques.

Deliberate variation in writing and printing

The second type of variation can be described as *deliberate* and relates to those variations in the same letterforms that do not depend on the tools, environment or technology but are introduced voluntarily by the writer and/or type-maker. Because they depend on the person, the deliberate variations increase or decrease independently from the domains of writing or printing, even at the extreme ends of the spectrum (Figure 3.8).

It is important to note that whereas for the Latin script the deliberate variations are *optional* (i.e. a ligature, a swash character), for Arabic only some are optional (i.e. stretched letters for an aesthetic enhancement of the text composition, or for line justification purposes), while most are *required* as part of the writing system and culture. As introduced in the previous chapters, the forms of Arabic letters vary not only according to the position in a word but also depending on which characters precede and follow them and type of connection formed. Examples of this feature of the Arabic script, which is also known as *context sensitivity*, can be found in different styles of calligraphy. The context-driven variants in Arabic are indispensable for the formation of words, as much as joining letters (e.g. the variants of the initial ba' letter group, or the use of taller teeth forms in a sequence of toothed letters required to improve the legibility of a particular string of letters). The contextual variants required by the Arabic script as part of its morphological behaviour¹⁵ can be deliberately introduced in equal measure in casual handwriting or in calligraphy, independently from the writer's control of the tool (Figure 3.9). Fewer contextual variants in a printed Arabic text – often restricted to four forms assigned for each letter,¹⁶ rather than the huge variations seen in manuscripts – contribute to the loss of an important feature of authentic written Arabic, and increase uniformity and monotony [i.e. repetitiveness] on the printed page and compromise the legibility of the text. Deliberate variations of this kind could be obtained in metal type (Figure 3.10), although it implied a significant increase in costs, labour and the character set

15. See § 2.1.

16. One form each for isolated, initial, medial and final position, except for those letters that have forms assigned only for the isolated or final position because they connect only on the left-hand side (alif, dāl/ dāl, rā'/ zā' and wāw).

amongst other things:¹⁷ these variations were often represented through ligatures, where the letter-level contextual variations in Arabic were represented as part of letter compounds.

Furthermore, the notion of deliberate variation in printing requires additional observations to explain other kinds of letter-level variations than those just discussed, which are also script-independent. The notion of deliberate variation in printing is more complex than in writing because it entails further remarks about the type-making process. As in writing, also in printing there are variants of same letterforms deliberately introduced that cannot be ascribed to the technology or printing conditions (i.e. unintended). This should imply that for each variant that reflects the intention of designing a different version of the same letterform, the type-maker made a new punch. However, drawing this conclusion is not as straightforward as it may appear. For this reason, before discussing these kinds of variations in greater detail, it seems necessary to remark on some aspects of printing that are instrumental to further contextualise the meaning of making variants in foundry types, regardless of the script.

With the introduction of printing, the aim of printers was to replicate a manuscript as closely as possible using a technology that could reproduce it faster and more economically: scribes would indeed require a longer time to make copies, and the laborious work made the manuscript expensive and not widely available. The type used to print Gutenberg's Bible in 1452 is exemplary of the tendency in early book printing to replicate the manuscript version as closely as possible:

the exhaustive pains taken by Gutenberg or the engraver or engravers working under his direction to achieve an absolute evenness of minim and space to match the rigidly disciplined *textura* as practised by fifteenth-century Mainz scribes resulted in the B42 type with over 300 characters. Many of these variations and combinations were maintained by printers reproducing the same or analogous hands.¹⁸

The variations and combinations in Gutemberg's type were alternative letterforms, abbreviations and ligatures included to make the type 'look as similar as possible to handwriting', and to replicate its characteristic irregularity.¹⁹ The implication of this practice – 'the nearer a type is to the manuscript hand on which it was based, the larger the range of characters it will exhibit'²⁰ – eventually called for a reconsideration of the approach mainly for economic reasons. Furthermore, the urge for simplification manifested itself in different aspects of the design and production process of a fount.²¹

17. As seen in § 2.1, and later in this chapter, one way of rendering this feature of the script in print was through an extensive use of ligatures. Granjon's work made a significant step in this direction (see § 6.1).

18. Barker, *Aldus Manutius*, 110. Barker is rather imprecise: it is not clear why he talks about 'over 300 characters' for the B42 type considering that even the source he quoted for this statement – George D. Painter, 'Gutenberg and the B36 Group. A Re-consideration', in *Essays in Honour of Victor Scholderer*, edited by Dennis E. Rhodes (Mainz: Karl Pressler, 1970), 319, note 35 – talks about '290 (including 243 lowercase)', not over 300. The same number of 290 appears in other sources such as Albert Kapr, *Johann Gutenberg: The Man and his Invention*. Translated from the German by Martin Douglas (Aldershot: Scolar Press, 1996).

19. Dreyfus, *Into Print*, 139–40.

20. Barker, *Aldus Manutius*, 110.

21. Issues discussed later in this thesis in relation to Arabic.

The adaptation of written letter-forms to provide three-dimensional metal types for letterpress printing was perhaps the hardest of all the technical problems that Gutenberg had to resolve on the way to his invention.²²

From a practical point of view, printing a piece of text implied decomposing it into single modules (or sorts) that could be independently created and reused in the composition of the text. The method of composing with movable types was based on this principle: the components would be positioned adjacent to each other until a whole page, or spread, was set and ready to be printed in one movement of the printing press (unless a second pass was necessary to add colour). The modules were then ready to be decomposed and distributed back in the case, where they were stored until a new page was ready to be composed. With this system, the type was used several times in the course of printing, until it was worn out and replaced by a new casting, or by an entirely new design.

The principle of movable type was perfectly suited to the rigid construction of *textura*, and adapted well for the roman letters, including the italic (Figure 3.11). Besides Latin, other European alphabetic scripts (like Cyrillic²³ and Armenian), and also consonantal scripts like Hebrew, later fitted the technology relatively well because it reproduced their behaviour, where individual elements stand independently without interacting with other letters.²⁴ The advantages of these kinds of letters were that being generally upright, they could be contained within a rectangle – or parallelogram space for italic – of the same height and variable width; this could be accommodated by the adjustable type-mould, which was central to Gutenberg's technological innovation. The translation of the Greek script to the modular printing system had, in advance of Arabic, posed a new set of difficulties, due to the vitality and non-conformity of the handwritten forms that the type-makers were trying to reproduce.²⁵ Unlike the Latin type, Arabic did not conform to a rectilinear model of type-making but presented more irregular shapes; moreover, it is common to have parts of letters that overhang the body of the metal sort that holds them (Figure 3.12). The printing of the Arabic script added the further challenge of its cursive nature: it is not surprising that the adaptation of a joining script to a system built for a different purpose was inevitably going to be defective, making its reproduction more prone to a wider array of problems. The task of sixteenth-century punch-cutters, typefounders and compositors who had to face, for the first time, the design, production and setting of the Arabic script in metal was, by all means, a challenging and delicate undertaking.²⁶ Firstly, these type-makers had to handle an unfamiliar script for which models and advisors were needed; secondly, they had to deal with the tension created by the gap between the sources they had to reproduce and the technology they had available. Conscious of the difficulties, they tried in different ways to meet the quality of the manuscripts they had at hand. Many decisions had

22. Barker, *Aldus Manutius*, 21.

23. Perhaps for the time it would be more appropriate to talk about the Glagolitic script, the oldest known Slavic alphabet, of which the Cyrillic is a derivation. See Giorgio Montecchi, 'Dalla Pagina Manoscritta Alla Pagina Stampata Nei Breviari in Caratteri Glagolitici'. In *Il Libro Nel Bacino Adriatico*, edited by Sante Graciotti, 3–30 (Firenze: Olschki, 1992).

24. The author refers here to interactions between letters due to a joining script, and not to other elements as spacing and kerning.

25. Punches and matrices for Greek were reportedly the most challenging to make during this period. Moreover, the character set increased dramatically: the Greek type of Laonicus and Alexander used in the Psalter of 1486 (nearly a decade before the first Aldine Greek) 'had approximately 1350 sorts'. Barker, *Aldus Manutius*, 21–22, 37.

26. The first three Arabic movable metal types appeared in Italy in the first half of the sixteenth century: in Fano in 1514 (§ 5.2.1), in Genoa in 1516 (§ 5.2.2) and in Venice in 1537–8 (§ 5.3.1).

to be taken in the adaptation of the letterforms to the new technological medium, and also many solutions to be found to address problems unlike those experienced before with the printing of Roman, Greek and Hebrew languages:

Not only is a higher degree of punchcutting skill required – especially if calligraphic norms are to be imitated – but matrices must be justified even more minutely if the breaks between adjacent sorts are to be disguised. The compositor likewise must constantly avoid using the wrong letter form. Moreover, as well as different initial, medial, final, and isolated sorts for each letter, an abundance of ligatures is also needed for pairs or groups of letters. If vowel signs (*harakāt*) are required – for Qur'anic and certain other texts – then even more sorts are needed, as well as huge quantities of quadrats and leads to be interspersed between the vowel strokes. A full Arabic fount can therefore contain over 600 sorts. This makes it an expensive investment, and economic factors alone have therefore impeded the development of Arabic typography, as compared with its European counterparts.²⁷

Having highlighted these aspects of the printing process and type-making, it seems clear that some variation has to be expected in typeforms, although this might be of different nature, whether to capture the richness of the written letterforms or as evidence of experimentation, perhaps to find the right balance of efficiency for a satisfactory representation of the script.

The difficulty in assessing the differences noticeable in printed letterforms – and thus draw conclusions to which type of variation they might belong to – is that the differences in the design of same letterforms are at times subtle. Furthermore, the challenge of the investigation is to establish whether or not those same letterforms that appear different originated from the same punch: this is where the distinction in the nature of the variation becomes crucial to the argument, as well as identifying whether the differences in the typeforms are deliberately or unintentionally introduced. If it is established that the different designs of same letterforms originate from different punches, it remains to understand the reasons behind this practice and, not less importantly, its practical advantages. On the other hand, if it is established that the different designs originate from the same punch, then it remains to understand why the same letterforms resulted different once printed. Likewise, if the variation in the design is identified as deliberately introduced by the type-maker, it can be safely implied that for each deliberate variant a new punch was made.²⁸ Clearly, when the difference between these variants is rather obvious, also the reason for making extra punches becomes more apparent (Figure 3.13). In other cases, the difference between the variants is quite subtle and it is difficult to establish the real reason for such variations, especially to justify the work of making extra punches (Figure 3.14).

These observations regarding variations of printed letterforms are script-independent and for the Latin script have been sparingly presented in typographic literature. The printer Giovanni Mardesteig, in particular, discussed them with regard to the Roman types of fifteenth-century Venitian printers, the likes of Nicolas Jenson and Aldus Manutius. In analysing Manutius' Roman type for the *De Aetna* published in 1495 (cut by Francesco Griffó) Mardesteig noticed that the design of several letters

27. Roper, 'The History of the Book in the Muslim World', 540.

28. As already mentioned, if the variation in the design of same letterforms is identified as unintended, this is ascribable to one of the elements during the type-making or printing process (to be established), but not the existence of a different punch.

was not identical each time it occurred in the text. Therefore, he claimed that the punch-cutter 'had cut two or more versions of some letters, and these had been jumbled together in the compositor's case, so that the incidence of the various versions was quite random'.²⁹

In his theory about the varieties of design of the same letterform, Mardersteig claims that both Jenson and Griffo deliberately introduced them in their Roman types to try and 'relieve the monotony of the printed pages' and to reduce 'the deadly uniformity which so often made a printed page look unsatisfactory'.³⁰ The idea 'that the liveliness of handwriting – in this case a humanistic roman – could best be achieved by introducing slight variations'³¹ seems, in theory, reasonable enough. However, it might appear less so if considering the practical and economical implications of such practice. It seems indeed more plausible that the punch-cutter would go through the trouble of making punches for different variants³² if the differences between the designs are noticeable and evident enough to the reader, rather than so subtle to be almost imperceptible. The second case, especially from an economic point of view, makes no sense.³³

Although Mardesteig highlights additional types of variations (i.e. flourishes, see Figure 3.15) to help justifying the lines of text – following the custom of the calligraphers of the time – he clearly refers to the more subtle variants of Griffo's Roman (Figure 3.16) when stating that Griffo added them 'to avoid being reproached by readers familiar with the characteristics of books written by scribes, which inevitably showed many minor variations of letter forms'.³⁴ This claim has no other evidence other than Mardesteig's word:³⁵ there is indeed no other source recording the complaints of Venetian readers for the boring-looking appearance of the printed books.³⁶

29. As reported in Dreyfus, *Into Print*, 149. The original article is Giovanni Mardersteig, 'Aldo Manuzio E I Caratteri Di Francesco Griffo Da Bologna, in *Studi Di Bibliografia E Storia in Onore Di Tammaro De Matinis* (Verona, 1964), also contained in the publication *Scritti di Giovanni Mardersteig Sulla Storia Dei Caratteri E Della Tipografia* (Verona: Il Polifilo, 1988), 107–58.

30. Dreyfus, *Into Print*, 149–51. Mardersteig found the use of several variations of the same letter in Jenson's Roman that became popular more than two decades before Griffo's type for the *De Aetna*, although these were less extensively used.

31. *Ibid.*, 150.

32. According to historian Martin Lowry, the first Aldine Greek fount for the first edition of Constantine Lascaris's Grammar *Eretemata*, 1495 has 'seven variant forms of the letter "nu", five of "alpha", "phi" and "omega", four of "beta" and "tau"; see Martin Lowry, *The World of Aldus Manutius: Business and Scholarship in Renaissance Venice* (Oxford: Basil Blackwell, 1979), 131. However, he does not supply any image in support of this statement; a more in-depth investigation is required to clarify what he might have intended with the enumeration of these variants.

33. An example of letterform variation imperceptible to the reader was 'the provision of alternative-width versions of some letters to enable smoother justification of lines', as observed in the types of the twentieth-century Bremer Presse. This German private press produced alternative-width sorts for letters such as 'r' & 's' in its revived Venetian type, giving the reason that it aided better justification (i.e. maintaining a regular wordspace). See Christopher Burke, 'Luxury and Austerity: Willy Wiegand and the Bremer Presse', *Typography Papers* 2 (2007): 117–8. Such minute attention to even justification is also mentioned by Barker with regard to the B42 type, see the above-quoted text in this thesis, corresponding to note 18.

34. Dreyfus, *Into Print*, 150.

35. In the cited sources, printing historians Lowry and Dreyfus report the claim without questioning it.

36. Indeed, there is a testimony of the contrary (i.e. the greater clarity of the printed letterforms compared to the manuscripts of the time), quoted from the British Library website: 'In a letter of 12 March 1455 Enea Silvio Piccolomini, later Pope Pius II, wrote to Juan de Carvajal, the cardinal for whom he worked. He mentioned that, in Frankfurt, a marvellous man had been promoting his

A more recent study on the fifteenth-century Venetian Roman types, questions Mardesteig's claims:³⁷ according to the author, Riccardo Olocco, it seems more likely that the different designs of the same letterforms do not necessarily originate from different punches, but are the result of other factors in the printing process – like the quality of the ink and of the paper – and notably in the type-making process, in relation to the hand-casting techniques (e.g. the movement of the hand; the metals used in the mixture, their quality and quantity; other less known methods like sand-casting).³⁸ This applies in particular to letterforms that show variations in the outlines rather than in the structure.

Based on his investigations on the roman type of the *De Aetna* – still in progress – Olocco rejects the existence of the many variations as postulated by Mardersteig, except for the lowercase 'p': for this letter Olocco confirms the existence of a second design that shows an open counter. The difference between the two forms of 'p' is clear and it seems evident that they originate from different punches. Furthermore, the variant with the open counter was probably vertically kerned, as its descendent is taller than any other letter and it appears to go beyond the type body. Nevertheless, there is no apparent reason for this alternate 'p', which therefore remains to be explained; the observation of the *De Aetna* shows that this form was used as the first letter of a word in the early pages of the book, whereas this practise was dropped in the later pages: an indication which can be useful to formulate a hypothesis or to guide further research. Olocco also reports of another letter in the roman of the *De Aetna* – not mentioned by Mardersteig – that has clearly an alternative form: the uppercase letter E has indeed two different designs, which also appear to originate from different punches. This particular case seems, on the other hand, to have an explanation. According to Olocco, variations of this kind are common in 15th-century books, related to economic or contingent reasons: when short of one or two letters in the type case, instead of casting new ones, they would use the sorts of the same letters from a different typeface of similar size.³⁹

Variant designs of the same letterforms are also common in much later centuries, as observed, for instance, by Fiona Ross in the analysis of eighteenth-century Bengali

work on the Bible. Piccolomini explained that the book had such neat lettering that Carvajal would be able to read it without his glasses. By March 1455 Piccolomini had seen several gatherings of the Bible and could report that all copies had been sold'. See C. Wight, 'Gutenberg Bible: Gutenberg's Life - the Years of the Bible', 21 July 2004, accessed 2 January 2017, <http://www.bl.uk/treasures/gutenberg/bibleyears.html>. Moreover, two of the most renowned contemporary (twenty-first century) Italian bibliographers – Piero Scapecchi and Edoardo R. Barbieri are not aware, regarding this particular issue, of any fifteenth-century testimony which disputes the monotony of the printed pages or the lower quality of the printed letterforms. Therefore, it is not clear where Mardesteig's claims come from, considering the lack of historical evidence to support them.

37. Riccardo Olocco ongoing PhD research (currently entitled *Redefining 15th-century Venetian typefaces*) combines bibliographical knowledge with analysis of letterforms (printed on paper); its aim is to develop a method to correctly identify historical type, through reproduction and analysis. This method is applied to the roman type used in Venice in the 15th century. Riccardo Olocco, e-mail message to author, 19 December 2017.
38. For instance, it might have been necessary to re-cast damaged letters, which resulted in a different form. The development of a new methodology for analysing historical type is part of Olocco's research. His analysis is based on macro digital reproduction and combines different kinds of data, such as the measurement of key letters and the depiction of certain details.
39. In this case the letter clearly originates from a different punch, although belonging to a different typeface. For this reason, no further discussion is needed about the variation in the design in relation to the punch-cutter's intention.

foundry types. Charles Wilkins' first Bengali fount appeared in 1778,⁴⁰ shows indeed clear evidence of variation in the design of certain characters. According to Ross, the variations of same letterforms that clearly derive from different punches could represent attempts of making a better version of a particular character, when the punch-cutter was not satisfied with the first version. The fact that the variations appear within the same page – and not from a specific point in the text onwards, thus justifying a sequential reasoning behind it – might signify that the newer versions never completely replaced the previous ones; instead, they ended up being mixed with the other designs in the same compartments of the typecase, and therefore randomly picked by the compositor.⁴¹

Finally, in referring to the variant forms of the letter *theta* (Figure 3.17) in the Greek movable type used in Milan by Domenico da Vespolate in 1476 – clearly based on a contemporary upright cursive hand – Barker states that their presence 'shows awareness, at least, of the expectation of variety'.⁴² Thus it appears that the hypothesis of explaining the variations of same letterforms to replicate handwriting forms is, for some historians, considered as the most plausible to explain those alternates that in Ross' words 'appear to serve no special function' (e.g. to solve the clashing for specific character combinations or to allow kerning), although from an economic point of view they seem to have no economic advantages in the type-making. However, this stance remains debatable: for instance, Charles Wilkins' Bengali type shows variations but, as Fiona notes, 'his type is so divorced from handwriting that a variation to show variety is not a plausible reason'.⁴³

In light of these considerations it can be added that, with regard to the Arabic script, the typeforms that reproduce the deliberate variations of manuscript practice (i.e. the contextual variants) are a legitimate addition in the fount, in the attempt to represent the script in its most authentic form.⁴⁴ On the other hand, those typeforms that seem to reproduce the unintended variations produced by the ductus of the hand – when writing repeatedly the same form on the page – are clearly a less legitimate addition to the fount, for which it is difficult to find a plausible explanation: in this case, the hypothesis that the punch-cutter was simply trying to replicate the model as closely as possible is harder to support.⁴⁵

The importance of establishing the nature of the variety in the design of same letterforms and thus the ability to discern between unintended and deliberate variations is important in typographic research, as already partly discussed, and can have different relevance to type histories. Whilst for Olocco's investigation it can supply vital information for the correct identification of Roman types,⁴⁶ for the present study it is important in the attempt to reconstruct the character set of a

40. Nathaniel B. Halhed, *A Grammar of the Bengal Language* (Hoogly, 1778).

41. According to Ross this is a plausible explanation, although she states that it is difficult to determine the purpose of having alternative forms 'particularly if the difference is barely noticeable and appears to serve no special function'. See Ross, *The Printed Bengali Character*, 12.

42. See Barker, *Aldus Manutius*, 30.

43. Fiona Ross, e-mail to author, 26 February 2018.

44. This is true whether or not the punch-cutter was aware of the function of those alternative forms, and how he was supposed to correctly integrate them in the design of the typeface.

45. It is possible that he noticed these kind of inconsistencies in the same letterforms, especially if he was following a chirographic manuscript rather than a calligraphic reproduction, where, as mentioned, the calligrapher has a higher control on the unintended variations (see Figure 3.6).

46. To establish, for instance, if typeforms belonged to the same fount of type when its identity is not known.

known Arabic type by identifying the individual punches.⁴⁷ It is worth pointing out that for this task, in order to bring some method to the process of the enumeration of the sorts carrying different designs,⁴⁸ it was established that when the same letters have noticeable differences but not so unambiguous to dispel any doubt about their provenance from different punches, they are not included in the enumeration but only one design for each letterform is counted. On the other hand, when the same letters have clearly different designs – therefore intentionally introduced and originating from different punches – they are included in the count of the character set separately (Figure 3.18). Additional considerations to this general rule are made in the individual type analysis in the following chapters, where more examples are also discussed.

Having discussed different factors related to writing and printing with regard to the transition of letterforms from one medium to the other, it remains to discuss additional aspects that are crucial to understanding the discrepancy between manuscript practice and the typographic representation of the Arabic script. These relate strictly to the domain of printing technology and Arabic type-making, and the processes of punch-cutting, typefounding and typesetting, which are discussed in the following section.

47. Variant designs originating from different punches evidently were cast from different matrices and added additional sorts in the type-case, increasing the character set of a given typeface.

48. This was done for the first three Arabic types, because they presented the right conditions to attempt a reconstruction of the character set (§ 4.1.1).

3.2 Punch-cutting, typefounding and typesetting of Arabic founts

The challenge of making typographic characters for printing Arabic was ultimately rooted in the tension between the need for fidelity to the script and its adaptation to the typesetting environment. By looking into the widely different type-makers' approaches, it is possible to identify some of the solutions devised in order to fit the script to the available technology, and eventually trace their progression towards the accomplishment of satisfactory Arabic typography. Moreover, this enables assessment of the need to stay close to the model for a more faithful reproduction of the script, against the perceived necessity of its simplification that was prompted by the technological environment in which type-makers operated.

The expected behaviour of people undertaking an unfamiliar task is to consider the factors involved in the process (or at least the ones with greater impact on the work) and decide which actions appear to be the most apt in the particular circumstances to successfully complete the assignment. The craftsmen of the first Arabic metal types were no exception. The process of Arabic type-making was understandably not straightforward, and the analysis of key extant Arabic printed editions supplies evidence in this regard. It was more likely a trial and error affair, where the route of makeshifts and highly customised solutions was also sought, particularly by the pioneers. Although a plan of action of some sort would be expected, inexperience with the Arabic script did not facilitate the identification of every element required by the system (i.e. when planning the character set), or the anticipation of problems not recognised as such beforehand.

Not much is known about the type-making of Arabic foundry type for hand composition since only a small amount of direct documentation of the different practices has survived. A comprehensive account of all the methods used is, therefore, impossible: 'the complexity of the Arabic script challenged the ingenuity of punch cutters, type founders, and compositors, and the resulting mixture of sometimes ad hoc solutions is often difficult to sort out.' Nonetheless, it is possible to attempt a reconstruction based on what is known so far.

3.2.1 Methods of Arabic punch-cutting

The craft of printing from movable types was preceded by different processes for their production, each requiring people with good skills in their respective craft. The first stage of type-making was the cutting of punches (see Figure 3.2) with which to strike the matrices; the latter were then justified and placed in an adjustable mould, where the type was cast as many times as necessary to have enough supply of a letter.²

It is common knowledge that punch-cutting did not start with the invention of printing, it was rather a practice already known in the metal trade by the likes of

1. Lane, Breugelmans and Witkam, *The Arabic Type Specimen*, xi.

2. Theodore De Vinne identifies six departments in type-making: punch-cutting; matrix-fitting; matrix-making; mould-making; type-casting and type dressing. Theodore Low De Vinne, *The Practice of Typography: A Treatise on the Processes of Type-Making, the Point System, the Names, Sizes, Styles and Prices of Plain Printing Types*, 2nd ed. (New York: The Century Co., 1902), 10. Walter Tracy reduces it to four: punch-cutting; striking of matrices; type-casting and type dressing. Walter Tracy, *Letters of Credit: A View of Type Design* (London: Gordon Fraser, 1986), 33.

goldsmiths and engravers. These were the people with the right skills: it was therefore only a matter of transferring existing knowledge to a different context.³ It is also known that the role of punch-cutters changed considerably since the early days of printing until the machine age so that it became difficult to pin it down with a univocal definition.⁴ In the fifteenth century, they started as independent craftsmen, making punches on the request of printers, combining in the same process design thinking and manual skills.⁵ In the sixteenth century, in particular, they evolved to be also editors, printers and publishers, making for themselves the types they needed; but by the seventeenth century, they turned into workmen for the new independent type foundries, becoming *de facto* executors of others' people designs.⁶

Barker suggests that, as a rule of thumb, it is incautious to assume – on observation alone and without documentary proof – that the same hands necessarily executed the design of characters and the cutting of punches, or that the printer and the punch-cutter were the same person.⁷ This observation becomes particularly relevant for the attribution of the first Arabic metal types produced in Italy in the sixteenth century, where no evidence to establish such facts is known to exist. The blurred lines in the role of the punch-cutters also applied to the other areas of type-making:

Printers financed and organised the making of type, but they took no other part in it. The task of cutting punches, striking and justifying matrices, mould-making, and casting were separate from printing and done by independent contractors. They needed great skill and experience and could only be done economically after a long specialized training. They were carried on individually or combined in various ways; punchcutters seem generally to have struck, and often to have justified, matrices; some typefounders whose trade was mainly casting were famous for justifying or making moulds.⁸

According to the printer and historian De Vinne, in large foundries few workmen had multiple expertise, although the ordinary workman had knowledge and practice in only one.⁹ The work of the punch-cutter was, however, the most valuable in the production process: not only it was the most highly skilled operation, but also that with the most disastrous consequences in case of mistakes.¹⁰ Moreover, the risk of error in the punch-cutter's hands multiplied if the striking and justification of matrices were also amongst his tasks. Indeed, both operations influenced the final appearance of letters: equal depth of strike was necessary for the faces of types to

3. Fred Smeijers, *Counterpunch. Making Type in the Sixteenth Century Designing Typefaces Now* (London: Hyphen Press, 1996), 59.
4. Walter Tracy, typographer and designer, divided punch-cutters into three classes: the designer punch-cutter, whose vision and artistic sense – as well as the manual skills – gave a distinctive appearance to their types; the interpretative punch-cutter, who interpreted someone else's vision and design; and the artisan punch-cutter, who had no design or interpretation abilities, but possessed manual skills and accuracy. See Tracy, *Letters of Credit*, 34–35.
5. See Smeijers, *Counterpunch*.
6. Ibid., 70–72. According to Smeijers the 'romain du roi' represents the best known case of the separation of design from execution.
7. 'Even Gutenberg, born goldsmith, employed others'. Barker, *Aldus Manutius*, 73.
8. Harry Carter, *A View of Early Typography up to about 1600* (Oxford: Clarendon Press, 1969), 10–11. Carter also suggests that Granjon 'must have been a justifier as well as a cutter' and that Guillaume Le Bé of Paris stated 'that he made and sold matrices for the types that he cut and moulds to fit them'.
9. De Vinne, *The Practice of Typography: A Treatise*, 10–11.
10. Ibid., 11.

lie flat on the matrix, have the same height, print evenly and without missing parts.¹¹ 'Punches might carry letter images of the highest quality; but if the matrices are not justified properly, then all the work of punchcutting is ruined'.¹²

Regarding the language in which the work was composed, Tracy argues that it did not affect the method of printing, whereas the typesetting required the compositor to be familiar with its letterforms and their traditional conventions.¹³ Whereas this is true, the same should perhaps be said about the punch-cutter (most likely to be a different person): he was the one making decisions in the first place, which shaped the fount's character set to be later used by the compositor. Regarding the best possible shape to give to letters, Fournier¹⁴ comments:

[...] it is a matter for the taste and discernment of the cutter, and it is in this that he displays his proficiency or his incapacity. It is a safe rule that he should do nothing without a correct understanding of the design of the letters, or having good models before him to allow him to catch the fashion of them, and to make such alterations as he thinks necessary.¹⁵

Questions regarding counterpunches

The making of foundry type was a slow manual process, and punch-cutting was at its core. Whilst casting was mechanised in the early nineteenth century, punches were still cut by hand until the pantographic engraving machine was invented in 1885.¹⁶ But how were punches made? In Smeijers' words (Figure 3.19 and Figure 3.20):

There is the tradition of counterpunching and cutting; and there is the tradition of digging and cutting. Both methods treat the outer contour in the same way: filing and then cutting. The essential difference between these two is that the former uses counterpunches and the latter does not.¹⁷

He continues saying that the counterpunch technique brought some system into the work, enabling the punch-cutter to repeat shapes in a very fast and consistent way by reusing certain counterpunches for more than one character.¹⁸ The method

11. Smeijers, *Counterpunch*, 121.

12. Ibid., 121–122.

13. Walter Tracy, 'Advances in Arabic Printing', *Bulletin (British Society for Middle Eastern Studies)* 2 (1975): 87. This issue is discussed in greater depth in § 3.2.3.

14. Pierre-Simon Fournier le Jeune, *Manuel Typographique* (Paris, 1764).

15. Quoted from Smeijers, *Counterpunch*, 99–100.

16. Tracy, 'Advances in Arabic Printing': 91, note 1. Evidence of Arabic composed on a Linotype can be found as early as 1915, although the contradictory nature of the sources leaves the beginning date of mechanical composition of Arabic still inconclusive, Nemeth, 'Arabic Type-Making in the Machine Age, 67–73.

17. Smeijers, *Counterpunch*, 75. A counterpunch enables making a counter very precisely which is entirely closed such as the one within lowercase 'o' or a counter which is nearly enclosed such as in lowercase 'n' (a serrified n). Moreover, counterpunches can be a good solution because they turn the inside (i.e. the counter) into the outside, which can be easily reached all around. On the other hand, 'you can work upon enclosed counters only from the top down into the counter. But when the counter has a large opening, such as in lowercase 'c' or 'z' for example, then you can also work on it sideways, so from this open side inwards. And a mix of these two from the top and sideways moving inwards at the same time. The last two possibilities are not possible with enclosed or nearly enclosed counters', Fred Smeijers, e-mail message to author, 22 September 2016.

18. A more exhaustive list of the advantages of using counterpunches is given by Smeijers as follows: 1. It is possible with help of a counterpunch to repeat the same shape in various punches in a rather quick way. 2. The repetition of keycounters might help to enhance the design of the alphabet to be cut. 3. The use of a counterpunch can help to transfer complicated shapes upon blank punches. 4. The use of a counterpunch makes it possible to make deep and clean counters with rather steep

of digging was less accurate – in theory, because many repeated movements of the hand and the graver were necessary, rather than a strike of the counterpunch into another piece of steel – and also more time-consuming.¹⁹ The punch-cutter had to start from scratch every time, rather than reuse a single counterpunch for the letters that shared, to a very large extent, the same counter. Smeijers advocates the advantages of the counterpunch method over the digging method, at least for the ‘simple and repetitive shapes of the roman alphabet’, but he acknowledges that the digging approach ‘is understandable when you have to cut the complex shapes of non-Latin characters’.²⁰ Because the Arabic script contains a significant amount of shared forms, it seems reasonable to assume that the counterpunch technique was used. It is equally reasonable to consider that the digging method would have been preferable in other circumstances, considering the amount of less regular inner shapes than Latin (multiplied in their initial, medial and final positions, besides the isolated ones), and those letters compounds represented as ligatures.²¹

Smeijers suggests that the sixteenth-century masters ‘all used counterpunches, and often in very clever and efficient ways’.²² One of the strongest evidence in support of his theory, obtained by looking at some early punches of the period 1520–1600, is that the dug-out part and the counterpunched counter show difference in neatness: where the digging method was used, the tracks made by the graver can be noticed in the metal, whereas the use of a counterpunch resulted in a flat surface to the counter of the punch. Moreover, the use of counterpunches produce deep and clean counters that have smooth walls (i.e. sides), meaning that the angle from side to bottom is well defined and has everywhere the same angle (Figure 3.21).²³ The coexistence of both elements on the same punch proved not only the use of two techniques but also that one didn’t rule out the other: in hindsight, a combination of both was perhaps the most desirable approach, particularly for the Arabic script.

The surviving punches of the Arabic types of by Robert Granjon and Savary de Brèves conserved in the Cabinet des Poinçons (CDP) of the Imprimerie Nationale, appear to present mixed evidence. Whereas some show counters with a flat surface (or *plateau*) and a more defined contour, others seem to show more clearly digging tracks (Figure 3.22). However, according to Smeijers, none of those punches were cut

walls or sides, resulting in type that has a sharp defined corner between the image of the letter and the sides. This is the kind of type that can be printed sharp. 5. With help of counterpunches such counters can be still made while they are very small, so small in size that these qualities cannot be realized with engraving or digging. 6. Counters made with help of counterpunches can do service just as a start. They can be refined and optimised with help of digging. This “hybrid” method also saves time. Whereas some of the advantages above might save time (1, 3, 6), other might concern beauty and aesthetics (2) or be of technical advantages (3, 4, 5, 6), Fred Smeijers, e-mail message to author, 22 September 2016.

19. However, ‘the fact that a set of punches has been dug out does not mean that they are inferior concerning design. It depends on the skill of the punchcutter’, Fred Smeijers, e-mail message to author, 22 September 2016.
20. Smeijers, *Counterpunch*, 78. For a more detailed analysis of the two methods and other considerations see Smeijers’ work.
21. Particularly in Granjon’s case, it could have been a longer task to cut all the possible reusable counterpunches, given the amount and variety of ligatures in his typefaces, rather than to dig the counters out as he went along.
22. He adds that there is also evidence suggesting ‘that some of the early punchcutters, such as Garandon and Granjon, sometimes used digging methods. But their use of it was inconsistent’. He is still talking in the context of Latin letters. Smeijers, *Counterpunch*, 78–80.
23. Ibid., 115–116.

with the help of a counterpunch, at least not in such a way that the counterpunch would produce the entire counter. What could have been done is that they used a counterpunch which represented the most difficult part of a counter. This punch would be hit to a shallow depth in the actual punch and its impression would serve as a orientation for further digging.²⁴ Smeijers also observed that counters of the all the Arabic punches (of the SDB1 type and those in Figure 3.23) are not deep and many bottoms of counters (or plateaux) were kept rather big especially in SDB1. This means that the surface which has to be pressed or struck into copper is bigger than necessary, causing more resistance and consequentially more pressure on the punch, increasing the risk of damaging it. However, this would be done if there was the need to add dots or accents in the strike of the matrix, as explained shortly. It can be therefore inferred that the punches of SDB1 were never meant to be struck very deep into copper.²⁵

It seems worth noting, in addition, that some Arabic punches of similar letters show hollow counters, whereas others have a flat plateau (Figure 3.24). The reason for this practice is not clear: the question of practicality and convenience in cutting out just enough metal to enable the striking of the matrix instead of removing it all (especially for larger counters or in larger sized types), may not be a sufficient explanation. According to Smeijers, having the plateaux instead of hollow counters might also be for a technical reason. The first hypothesis is that it would enable to obtain a matrix that has a base where dots can be then added (by striking it later on with punches of dots, instead of having them on the same punch carrying the letter). This method was really standard in the sixteenth century: it was common practice for Hebrew that makes use of the so-called dagesh dots (Figure 3.25), and it would also be very suitable for Arabic.²⁶ The second hypothesis of having flat plateaux on punches is that it would allow for the 'L-shaped' punch carrying the dot to rest.²⁷ While this finds evidence in a punch discovered in the Medicean collection in Florence that appears to belong to Granjon (Figure 3.26),²⁸ it proves how little is known about the techniques of Arabic type-making and how much research there is still to do. As highlighted by Smeijers 'the problem is we do not know how much knowledge was shared between punch-cutters. The 'L-shape' accent is something that could be solved otherwise, yet it is there but we have to be very careful, we cannot state that this was common practice. On the other hand, it is proof of how far a certain cutter could go for solving a problem'.²⁹

The issue of diacritics marks (dots and vowels) is another important technical question of Arabic type-making, which is discussed in greater depth later in this

24. Thus serving for the points 3 and 6 listed in note 18. Fred Smeijers, e-mail message to author, 22 September 2016.

25. Fred Smeijers, e-mail message to author, 22 September 2016. Note that all Smeijers' observations regarding the Arabic punches have been made by looking at images of the punches in question and not through their direct observation, which should be preferred for more accurate evaluations.

26. Fred Smeijers, e-mail message to author, 22 September 2016.

27. Fred Smeijers, personal conversation with the author, 8 March 2017, Reading (UK). This particular example was found in the Medicean collection in Florence (BML). The author is indebted to Fred Smeijers for supplying and sharing the images from his own personal collection.

28. The author has identified the punch as matching the typeforms of Granjon's RG3.

29. Smeijers adds: 'The Arabics in Florence and the Imprimerie were cut late 16th century or 17th century. In the late 16th century the only punchcutter who could know about real 16th century practices was Le Bé (the elder). When he dies all the knowledge went with him and if he passed it on to his son, he did not use or record that knowledge. It might be that the Arabics are cut by a generation of cutters who had to start over again so to say', Fred Smeijers, e-mail message to author, 30 January 2018.

section. Nonetheless, the issue of dots relates in particular to that of counterpunches with regard to those Arabic punches containing diacritic dots inside the counters. Hypotheses can be made about the method used, especially if more punches had to be made for characters sharing the same shape containing the diacritic dot. For this particular case, it is possible that a counterpunch was used³⁰ but, as suggested by Smeijers, only to make the most difficult enclosed part of the counter (Figure 3.27):³¹

the punch-cutter, however, allowed himself quite some freedom. He could alter the shape made or left by the counterpunch when necessary. The counters can also be changed out of cutting convenience, so by working very fast and therefore less precise. More evidence in support of this hypothesis might be provided by the analysis of the corresponding matrices or strikes with the help of a microscope.³²

On the other hand, a counter containing a dot could be made with the help of a counter-counter punch³³ with the following procedure:

First, make a rhombic dot as a punch and hit it in another blanc punch; from this obtain an oval-shaped counterpunch and hit it in another blanc punch which is to be cut into an actual character [at the same height level of the dot]. This actual character will have a counter with a rhombic dot sticking upwards. This might sound complicated but it could be easily done this way; to go through a procedure like this was actually quite normal. The rhombic-dot-punch is, in this case, a counter-counterpunch.³⁴

However, there is no certainty of knowing that punches with rhombic dots were cut in this way (Figure 3.28). From the examples shown,³⁵ it can be claimed that the Arabic punches have been dug out for the larger part; there are occasions where the use of a counterpunch would make perfect sense but whether this was really done is unclear. More evidence can be supplied through the direct observation of punches and the matching matrices.³⁶

Economy of punches

In the context of this study, the punch-cutter's decisions determining which punches to cut are more important than the mere technique with which they were executed. To a certain extent, at that point, all the attributes of the fount would have been

30. As already said, it makes sense in presence of repetitions to make them with help of a counterpunch.

31. Thus, again, serving for the points 3 and 6 listed in note 18, Fred Smeijers, e-mail message to author, 22 September 2016.

32. Fred Smeijers, e-mail message to author, 22 September 2016.

33. Smeijers classifies counterpunches into three sorts: counter-counterpunch, counterpunch and transferpunch. 'A normal counterpunch for a capital "A" for example, is also made with help of a counter-counterpunch. A sharp chisel-like counter-counterpunch would be used for the crossbar of the "A". Once this is there in the actual counterpunch the triangular enclosed top and the bottom of the "A" can be easily made. So a capital "A" is best made with help of a counter and a counter-counterpunch'. Fred Smeijers, e-mail message to author, 22 September 2016.

34. Fred Smeijers, e-mail message to author, 22 September 2016.

35. Extracted from the cases of punches of the RG3, ADA and SDB1 types at the CDP (the full image is shown in Appendices 32, 57 and 63).

36. Fred Smeijers, e-mail message to author, 22 September 2016. It should be noted that the evaluations presented are made looking over the images of punches rather than the three-dimensional objects. To clarify and further understand the issues raised about the use of counterpunches for the making of Arabic punches, a direct and extensive analysis of the Arabic punches and corresponding matrices is necessary; this is not in the scope of this study at this moment, although it represents a fascinating subject of investigation to be undertaken by future researchers.

determined (e.g. the structure, method of character joining, diacritical mark inclusion or positioning, kerning) in order to plan all the required letterforms and their requisites (i.e. the character set). Moreover, the punch-cutter's work determined not only the quality of the typeface's design but also the cost and time necessary to complete it. Making punches was also a lengthier manual craft than casting types, so his time was valued more: all these factors must have seemed very good reasons to keep the numbers of punches low and devise various methods to reuse and combine punches to produce matrices.³⁷

One of the solutions to reduce the number of punches (but also matrices, as well as the number of sorts in the compositor's case) was to use the forms for the initial and unconnected positions of some letters in a word to also represent them when in the medial and final positions respectively. The obvious disadvantage of this method was that the letter would appear completely undifferentiated in two positions (Figure 3.29). Another approach to economise on the number of punches was to cut the diacritic dots (or vowels and other marks) on separate punches from the base-form (Figure 3.30) – avoiding cutting a punch for each possible letter-dot combination, or cutting multiple times the punch containing the same base-form only combined with a different diacritic mark.³⁸ This procedure would drastically simplify the job of the punch-cutter essentially transferring the problem of assembling base-forms and diacritic signs in the hands of the compositor, whose work would become much slower, challenging and tedious, having to deal with more fiddly pieces in his case.

Nonetheless, the approach of having dots (or vowels and other marks) on separate punches did not necessarily mean that the two elements had to be cast separately by striking two matrices, and end up as two separate pieces in the composing case. The operation could be in fact simplified for the benefit of the compositor before the typefounding stage: the two punches (i.e. base-form and dots, base-form and vowel) could be used to strike the same matrix independently³⁹ or bound together to obtain the desired character.⁴⁰ The latter technique consisted in stepping the punch for the base-form to fit a smaller punch carrying the dot (or vowels and other marks) and tie the two together with a thread (Figure 3.31 and Figure 3.32). The technique, already used to make accented letters for Latin and for Greek, was a standard method in the sixteenth century and very suitable for Arabic, because the punches could be stepped above, below or both (Figure 3.33 and Figure 3.34).⁴¹ The disadvantage of this method was that, regardless of how tightly the two punches were bound, they 'will move slightly in relation one to the other during the striking, so that the position of the accent will vary a little in different matrices'.⁴² The advan-

37. The usually accepted average rate of work of a punch-cutter is one punch a day, but Smeijers argues that, based on his own experience, this number can be brought up to 3–4 punches a day (at least for Latin capitals). Smeijers, *Counterpunch*, 114. Fournier says that the production of a French hand-caster was from two to three thousand types a day; Moxon says the English caster cast four thousand; De Vinne, *The Practice of Typography: A Treatise*, 26.

38. The Arabic type used by Thomas Roycroft (TR) to print Walton's London Polyglot Bible, *Biblia Sacra Polyglotta* printed in London in 1657 appears to use dots together with vowels or double vowel marks either cut on the same punch or cast on the same sort (Figure 6.111).

39. As discussed earlier in this section with regard to the practice of having flat plateaux in punches instead of hollow counters.

40. This would eventually result in a higher number of matrices than punches.

41. The step on the shank of the punch is also designated with the term *shoulder* in other literature. The mark attached to the punch with this technique is called in French *accent postiche*.

42. Hendrik D. L. Vervliet, *Sixteenth Century Printing Types of the Low Countries* (Amsterdam: Menno Hertzberger & Co., 1968), 11. This is relevant information for the type analysis: slight movements of this kind can be noticed in the same letters combinations in the printed text.

tage was that it ensured greater accuracy and a consistent depth of strike compared to striking the matrix with individual punches.

Another interesting approach to reduce the number of punches was to cut letters (single or in composition with others) with all the possible dots, creating impossible characters: with this method the problem was again in the hands of the compositor, who had to file off the unnecessary dots to obtain multiple combinations (Figure 3.35).

The single element capable of drastically increasing the number of punches in an Arabic fount was the number of ligatures included: they were used not only to save time and space in composition – by having recurring letter combinations on individual sorts – but also as an attempt to reproduce the deliberate variations of written Arabic. Of course, there was potentially no limit to the ligatures that could be included in the fount and the whole matter was at the discretion of the punch-cutter (or the person financing the work). The ligatures in Robert Granjon's Arabic typefaces constituted a step forward in the representation of a more authentic Arabic in metal types with combinations of up to five characters (see Figure 3.10). Very complex ligatures of up to six characters long have been found in another Arabic typeface in the Imprimerie Nationale (Figure 3.36). Moreover, the number of punches would increase if more punches of the same letter with slightly different variations in the design were cut, in an attempt to reproduce the features of written Arabic (Figure 3.37).

In conclusion, it is important to remember that each punch-cutter developed his own method and that even if the punches are not necessarily self-explanatory in revealing his approach, they may raise further questions.⁴³ It is even harder to understand the punch-cutter's process by looking at the printed books. In the type analysis chapters that follow⁴⁴ many issues of this nature are described in terms of inconsistencies for one simple reason: in reconstructing the puzzle in front of us, we are trying to find 'patterns that make sense'⁴⁵ although this is ultimately guesswork, that may or may not find answers that correspond with the punch-cutter's intentions.

3.2.2 Methods of Arabic typefounding

Making the matrices

The characters' appearance and structure were already determined by the punch-cutter prior to their casting: the latter was merely a production stage, and although different methods could be used, these were chosen according to the decisions made in the previous phase. In between, there was the important operation of striking the matrices, usually carried out by the punch-cutter himself.⁴⁶ The matrices were struck one or multiple times, depending on the chosen method. With the first,

43. For instance, it is not clear why the punch-cutter included dots on the actual punch itself for some letters (or letter combinations) that share the same base-form but not for others; nonetheless it should be noted that the set might not be complete and that punches may have been lost.

44. See Chapters 5–9.

45. Smeijers, *Counterpunch*, 160.

46. Smeijers argues that this was the case particularly in the early days of printing, because 'only punch-cutters knew enough about how type worked'. In the industrial period this task was entrusted to the hands of specialists. Smeijers, *Counterpunch*, 121.

a single set of actions⁴⁷ was necessary to strike either a single punch containing the full image of the final character, or a stepped punch containing separate elements of the character, tied together to form the same image. With the second method, multiple strikes were necessary in order to impress the desired final character in the matrix: this was usually done using individual (non-stepped) punches. The sorts obtained could be either ready to use as they were – after being dressed to the same height – or further adjusted and prepared for composition.⁴⁸ Accordingly, the punch and the matrix might correspond perfectly or not, depending on which solution is chosen (Figure 3.38).

From the mid-nineteenth century, matrices could also be made without punches, by the process of electrotyping.⁴⁹ According to J.F. Coakley, the Oxford University Press practised electrotyping from c. 1864 to make pointed matrices for Syriac;⁵⁰ likewise, the German Drugulin foundry at the end of the nineteenth century. The technology also reached Beirut via France and England, ‘to make pointed Arabic type’.⁵¹

Separate and joined casting

The choice of one particular casting method over another would have benefited either the punch-cutter, by keeping low the number of punches and matrices, or the compositor, by reducing the number of characters in the cases or by facilitating the composing method and consequently increasing the speed of hand-setting.

One of the main problems in Arabic type-making was to optimise the rendering of the relationship between the base-forms and relative dots and between the base-form and corresponding vowels (or other marks), which had to sit above or below them. At the typefounding stage, this issue could be addressed with the following two approaches: the first method – or *separate casting* – was to cast the base-forms and dots (or other diacritical marks) on separate pieces of metal, which the compositor had to assemble. According to John Lane, there is no doubt that most printers of the sixteenth century used this method, which was easier to cast but increased the complexity of composition.⁵² The second method – or *joined casting* – was to cast the base-forms with all possible dots, and subsequently, file off those superfluous to

47. The strike of a matrix with a single punch is designated in this thesis as a ‘single strike’. Nevertheless, even in this instance, the strike might have required repeated movements to complete, hence, for accuracy, they are here collectively described here as ‘set of actions’.

48. For example, filing off dots might have been necessary.

49. ‘The first electrotype matrix for types was made by Edwin Starr of Philadelphia in 1845, and used in the foundry of James Conner in New York’. De Vinne, *The Practice of Typography: A Treatise*, 18. This process, which enabled the copying of founts without the necessity of punch-cutting, also caused ‘an increase in the conscious plagiarism of successful designs’. See Ross, *The Printed Bengali Character*, 111–17.

50. A pointed matrix included both the base-form and the diacritic marks, so that the pointed character could be cast on the same sort with a single matrix. Coakley uses the term *points* broadly to denote all reading signs including vowels, J. F. Coakley, *The Typography of Syriac. A Historical Catalogue of Printing Types, 1537–1958* (New Castle and London: Oak Knoll Press and The British Library, 2006), 21. The expression pointed Arabic might be used in literature to designate the inclusion of diacritics; however, it has already been mentioned that in this thesis, the term diacritical marks refers to the vowels and other signs for reading, while the term diacritical dots is used to indicate the dots exclusively.

51. The head workman of the Imprimerie Catholique in Beirut went to the Imprimerie Nationale and an unknown typefoundry in London to learn how to make electrotype matrices: ‘this was in order to make pointed Arabic type from the unpointed type supplied to the press by the American press in Beirut’. Coakley, *The Typography of Syriac*, 23, 55–56, note 86.

52. Lane, Breugelmans, and Witkam, *The Arabic Type Specimen of Franciscus Raphelengius*, xxviii. The typesetting implications of this method are discussed in § 3.2.3.

the required character. The joined casting method resulted in an easier composition process but demanded a larger fount, which was more difficult to prepare (Figure 3.39).⁵³ Regarding the vowels, only the most frequent combinations were cast on single sorts, whereas the full vocalisation of the text had to be achieved with other methods.⁵⁴

It is worth observing that a method which seems more efficient at first, might be less desirable given the circumstances: 'depending on the amount of type to be cast, it might be more efficient to make extra matrices than to cut away the superfluous dots'.⁵⁵ Moreover, it is possible that different techniques were used for the same fount, because what worked for some characters was not necessarily suitable for others: it was more efficient to cut an extra punch for a frequent character – or a ligature for a sequence of more characters – than having to modify it after casting (or repeat the composition when typesetting).

Finally, it is possible that other techniques were used for Arabic, of which no evidence survives. This could be the case of matrices with no margins used in the sixteenth century to cast music, where the lines of the stave ran across the matrix from one edge to the other, so to give the appearance of continuous lines when joining. A set of matrices was made in the same way for the printing of a small Hebrew typeface so that the letters could be cast without gaps between them: the matrices containing the letters would be placed next to each other in the mould, and the characters would be cast together as a single sort. The result had the same appearance of a ligature but was obtained from multiple matrices rather than from one. With this method, the flexibility of not having a single punch for the ligature allowed for variations within the same group of letters.⁵⁶

Kerned casting and alignments

An alternative casting technique was available to produce kerned letters and kerned accents. This method would allow characters to have a body width only half as wide as usual, and part of the face to be cast on the overhang or kern. The accents would be cast separately, but also on narrow bodies. When combined, the overhanging characters (or kerned letter) could rest on the body of the accent for support, forming an accented sort with full body (Figure 3.40).⁵⁷ It was a common method for Greek floating accents and possibly used for the positioning of Arabic marks. According to Philip Gaskell, both methods of casting (tied letters with stepped punches and kerned letters) were in use by the early sixteenth century, 'although printers preferred to use unkerned sorts, keeping the kerned vowels for emergencies'.⁵⁸

In terms of casting, Arabic posed an additional difficulty. Unlike Latin and the majority of other scripts, the letters do not sit on a single baseline but rather relate collectively to a middle line (Figure 3.41).⁵⁹ In order to maintain this feature, the

53. Ibid., xi. See also examples of the punches in Figure 3.35.

54. Essentially with separated sorts, differently assembled according to how they had been cast: either composed on top of each other or kerned next to each other. This is explained in greater depth in § 3.2.3.

55. Lane, Breugelmans, and Witkam, *The Arabic Type Specimen of Franciscus Raphelengius*, xi.

56. Carter, *A View of Early Typography*, 20.

57. Philip Gaskell, *A New Introduction to Bibliography* (Oxford: Clarendon Press, 1972), 30.

58. Ibid., 30–31. The typesetting implications are discussed in § 3.2.3.

59. The term baseline is used to denote the line on which the type is horizontally aligned. For the Latin script this definition is more fitting because even though letters have different heights, they rest on a common single line. In Arabic this does not happen: letters have different heights and different alignments, meaning that they do not have a baseline as such but all elements of a letter group relate collectively to a middle line. In typography, the difficulty of reproducing this feature of the

characters had to be cast with different alignments.⁶⁰ These could be obtained by striking the punch at different heights on the matrix (producing more matrices of the same character) or by shifting a matrix within the mould at different heights (thus producing characters differently cast on the sort).

As reported by Coakley, the moulds made by the Tauchnitz foundry, to make an Arabic type with five alignments, were adjustable with a screw to allow for different alignments. 'The adjusting screw was said by Tauchnitz's workman to be a French innovation'.⁶¹

3.2.3 Methods of Arabic typesetting

The typographical difficulties of hand-setting Arabic with movable metal type discussed above were a direct result of the attempts to translate into printing – with different type-making approaches – the cursive nature of the script, the various features of its calligraphic tradition and the requisite for floating marks to be combined. The Arabic script has an inherent need for flexibility; thus the elements (both base-forms and diacritical marks) can interact with each other and contextually vary according to what surrounds them. This characteristic found in writing a suitable medium for expression, but a rather hostile ground in printing, where the three-dimensional blocks of metal – traditionally cut at a 90° angle – made it practically unfeasible to be reproduced without being compromised.

Type-case, compositor and approach

Fount type-cases are the ideal source of information to give an adequate reconstruction of how an Arabic text was composed by looking at the actual metal sorts. Handling sorts first hand is the easiest way to understand how they work: the way sorts are cast reveals, to some degree, how they should be assembled. Moreover, the 'lay' of the case reflects the compositor's *modus operandi* (Figure 3.42).⁶² Before starting typesetting, he would study a printed version of the layout to get familiar with it and improve the speed of his typesetting. That document was also critical if the case was accidentally dropped, as a reference for the assembly of the sorts in their intended positions.⁶³

As mentioned briefly in § 3.2.1, the compositor was required to have some familiarity with the language to be typeset. De Vinne on this matter states: 'Foreign languages will be set with most correctness by the compositor who clearly understands the meaning of his copy, but a knowledge of more than one language is not to

Arabic script has caused the implementation of a baseline for the alignment of characters also for Arabic, as standard practice for Latin types. This is referred to as *notional baseline*. This term has been originally introduced by Fiona Ross in the context of the Bengali script to designate the alignment of its characters in relation to Latin, which was often the requirement for mixed typesetting, see *The Printed Bengali Character*, 9.

60. Intended as the position where the letter sits on the sort.
61. J. F. Coakley, 'Homan Hallock, Punchcutter', *Printing History* 45. *The Journal of the American Printing History Association* 23, no. 1 (2003): 27.
62. The characters in the type case should be arranged to minimise the work of the compositor: the letters that occur more frequently are positioned next to each other in the case, and closer to the reach of the compositor's hand, so that they can be quickly accessed. It is worth observing that a single fount, particularly for non-Latin types, can have more than one case, so a lack of organisation in the layout arrangement could have a great influence on the speed of a typesetting job.
63. For more type-case layouts of Arabic types from the Imprimerie Nationale, see Appendices 31, 39, 48, 49, 50, 62, 67, 84, 91.

be expected of the ordinary typesetter'.⁶⁴ Founts of languages with alphabets other than the roman 'should be handled by compositors and supervised by readers who have at least some superficial acquaintance with the languages'.⁶⁵ Nonetheless, the familiarity with the language was perhaps more wished for than required, as previous studies on the typesetting of other non-Latin founts have reported. According to Jo De Baerdemaeker, most of the compositors and proofreaders at the OUP hardly knew the languages, although they became very adept at their jobs.⁶⁶ This seems to have also been the case at the French Imprimerie Nationale, as Gilles Contesenne, former Oriental compositor between the years 1966 and 2010, confirms:

Nous étions 8 apprentis en 1966 et nous avons appris les alphabets et les règles de base de la composition d'une cinquantaine d'écriture mais sans jamais les comprendre. Nous avons beaucoup composé ces écritures afin d'obtenir une certaine rapidité.⁶⁷

The knowledge on how to compose in the different scripts would be acquired from a composing manual for Oriental scripts, a guide for the compositor that provided indications to help the typesetter prevent mistakes (e.g. letters that could be mixed-up), learn how to combine letters or to vocalise correctly according to the system adopted in a particular fount (Figure 3.43).⁶⁸ Evidently, the twentieth-century instance of the Imprimerie Nationale was not the norm for printing houses in earlier periods; it was more likely that compositors had to develop their own method of typesetting – perhaps at times in direct contact with the punch-cutter – to get familiar with the script, especially if they did not know the language, and with the fount's typesetting system devised by the type-maker, to optimise their workflow.

Regarding the methods of handsetting Arabic types, only limited historical evidence has been found in extant sources. In order to describe the process, it is necessary to make informed hypotheses of the techniques used.⁶⁹ The first method followed the same procedure as used for Latin script types, to which the compositors were already accustomed. This implied holding the composing stick with the left hand and starting composition from left to right (Figure 3.44). Due to the reading direction of the script, the letters had to be inverted from their usual orientation for

64. Theodore Low De Vinne, *The Practice of Typography: Modern Methods of Book Composition. A Treatise on Type-Setting by Hand and by Machine and on the Proper Arrangement and Imposition of Pages* (New York: The Century Co., 1904), 231.

65. *Ibid.*, 232.

66. See De Baerdemaeker, 'Tibetan Typeforms', 271.

67. 'We were 8 apprentices in 1966 and we had to learn the alphabets and the basic rules of composition of about fifty writing systems, but without ever understanding them. We have composed these writing systems a lot in order to obtain a certain speed'; approximate translation by the author. Gilles Contesenne, e-mail message to author, 8 August 2016.

68. *Mémento De Typographie Orientale: À L'usage Des Compositeurs De L'Imprimerie Nationale*. Paris: Imprimerie Nationale, 1947. Another important source of this kind from the Imprimerie Royale was compiled in 1787 by the French Orientalist Joseph de Guignes after the discovery and identification of punches of Oriental languages (see § 6.2, note 18). The work supplies observations regarding the principles of typographic composition for various languages, including Arabic. As suggested by De Guignes, the work could be used by a compositor to instruct himself on how to compose with Oriental types. See Joseph De Guignes, *Principes De Composition Typographique Pour Diriger Un Compositeur Dans L'usage Des Caractères Orientaux De L'Imprimerie Royale* (Paris, 1787).

69. In addition to the sources, the author has discussed her hypotheses with two people who have typeset Arabic metal types: Gilles Contesenne, mentioned above, and J.F. Coakley, who has composed Arabic, Hebrew and Greek besides Syriac at his own Jericho Press. At those premises, the author has done some Arabic typesetting with the OUP 14 pt, now in the NLTC (together with the 18pt).

typesetting (upside-down for roman letters), and face the compositor the right way up, so that the typesetting of the line could progress as usual. This meant that the nick⁷⁰ of the Arabic sorts, if cast in the same position as the Latin script (i.e. at the foot of the letter), would now face the composing rule, instead of showing on top of the composed sorts (Figure 3.45).⁷¹ Once the line was completed and also justified, it was turned 180° before being placed in the galley. If the text required vocalisation, after the justification of the line, the vowels (or other diacritic marks) were added above the letters. The line was then turned and placed again in the composing stick to compose the line below.⁷² However, if the vowels were cast on the same body of the letters and kerned, they would be composed at the same time, forming only one line of composition.⁷³

Evidence of the left-to-right approach for Arabic typesetting was found in the *Journal Asiatique*, 1860:

Aujourd'hui les points diacritiques sont gravés avec les consonnes mêmes, et les voyelles ou les accents se paragnonnent soit en dessus soit en dessous de la ligne principale, que l'on compose d'abord de gauche à droite avant d'ajuster les voyelles supérieures; puis on retourne dans les composteur les deux lignes justifiées, pour placer en dernier lieu les voyelles inférieures. Des cadratins fondus exprès servent à supporter la tête ou la queue des lettres dont les traits dépassent les proportions de la ligne médiale.⁷⁴

This system was used at the Imprimerie Nationale until recent years, as confirmed by one of their former compositors.⁷⁵

70. 'The nick tells the compositor whether all the type in the line is the right way up or not [...], is visible to the compositor and it can be felt with the thumb, reassuringly, as the type is set'. James Mosley, 'Type Held in the Hand'. *Typefoundry*, 2012. Accessed 17 July 2016. <http://typefoundry.blogspot.co.uk/2012/01/type-held-in-hand.html>.

71. The position of the nick on the sort depends on the type-maker. The Arabic types of the Imprimerie Nationale (and French type in general) had the nick at the top of the letter, not at the foot: therefore when composing with the Arabic letters 'the right way up', the nick would show. In fact also some 17th century founders in England followed this practice, and also Monotype r-t-l languages have the nick on top. On the other hand, the Arabic types of the Oxford University Press (OUP) have the nick in the usual position at the foot of the letter, as well as the Arabic types of the Lebanese Khenchara Press (see Appendix 123). More about the position of nicks on sorts can be found in Mosley, 'Type Held in the Hand'.

72. The method described assumes that the dots were cast together with the base-form. If the dots were cast separately, the procedure of adding them would be the same as (and precede) that for the vowels.

73. This was partly the system proposed by Jules Ferrette in 1859, with his simplified method to compose vocalised Arabic. See below in this section.

74. 'Today the diacritical points are cut together with the consonants, and the vowels or accents are stacked-aligned either above or below the main line, which is composed first from left to right before adjusting the vowels above; then the two justified lines are rotated in the composing stick in order to place the lower vowels last. Spaces expressly cast serve to support the head or tail of letters whose strokes exceed the proportions of the median line'. Approximate translation by the author. From A. P. Pihan, 'Note Sur La Nouvelle Méthode Du Révérend Jules Ferrette Concernant La Typographie Arabe', *Journal Asiatique* 5, XV (1860): 457.

75. At least in the years between 1966 and 2010: as confirmed by Gilles Contesenne, this is the only method he has ever known, used and seen for the composition of Arabic. He also confirmed that out of the Arabic type collection of the Imprimerie Nationale, only the 'Monotype Arabic 23' was composed on one line with the kerning method. Gilles Contesenne, e-mail message to author, 3 June 2016.

A second method to compose Arabic was also possible: the composing stick was still held with the left hand, while the composition was started from the 'wrong end' of the stick (Figure 3.46). This approach allowed the letters to remain in the usual orientation for typesetting as Latin ('upside-down') and to maintain the reading direction of the Arabic script, as the line was typeset from right to left. Moreover, it would allow having the nick 'on show' on top of the sorts (if cast in the usual position at the foot of the letter), as standard practice for the composition of roman letters. If the text required vocalisation, after the justification of the line, the vowels (or other diacritic marks) were added below the letters. The line was then turned 180° to set the marks above. The right-to-left approach for Arabic typesetting is used at the Jericho Press.⁷⁶ Two sources describing the composition of Hebrew may provide a relevant insight into the practice of typesetting right-to-left scripts. The first source seems to confirm the first method described above for the typesetting of Arabic:

[...] Hebrew is read from right to left. To give to the characters this sequence in print, the types must be reversed after they have been set. The compositor begins as he does with English, by setting the characters at the left hand of his copy, turning the nicks of the type inward to face the composing rule. When the line has been spaced and justified (wide spacing is preferred), turn the line in the stick. If accents are to be added, justify them in a separate line in their proper places.⁷⁷

The second source adds important information about Hebrew typesetting: it confirms that the first method was used in English offices, whereas it seems to suggest that the second method was used in Jewish offices:

Composition is done in English offices usually by setting from left to right, the nick being against the composing rule, and therefore the contrary way to ordinary setting. The bottom vowel-points and accents are justified to the letters, and then the whole is turned round. In Jewish offices, however, the setting is done from the end of the line forward, and after the line is justified the separate accents are put in.⁷⁸

These words suggest the possibility that the native readers of a particular script (or even the indigenous presses as a whole) were using different practices for the typesetting of their own script than the Western approach. If Jews composed from right to left – therefore in the reading direction of the script – while English offices maintained the same method used for the roman letters, it is possible that this was the case for Arabic as well.

It should be considered that besides the familiarity aspect, the matter of comfort was also important for a compositor. Composing with the right-to-left approach the stick cannot be inclined in the usual manner (Figure 3.47) but in the opposite direction, with the end pointing downwards instead of upwards, to prevent the letters from falling out. This unnatural position is worsened by a more precarious grip and general balance, due to the different distribution of the weight (the sorts are now on the opposite end of the adjustable knee). Moreover, it is more tiring for the

76. J.F. Coakley, e-mail message to author, 13 May 2016. According to Gilles Contesenne 'on peut certainement composer avec cette méthode, mais cela doit être beaucoup plus long et moins aisé, en tout cas je n'ai jamais vu faire ça!' ('It is certainly possible to compose with this method, but it should be slower and more difficult, and anyway I have never seen it!', approximate translation by the author). Gilles Contesenne, e-mail message to author, 3 June 2016.

77. De Vinne, *The Practice of Typography: Modern Methods*, 245.

78. John Southward, *Modern Printing. Section II. Book & Jobbing Composition, Machine Composition* (London: Raithby Lawrence and Company, 1899), 32–33.

hand: the wrist has to be bent rather than kept in a straight position, and the thumb instead of holding the sorts, has to push against them to keep the letters in place: a position very uncomfortable to hold for extended periods of time.

All these hypotheses regarding Arabic typesetting consider that the composing stick was held with the left hand. It seems indeed that if the compositor is right-handed, he should hold the stick with the left hand, no matter what language he is setting in: 'there might be a little advantage with right-to-left languages in holding it with the other hand, but it would never outweigh the advantage of having the hand with the greater dexterity to pick out the sorts'.⁷⁹ It is possible that composing sticks for left-handed people to be held with the right hand were produced, but this did not necessarily have any relation to the issue of right-to-left languages. Either way, no historical references of them have been found.

Setting unvocalised and vocalised text

As the last stage before the printing process, typesetting was determined by the way the sorts had been cast, although the preference of one composing method over another could have influenced the choices for the making of the type (e.g. using or not using kerned sorts, casting the diacritic marks together with the base-form).

The composition of a text with no vowels and sorts cast on the full body was a pretty simple affair (Figure 3.48). The inclusion of separate vowel signs in typesetting with metal type was a slow and fiddly process and added complexity to the job. Their small size made them hard to handle and prone to move out of position during printing; additionally, they could be made in this way only for types above a certain size. For these reasons, in some cases the vocalisation was abandoned because it was considered too difficult; in others instances, compromises were reached to still include some marks: accordingly, the size of the vowels was increased, or only a selection of vowels was chosen to be represented, leaving out the rest.

Strictly in terms of ease of setting, casting all the combinations of Arabic letters together with each vowel was the preferable method, mainly because the composing lines would be reduced from three to one. However, the number of required sorts made this method practically unfeasible, as it would have dramatically increased the size of the character set, and thus of the case-lays.⁸⁰ This technique was only adopted by the punch-cutter for the most frequent combinations (Figure 3.49).

Two separate pieces of type could be assembled next to each other or one above the other; the sorts could be either on the full body or kerned, overhanging the body width, left or right (Figure 3.50). Particular care had to be taken with the latter sorts, as they were fragile and they could bend or break in printing. The sorts could also kern vertically, to reduce the visual space between the lines of text: in this case, the character would overhang the body above or below (Figure 3.51, Figure 3.52 and Figure 3.53). For heavy kerns, occurring for instance when elongated letters were used (Figure 3.54), different solutions were also made. In one of Granjon's Arabic founts,

79. J.F. Coakley, e-mail message to author, 16 May 2016.

80. This technique was adopted by the 'American Arabic' type of the ABCFM Press cast in Leipzig in the nineteenth century, see § 8.4.2. In discussing this method, Jules Ferrette remarked that each letter combined with every vowel and orthographic sign would require a different sort for every contextual variant, resulting in two or three thousand characters. If the method brought any improvement, it was certainly not through simplification. Another problem of setting vocalised text in Arabic was to find correctors really capable of supervising the work. See Jules Ferrette, *Méthode Simplifiée Pour Imprimer L'arabe Avec Les Points Voyelles, Par Le Révérend Jules Ferrette, Missionnaire À Damas*. Extrait du *Journal Asiatique*. 1859. N.11 (Paris: Imprimerie Nationale, 1860), 14. The original article is published in *Journal Asiatique* 5, XIV (1859): 298–327.

the swash characters were cast on the full body, but the sort was 'L' shaped: the space cut above the swash had to hold the setting of the nested letters (Figure 3.55).⁸¹ *Setting vocalised Arabic: standard and simplified methods (Jules Ferrette, 1859 and A.P. Pihan, 1863)*

Vocalised composition for Arabic would normally be achieved with vertically stacked sorts.⁸² base-forms were cast on one body, and the diacritical marks, which were cast on a smaller body, would be placed above or below the base-forms. With this method, every line of fully vocalised text would consist of three levels (Figure 3.56).⁸³ Although this method was more economical from the manufacturing point of view than having the marks cast together with the letters, it increased the complexity of composition, due to the difficulty in handling small sorts that could break or move out of place under the printing pressure. A great deal of precision was also needed in the spacing of the marks above or below the letters, in order to achieve the most accurate placement possible to avoid any confusion.⁸⁴ With the kerned method (see Figure 3.40), the vowel was virtually locked up with the character it belonged to, so an accurate positioning of the diacritical mark was easier to achieve.

In 1859, the Reverend Jules Ferrette, missionary in Damascus, presented a new simplified method for printing vocalised Arabic, with a simpler, quicker and less expensive system than those practised so far.⁸⁵ In Ferrette's words, his 'simple invention' removed the 'great expense'⁸⁶ – the main obstacle to printing vocalised Arabic – and the difficulties to control the accuracy of the vowels' relative position to the characters:⁸⁷

In Arabic printing, consonants are connected together as in English handwriting; and the rules of calligraphy permit the prolongation *ad libitum* of the horizontal connecting line. The type by which this prolongation is effected is made, by my invention, to bear the vowel of the preceding letter, while vowels placed after unconnected or final letters are cast without connecting lines, and placed, according to the same principle, after the consonants which project over them. In this manner, I am enabled to print Arabic, with all its vowel-points, by means of one line of types only, instead of three as formerly.⁸⁸

81. Letters set inside the space of the neighbouring sort. Kerned letters are also nested.
82. Two notorious exception are: the simplified method of Jules Ferrette introduced shortly and that of the 'American Arabic' type of the ABCFM Press in Beirut illustrated in § 8.4.2.
83. A similar method, known as *Degree* system was used for the typesetting of Devanagari. The kern method, known as *Akhand*, was also used. See Ross, *The Printed Bengali Character*, 136.
84. The inadequate mark positioning and the lack of kerning can compromise the word image. This for Arabic 'amounted to a severe design and legibility issue', while for Latin was 'an aesthetic shortcoming'. Nemeth, 'Arabic Type-Making in the Machine Age', 79.
85. Ferrette presented his simplified method and that of the ABCFM Press as the two main techniques that attempted to solve the challenges of typesetting vowels in Arabic, see *Méthode Simplifiée*, 16. 'He acquired a press and a vocalized Arabic type enhanced to his own specifications in London, and brought them to Damascus in 1864'; see J.F. Coakley, 'Mission Presses in the Ottoman Empire: A Bibliographical Survey', *ARAM* 25, no. 1&2 (2013): 103–04
86. Ferrette suggested that printing a vocalised text with his system would cost a quarter more than without vowels. Ferrette, *Méthode Simplifiée*, 30–31.
87. When typesetting three lines of type as required to add separately cast vowels.
88. Jules Ferrette, *The Gospel of Matthew in Arabic printed with all the vowels, according to the simplified method of the reverend Jules Ferrette, missionary of the Irish Presbyterian Church at Damascus. With an Introductory explanation of the method both in its mechanical and philological part*, (London: W. M. Watts, 1863), iii–iv.

Ferrette's method (Figure 3.57) was based on a simplification approach⁸⁹ made of two parts – independent from one another and applicable separately – one typographic (or mechanical) explained above, and one philological:

Notre simplification consiste simplement à écrire ceux d'entre les signes orthographiques qui sont nécessaire pour fixer la prononciation, et à supprimer ceux qui ne servent absolument à rien, et qui n'ont été introduits que par la tendance des Arabes à la redondance et à la subtilité.⁹⁰

The method does not give all the vowels or orthographic signs, but only 'as many as are necessary to the adequate representation of the language'.⁹¹ Accordingly, it gives only the ones that are pronounced; the preservation or suppression of marks is based on 'very few and very simple rules, which leave nothing uncertain'⁹² (Figure 3.58). Ferrette promotes his new system as applicable to every existing Arabic case-lay:⁹³ it is sufficient to cast about sixteen new characters on the same body as the letters, which represent the vowels or other orthographic signs (Figure 3.59). The text composed with the new simplified method works better with types that do not rely heavily on ligatures because the first character of the ligature – or indeed any other than the last – would remain necessarily without a vowel:⁹⁴

Nous ne voulons pas exterminer les beaux types à ligatures dont le Révérend docteur Ely Smyth, de Beyrouth,⁹⁵ a si bien combiné toutes les proportions, quoique des caractères de cette espèce soient rebelles à la vocalisation, et se prêtent moins bien à notre système que les caractères également beaux, mais beaux dans un genre plus simple, qui ont été gravés pour le Coran de Flügel ou pour la Propagande de Rome.⁹⁶

Ferrette recommends particularly the use of the Propaganda Fide's Arabic types, because they had the advantage of connecting the letters ح ح to the preceding one without forcing it to rise above the notional baseline, which simplified the composition.⁹⁷

Finally, it should be noted that in the first specimen published to present the method in 1860, the vowel below the characters maintains the same slant as the one used above characters, whereas in the book printed in 1863, the kasrah becomes perfectly horizontal (Figure 3.60). It is not clear when or for what reason this change

89. Ibid. vii. Rather than a proper reform of the Arabic alphabet and orthography, 'which would be resisted by the Arabs'.

90. 'Our simplification simply consists in writing those orthographic signs which are necessary to fix the pronunciation, and to suppress those which serve absolutely nothing, and which have been introduced only by the tendency of the Arabs to redundancy and subtlety', approximate translation by the author from Ferrette, *Méthode Simplifiée*, 19.

91. Ferrette, *The Gospel of Matthew in Arabic*, v.

92. Ibid., v–vii. Refer to source for a complete list of the rules.

93. And also applicable to Hebrew, Chaldaic, Syriac and other languages using the Arabic script (e.g. Persian, Kurdish, Afghan, Turkish, Tartar, Hindustani, Malay, Barbar, Ghadamsi). Ferrette, *The Gospel of Matthew in Arabic*, viii.

94. Ferrette, *Méthode Simplifiée*, 27.

95. He is referring to the 'American Arabic' type of the ABCFM Press in Beirut, see § 8.4.2.

96. 'We do not want to exterminate the beautiful types of ligatures of which Reverend Dr. Ely Smyth, of Beirut, has so well combined all proportions, although characters of this kind are rebellious to vocalisation, and are less suited to our system than the characters equally beautiful but in a simpler way, which were engraved for the Koran of Flügel or for the Propaganda of Rome', approximate translation by the author from Ferrette, *Méthode Simplifiée*, 28.

97. Ibid., 29.

happened: the only papers in the archive of the Imprimerie Nationale show only the use of the horizontal vowel design used below the characters (see Appendix 4).⁹⁸

Ferrette's simplification method was openly criticised by A.P. Pihan – *prote*⁹⁹ of the 'Oriental typography' at the Imprimerie Nationale – in an article published in 1860.¹⁰⁰ Pihan highlighted different problems with Ferrette's method, mainly concerning issues affecting the nature of the script,¹⁰¹ and the economical disadvantages of using the system.¹⁰² Firstly, the new sets of marks to insert between characters compromised the appearance of the letter-joins (e.g. affecting the continuity) due to the small lines that supported them. Secondarily, their insertion lengthened unnecessarily the connections, resulting in stretched words and a less economical use of the space.¹⁰³ Moreover, the new marks were too fragile and prone to breaking during their handling and in print;¹⁰⁴ they had to be replaced often, making the system not cost-effective. Pihan also criticised the suppression of ligatures – 'le plus bel ornement de l'écriture arabe'¹⁰⁵ – forced by Ferrette's system due to the unfeasibility of correctly vocalising them.¹⁰⁶ The French typographer concluded his critique with a firm rejection of the method:

[...] je crois pouvoir affirmer, en teminant, que les exigences de la composition arabe ne permettent pas de substituer à l'ancien système, qui fait l'honneur de la typographie orientale, une méthode dont l'application serait un pas fait en arrière au lieu d'être un véritable progrès.¹⁰⁷

88. A note that accompanies the paper states: 'The Reverend Jules Ferrette, passing through Paris in 1880, came to the Imprimerie Nationale to take the matrices of the body 22, which he had ordered, and which were electrotyped and inset into a tin alloy. The matrices of the small body, also electrotyped and inset into a tin alloy and whose impressions had been authorized by M. Ferrette, were handed over to the office of the *prote* of the foundry on 7 November 1881. These types have not been used by the Imprimerie Nationale', approximate translation by the author from 'Arabe (corps 22)'. From 'Méthode simplifiée pour imprimer l'arabe avec les points voyelles, par le Révérend Jules Ferrette, missionnaire à Damas', *Folders*, CDP. The Arabe 22 points is Granjon's RG4 (§ 6.1.5), as shown in Figure 3.58. Note that the translation 'tin alloy' comes from the original *étain*, literally 'tin'. However, as suggested by James Mosley, being a rather soft material it is unlikely that it was used to make matrices, especially on its own; other materials like nickel were more likely used. James Mosley, e-mail message to author, 10 January 2018. The term *prote* is explained below.

99. The person responsible to distribute and coordinate the work in the composition department of a press, and who controls the technical execution of the printing. A corresponding term commonly used in English is lacking, thus the original word is kept.

100. Pihan, 'Note Sur La Nouvelle Méthode'. He compares Ferrette's method to the traditional Arabic composing system on three lines, one for the consonants and two for the marks above and below.

101. *Ibid.*, 459. 'On arriverait à produire un caractère bâtarde, désagréable à la vue' ('It will produce a bastard character, unpleasant to the sight'), approximate translation by the author.

102. Refer to the original article for a detailed explanation of the issues, which are here concisely presented.

103. The new method was therefore not cost-effective because a page would contain less text than if set with the traditional method.

104. Pihan, 'Note Sur La Nouvelle Méthode', 458. The marks, which are already rather small, are cast overanging the body either on both sides or on the right side, exposing delicate pieces of metal.

105. *Ibid.*, 459. 'The finest ornament of Arabic writing', approximate translation by the author.

106. This was a double shortcoming of the new method compared to the traditional one, which allowed the use of ligatures and their correct vocalisation.

107. '[...] I think I can affirm, in concluding, that the demands of Arab composition do not allow us to substitute for the old system, which honors the Oriental typography, with a method whose application would be a step backwards instead to be a real progress', approximate translation by the author. Pihan reserved a short praise only for the 'remarkable' philological part of Ferrette's method concerning the suppression of unnecessary marks to economise the composition. Pihan, 'Note Sur

A different attempt to simplify the composition of Arabic was undertaken at the Imprimerie Nationale in 1863 by A.P. Pihan using the fifth Arabic types of Granjon (RG5), as 'modèle de gravure'. The new type was also on 17 points but differently cast.¹⁰⁸ Compared to the original, only the essential ligatures were used, reducing their number by 300, in order to make it more economical.¹⁰⁹ The case-lay was thus reduced from four parts¹¹⁰ to two (Appendix 5). The method is explained as follows:

The consonants on 9 points offer larger shoulders to support the vowels, and all the letters are cast in fixed register matrices,¹¹¹ of a narrower set¹¹² than the one used for the Arabic on 7 points. This size of Arabic can be used advantageously, with or without vowels, in the 9 points Roman, provided that the latter type is uniformly interlined at 4 points¹¹³ (Figure 3.61).

Moreover:

The vowels ' and ' are cast only on two heights, because they may be rotated,¹¹⁴ serving for all consonants with or without diacritical points. The other vowels and accents, had to be cast on three heights, to combine: 1° with the consonants without points (in this case the signs which bear on the shoulder of the consonant are used); 2° with the dotted consonants (the vowels must then be live casted); 3° with the tall consonants (the superior marks must be used). The beauty of the work resulting from the perfect harmony of vowels and consonants, it is necessary to conform to the present observation.

Extensions shall be used only for the requirements of justification and words shall not be spaced more than three points. A special case contains the letters necessary for the composition of Persian and Turkish.¹¹⁵

Multilevel composition problems

The dynamic nature of Arabic in manuscript form posed notable challenges to the type-makers, particularly due to the fundamental difference between the high adaptability of Arabic letterforms and the static nature of the sorts.¹¹⁶ This characteristic of the Arabic script not only provided an array of context-driven variants, but also required different types of connections for particular letter combinations, ei-

La Nouvelle Méthode', 460.

108. At the Imprimerie Nationale, the 17 points of RG5 were intended as (7+5+5), where the first number indicated the size of the base-form (or consonant) and the other two that of the diacritic marks. Pihan's simplified type was also 17 points but divided as (9+4+4). Therefore, in the documents of the Imprimerie, the RG5 type is named as Arabic on 7pt and Pihan's type as the Arabic on 9pt. See also *Liste Des Types étrangers de l'Imprimerie Nationale (compris dans le specimen de 1889)* (Paris: Imprimerie Nationale, 1890), 20–1.

109. *Les Caractères de l'Imprimerie Nationale*, 196.

110. See Appendix 49.

111. From the original 'matrices à registre arrêté'. This term is also used by Fournier in *Manuel Typographique*, with regard to the justification of matrices. Fournier's expression 'justifier à registre arrêté' is translated in English by Harry Carter as 'justifying for fixed register' in Harry Carter and James Mosley, *The Manuel Typographique of Pierre-Simon Fournier Le Jeune; Together with Fournier on Typefounding, an English translation of the text by Harry Carter, in facsimile* (Darmstadt: Lehrdruckerei Technische Hochschule Darmstadt, 1995), 89.

112. The width of type is known as 'set', James Mosley, e-mail message to author, 10 January 2018.

113. Approximate translation by the author. See *Liste Des Types étrangers*, 20–1.

114. By 180°.

115. Approximate translation by the author (see the original text in Appendix 5 at the bottom of the case-lay). From 'Arabe Nesky, 17 points (9+4+4) ou Arabe d'Avicenne simplifié par A. P. Pihan, en 1863', *Folders*, CDP.

116. Clearly the intrinsic limitation of movable type is due to the physical properties of the metal.

ther horizontally or vertically.¹¹⁷ The dynamic behaviour of the script was practically unfeasible to reproduce within the constraints of the available technology without some form of compromise. Nonetheless, even to the first European type-makers who had no experience or knowledge of the Arabic script, this characteristic must have seemed too important to be entirely dismissed in the name of a trouble-free process; therefore, they tried to replicate it to the best of their abilities. Although it is true that the simplification approach was often the preferred route, it is fascinating to identify what different type-makers considered indispensable in the typographic reproduction of the Arabic script and what they prioritised in their decision-making when compromises were needed. Clearly, different type-makers attempted various methods, of which an account is given in the analysis of individual types in the following chapters. Nevertheless, some general indications can be given here to summarise some techniques.

It has already been mentioned that the use of ligatures was the most successful way in the typographic environment to represent the appropriate context-driven form of particular combinations of letters and to reproduce the correct positioning of their horizontal or vertical connections with seamless joins. The design of a combination of two or more letterforms on an individual punch – later cast on a single sort – was only limited by the punch-cutter's ability, particularly if the specific combination was standing on its own, without having to provide for connections with other characters. Although this solution could provide the most desirable effect – and ease the compositor's task – it had the disadvantage of requiring more work from the punch-cutter and of producing founts with potentially very large typecases. Clearly, this was also influenced by the number of combinations that the punch-cutter decided to reproduce, and by the method chosen to deal with the placement of diacritic dots, as explained earlier in the chapter. The synthetic nature of the Arabic script could indeed help to reduce the number of punches needed if the dots were added separately – for combinations of letters that shared the same base-form – rather than cutting a new punch for each possible combination. Since it was practically impossible to make ligatures to represent each context-specific letterform joined to other letters, only a few combinations could be included in the fount. The criteria for selection are not always obvious in hindsight when analysing the Arabic types, but it seems safe to say that if the punch-cutter was following a particular Arabic text, he would reproduce the combinations seen in the manuscript, especially the most frequently occurring ones. Nonetheless, in order to extend the capacity of the fount to replicate the dynamic nature of Arabic, punch-cutters had to devise other methods besides relying on individual sorts carrying ligatures. These solutions were needed in particular to replicate the multilevel connections representing the cascading feature of the Arabic script recurring abundantly in Arabic manuscripts.¹¹⁸

117. See Figure 1.7 and Figure 3.9. Vertical joins need one or more letterforms to be raised from the notional baseline, creating the challenges for type-makers to find solutions to accommodate for this characteristic of the script.

118. For instance, the letters ݂, ݄ and ݆ traditionally allow for an elevated stroke leading into their medial and final position, meaning that the preceding letters have to be connected from the top ('set or cast on a higher baseline'), see Lane, Breugelmans, and Witkam, *The Arabic Type Specimen of Franciscus Raphelengius*, xii. This issue is discussed more in depth in § 4.1.3.

From the observation of primary sources,¹¹⁹ it was possible to isolate examples of different methods used, depending on the kind of multilevel connection to achieve. Distinct sorts were entirely stacked on top of each other to replicate some vertical joins: the gap visible between the two letters indicates the break between two sorts.¹²⁰ Moreover, if the sorts were composed with some other techniques horizontally (i.e. overhanging characters), a space between the vertically combined letters and the previous character should be present, to allow for the positioning of a sort (Figure 3.62). In a different approach for obtaining multilevel connections, it seems that the same sorts used for the standard joins along the notional baseline were shifted to a higher level of composition, in order to meet the connection with the following letter. It is possible that these sorts rested on the spacing material, which provided white space beneath them, allowing at the same time to have for stable composition (Figure 3.63). Another option to achieve this type of raised connection was to have a second set of sorts cast on a different alignment: in this case, the sorts were composed as normal horizontally but the letters, being cast higher on the sorts, would join on the same second level above the notional baseline (Figure 3.64).

Multilevel connections were certainly one of the biggest challenges for type-makers of Arabic fonts: it is not surprising that a completely different approach aimed to remove them altogether, through a modification of the form of the ڭim letter group in medial and final position, which required most of the multilevel connections. The traditionally raised stroke of manuscript practice – enabling vertical connections from the top of the character – was variously modified in typography (Appendix 6) to the extent of aligning the connections on the notional baseline disposed on a linear arrangement (Figure 3.65): although this provided a simpler solution, it distorted the traditional calligraphic forms.¹²¹ Finally, it is worth reminding that one method did not necessarily exclude the other; combinations of different approaches are found in the same fount.

It is within the scope of this research to question the methods of Arabic type-making as a whole, trying to establish as much as possible which methods were used for a particular fount. Moreover, this study questions whether it is possible to do so by observing the Arabic typeforms in the printed books – in most cases the only source available, as highlighted in the framework – to develop an understanding of what happened behind the scene (Figure 3.66 and Figure 3.67). As shown, evidence can be found in the printed text, and although a complete reconstruction is difficult to achieve, pieces of the puzzle can be added, laying the basis for future research. Likewise, it is not a straightforward task to isolate and enumerate the punches of a given fount only by looking at the typeforms, because there is no direct correspondence between their number and the sorts present in the character set or case-lay. Equally, as discussed, there is not necessarily a direct correspondence between the punches and matrices: enumerating the latter becomes even more difficult unless the methods used to make them is known.

119. There are no written records about these processes, therefore considerations have to be extracted from the observations of the printed books.

120. If this was a ligature the gap would not be there, as one of the advantages of having a ligature is to have a seamless connection (a confirmation comes from the gap that recurs in other combinations of the above sort with other letters).

121. In the Arabic fount of Franciscus Raphelengius, 1595, the leading elevated stroke before the letters ڭim, ڭâ' and ڭâ' was cut as a separate sort and placed between these letters and the preceding connecting ones, Lane, Breugelmans, and Witkam, *The Arabic Type Specimen of Franciscus Raphelengius*, xii (§ 7.1.1). See also Legros and Grant, *Typographical Printing-Surfaces*, 541–42.

Despite the difficulties, an attempt to reconstruct the fount synopsis has been made for the first three Arabic metal types produced in Italy in the sixteenth century. Presenting favourable research conditions,¹²² these types demonstrated that not only valuable information can be extracted from the observation of printed editions, but also that this practice can raise critical questions for the understanding of the type-making process, especially when no other primary sources are available to supply this type of knowledge.

122. One book has been printed with each type: this narrowed the field of research and increased the chances to have a realistic overview of every sort included in the fount, as explained in § 4.1.1.

3.3 The collaborative nature of Arabic type-making

Making types was a process where the individual skills of punch-cutters, typefounders, compositors and printers were not enough to achieve an overall satisfactory result without a combined effort. A design masterly executed could have been easily spoiled by defective casting, inaccurate setting or substandard printing; on the other hand, ‘if the punch-cutter has not the requisite ability for the work, the founder [...] and the printer [...] cannot retrieve his errors’.¹ Moreover, decisions made independently at different stages of design or production would inevitably influence others in a kind of domino effect.

When approaching different scripts other than Latin (which was familiar territory for fifteenth and sixteenth centuries type-makers), the technical skills required for the manual execution of the types had to be combined with additional skills specific to the new script and the related language (or languages) that could be set with the same script. Translated into practical terms, type-makers had not only to analyse what the letters looked like on a purely aesthetic level but also investigate how they interacted with each other – in other words, build an overall understanding of how the system worked in terms of script structure.

As discussed in Chapter 1, in sixteenth-century Europe the number of people who knew Arabic was extremely limited, and it is highly unlikely that any type-maker was amongst them. Therefore, in order to educate themselves and familiarise with a new alphabet, they had to either blindly copy from the available models of the script, or rely on the knowledge of advisors to guide them through the design and execution processes. As discussed in Chapter 2, the quality of the models and the competence of the advisors have to be questioned, being both influential factors in the quality of the products of Arabic typography. Regarding the models, it has been previously discussed that original Arabic manuscripts were certainly available in Europe when the first Arabic types appeared on the market, although the nature and provenance of these models have to be investigated.² Furthermore, it should be questioned whether the original manuscripts made their way to the tables of the punch-cutters. According to Tracy, the poor ‘artistic quality’ of the European-made Arabic types was not because of the lack of skill:

the probability is that European scholars declined to lend their valuable Arabic manuscripts to the typefounders, and supplied them merely with their own handwritten versions of the Arabic characters. The punch-cutters could do no more than follow these imperfect models.³

Regarding the people possessing language and script expertise for Arabic, their availability to European type-makers and their competence has to be questioned. European Orientalists with interest in Arabic were few – mainly self-taught – and clearly they could only transmit to others the same level of knowledge that they themselves possessed, including their faults: they knew the language, but they lacked a deep understanding of the script’s structure, which also showed in the poor quality of their written Arabic. Moreover, in the sixteenth and seventeenth centuries, European Arabists were the ones in constant search of native Arabic speakers, scribes

1. De Vinne, *The Practice of Typography: A Treatise*, 11.

2. Whether of calligraphic or chirographic nature; whether supplied by European Orientalists in their own hands or by Muslim educated people employed as scribes (e.g. from the Maronite college in Rome, founded in 1584 by Pope Gregory XIII).

3. Walter Tracy, ‘Advances in Arabic Printing’, *Bulletin (British Society for Middle Eastern Studies)* 2 (1975): 87–88.

and educated Muslims to support their learning of Arabic, and to supply them with translations and editions to further their studies.⁴

The same considerations should be made for the type-makers of Arabic movable type operating in the Middle East. The majority of them were also non-Muslim and non-native Arabic speakers (e.g. they were Christians or Muslim converts of Hungarian, American and Armenian origins). Like their European peers, they also had to resort to external support to make up for their lack of knowledge. In this context, it is particularly relevant to investigate what kind of script models or expertise was accessible to them and evaluate whether or not these resulted in a difference in the quality of their typographic products.

It is clear that the making of Arabic types required a combination of skills, for the understanding of the script and its typographic reproduction. The typographic know-how for the execution of letterforms in movable metal type was a process explored and tested on different scripts, and a skill readily available to type-makers, which had to be applied to Arabic.⁵ On the other hand, language and script expertise had to be sought externally, through the help of models or people. In light of these considerations, it becomes easier to understand how skilled craftsmen without access to the right script education, models or advisors ran into problems. Likewise, for the types produced with access to script and linguistic expertise, but without a high level of craftsmanship.⁶ A balanced combination of execution and knowledge was a necessary requisite for achieving a more faithful reproduction of the Arabic script with the new medium of printing, and for a more successful translation of the script from its written to printed form. Therefore, an informed analysis of the Arabic types has to take into consideration and discuss both the skills in execution and the script knowledge. The first in relation to the quality of the design, the approach and the technical solutions devised to attend to specific problems; the second in relation to the awareness of the structure of the Arabic script, the adherence to a specific calligraphic style and to the rules governing the script's proportioning and behaviour.

4. See § 1.3.4.

5. Clearly with all the challenges posed by the new script, discussed in § 3.2.

6. Discussed further in Chapters 5–9 with the analysis of different Arabic types.

4.1 Development of criteria to assess typographic quality

The analysis of Arabic foundry types is at the core of this research. The line of enquiry for their assessment follows in some respects the approach established by Fiona Ross,¹ which 'considers each significant development' in the typographic realisation of the particular script within its historical context and 'attempts to identify the influences behind the styling [...], appreciating the constraints imposed by technical or artistic limitations, typographic fashions, and even linguistic ignorance and misinformation'.² This methodology allows the appreciation of the origins of current typeforms by understanding the historical reasons behind the discrepancy between the shaping of the printed characters and their calligraphic antecedents, and ultimately determine the criteria that distinguish good design.³ The principles of Ross' work on the Bengali type are transferable to the study of other non-Latin scripts, with due adaptation to script-specific requirements.

It has also been previously stressed that informed evaluations of Arabic printed characters can be made only by acknowledging all the influential factors instrumental in their production: awareness of the historical context, understanding of the writing system, appreciation of the calligraphic tradition, manuscript practice and the technological constraints are all valuable prerequisites for the analysis. While these ensure a balanced perspective, the qualitative assessment of typefaces requires additional criteria that relate closely to their aesthetic forms and functional aspects; being independent of personal preference, they can guide more objective judgments.⁴ The criteria established for the analysis of Arabic types – introduced and discussed more in depth below – are effectively the analytical tools for the evaluation of the individual typefaces; by addressing objective parameters, this approach is also transferable across typefaces, hence providing a common ground for their comparison. Moreover, by forming a kind of checklist with which to scan a type, the set of criteria allows a more efficient approach to the analysis. This is particularly useful to tackle lengthy documents: the key characteristics of the typeface can be elicited from a few pages of the source, without having to scrutinise the entire volume. Equally, it permits the assessment of types for which extensive sources might not be available.

While this research was shaped by the quality and quantity of sources that it was possible to gather for the selected Arabic types, it is important to note that the depth of the examination of available material is tailored to answer specific research questions. Thus the depth of the investigation for a particular fount is determined by the identification and discussion of salient features that are ultimately relevant to the typographic analysis. Furthermore, it should be noted that it was necessary to provide a detailed examination for the first Arabic types in order to set up the terminology and method of analysis. For the same reason, for the first three Arabic

1. Ross, *The Printed Bengali Character*. This approach was also applied in other two research projects on non-Latin scripts: see De Baerdemaeker, 'Tibetan Typeforms' and Nemeth, 'Arabic Type-Making in the Machine Age'.
 2. Ross, *The Printed Bengali Character*, 1.
 3. Ibid.
 4. Ibid., 2.

types,⁵ the analysis was also structured according to the breakdown of the evaluating criteria as described below. This was not necessary for the subsequent case studies.

The criteria for the qualitative assessment of the Arabic types are supported by precise observations along specific *parameters*. These have been identified as:

- a. *The size of the character set*
- b. *The formal execution of the strokes*
- c. *The proportions and shaping of the individual characters*
- d. *The influencing calligraphic style*
- e. *The horizontal and vertical letter-joining*
- f. *The positioning of the diacritical marks*
- g. *The horizontal and vertical spacing*
- h. *The kerning of the characters*
- i. *The texture of the type on the printed page*
- j. *The colour of the type on the printed page*

Structured observations according to these parameters allow the analysis of Arabic types according to more general *criteria of typographic adaptation*, which include one or more parameters that are closely interrelated, as follows:

- 1. Degree of simplification (a, c)
- 2. Calligraphic properties and diversification of letters (b, c, d)
- 3. Letter-joining and multilevel composition (e, f)
- 4. Regularity of fitting (g, h)
- 5. Evenness of texture and colour density (i, j)

The following sections of this chapter explain and illustrate each criterion, using images from relevant archival resources.

4.1.1 Degree of simplification

The simplification of the Arabic script occurred with the first attempts to adapt the written letterforms to movable type technology for the reproduction of manuscripts texts in print.⁶ In practical terms, the structure of the Arabic script was adapted to replicate the functioning of the Latin script – for which the available technology was designed – by accommodating the existing constraints and, at the same time, reducing the number of problems to solve. This posed considerable challenges to the type-makers and imposed significant compromises to the representation of the Arabic script. The resulting typographic image was eventually ‘completely illegible and culturally alien’.⁷

Although this approach was shared by different type-makers of Arabic foundry types, the simplification that they applied to the script varied (Figure 4.1); hence the criterion for assessment, here presented, evaluates to what extent the simplification influenced the types – formally and functionally – which is reflected in the charac-

5. See §§ 5.2.1, 5.2.2, 5.3.1.

6. The need for simplification continued during the hot-metal era. At that time it was explicitly addressed with the introduction of the ‘Simplified Arabic’, a concept developed for the Linotype machine in the 1950s, represented by the landmark typeface Yakout. See Fiona Ross, ‘The Type Design Process for Non-Latin Scripts’, in *Non-Latin Scripts: From Metal to Digital Type* (London: St Bride Library, 2012), 131–33.

7. Milo, ‘Arabic Script and Typography’, 119. These and other reasons discussed in the thesis contributed to the lack of success of this approach.

ter set. For the Arabic script, the character set includes letters, ligatures, numbers, diacritic marks (i.e. dots, vowels and orthographic signs), and other typographic elements needed for ornament, punctuation and spacing purposes. The size of the character set is an essential decision at the beginning of the manufacturing process because it affects decision-making for the cutting and casting of letterforms, and ultimately their shaping and appearance on the printed page.⁸ The number of characters to be created for a particular fount varied according to the punch-cutter's approach towards the structure of the Arabic script,⁹ the method devised to tackle it and the degree of simplification applied. For instance, decisions made on the design of individual letterforms determined how many modules were necessary for their setting (e.g. inclusion of the diacritic dot with the base-form, or added later separately in text composition). The typographic simplification of the script contributed to restricting the size of the character set by re-using shared components. Furthermore, some contextual typeforms were used in more than one context,¹⁰ a decision that often affected the design of letterforms: for this reason the parameter that looks at the shape of individual characters is also included in this criterion (Figure 4.2).

Finally, it should be borne in mind that although the simplification manifested in the design and production of the type, it was the result of the type-makers' knowledge of the script, their ability in the craft and the circumstances in which they operated: economic constraints (e.g. amount of metal available to melt, storage), time limitations (how quickly the job had to be finished), access to models (good samples of Arabic calligraphy to guide the design or a specific manuscript to follow) or informed advisors (to make up for the lack of script knowledge), manpower (number of people available to do and supervise the work; their skill level) and the intended purpose of the type,¹¹ were all crucial factors.

Character set examples

The Arabic types that are the object of this research rarely if ever appeared in printers' specimens or foundry catalogues – where the fount's synopsis might be shown – and neither have many case-lays survived; therefore the character set had to be extrapolated from the printed books in which the types have been used. The challenge of the task increases accordingly to the number of works printed with a particular type: not only every book should be checked, but ideally, every edition printed with the same type in different years, to verify possible additions to the original design. This is even more arduous for the types that have been shared by various printers because the chances of divergence from the original increased significantly.¹² Needless to say that it is a time-consuming work; moreover, exhaustive fount synopses are not essential for this research.¹³

Nonetheless, in three cases it was possible to attempt the reconstruction of the character set which formed a useful exercise for the critical approach to primary

8. The listing of characters also 'provides a vital tool for envisioning and managing an entire font development project'. Ross, 'The Type Design Process', 137.
9. This includes the treatment of the cursive nature of the script and the joining of letters, as explained in the following sections.
10. Ross, 'The Type Design Process', 133.
11. For instance, the full vocalisation could be omitted for secular works.
12. For instance the Arabic types of Robert Granjon for the *Typographia Medicea* looted by Napoleon and later re-used with additions by the Imprimerie Nationale, see Chapter 6.
13. The scope of the project is mainly to analyse how the type-makers approached the structure of the Arabic script and therefore how they designed and executed forms, rather than a simple enumeration of the sorts.

sources and type analysis.¹⁴ The first three Arabic founts produced in Italy were used exclusively to print three separate books; these were photographed in full during research field trips.¹⁵ Because the field of investigation is confined to one source for each type, it represented ideal conditions for the task.

The first step for counting the sorts¹⁶ was to identify the individual letterforms and the ones combined into a ligature (Figure 4.3). For some individual letterforms, it was also necessary to determine if they constituted a single sort or more (Figure 4.4). Due to uncertainties regarding the type-making process (e.g. the re-use of the same sorts for letters sharing the same base-form),¹⁷ it appeared clear that realistically only the minimum amount of identifiable units could be enumerated.¹⁸ Moreover, it was necessary to establish a method, especially for counting letterforms that recurred in the text carrying a different number of dots. Thus it was decided that for the characters of the Arabic abjad, the letterforms sharing the same base-form were counted individually; whereas, for the ligatures, only the shared base-form was counted (Figure 4.5). This method was applied for two reasons: firstly, to prioritise the accurate count of the basic Arabic abjad over the ligatures; and secondly to facilitate the count of ligatures, whose identification was not as straightforward.

A more comprehensive reconstruction of the characters sets will be possible only when more questions regarding the type-making processes are answered, allowing a more accurate and assured count of the individual components.¹⁹

4.1.2 Calligraphic properties and diversification of letters

The pioneers of printing – in any script – essentially had the task of reproducing manuscripts into printed books; for obvious reasons, the letterforms written by hand provided the source of reference to be translated into metal types. As seen in Chapter 2, for the Arabic script the manuscripts also carried a strong tradition of calligraphy, which in the Islamic world embodied the image²⁰ of the script to which readers were familiar and accustomed. It seems safe to say that for a faithful typographic representation of the Arabic script, the closeness to calligraphic forms was an essential requirement for type-makers and an expected requisite for the indigenous readership.²¹

The calligraphic properties of a printing type show whether any of the features of the calligraphic tradition of the script was maintained or dismissed. The criterion

14. As explained in Chapter 3.

15. The three books are: the *Kitāb Ṣalāt As-Sawā’ī* printed by Gregorio de Gregori in 1514 with the fount GDG1; the *Psalterium, Hebraeum, Graecum, Arabicum, & Chaldaicum, cum tribus Latinis interpretationibus & glossis* printed by Pietro Paolo Porro in 1516 with the type PPP and the *Venice Qurān* printed by Alessandro Paganino in 1537–8 with the fount APQ1. It should be stated that only one copy for each book was investigated.

16. The term sort signifies here each different character design that can be isolated in the fount. The multiplication of the same design obtained by casting is not considered in the enumeration.

17. This was possible with different methods, by adding or removing diacritic dots: see Chapter 3.

18. The ‘minimum amount’ of sorts as counted in the fount synopsis should be intended as a virtual case for each type, where the author is attempting to establish the number of compartments assigned to different characters; for this purpose is sufficient to count only 1 sort for each compartment.

19. The character sets can be found in the §§ 5.2.1, 5.2.2, 5.3.1. They supply the best possible estimate for each fount, rather than being a ‘complete’ synopsis.

20. Already defined in this context as the graphic representation of the script.

21. Clearly these are considerations made in hindsight by the author, of which the first European

discussed in this section includes the execution of the strokes, the proportions and shape of the individual characters and the calligraphic style as parameters for assessment. The execution of the strokes reveals not only the ability of the punch-cutter as a craftsman but also a sensibility for the script's letterforms and the knowledge of the calligraphic requirements to be translated into metal. In particular, the stroke modulation created in calligraphy by the reed pen cut at an angle produced thin and thick strokes that had to be reproduced in typography for a more authentic representation of the script (Figure 4.6). The same should be said for the general shaping of the letterforms and their proportional relationships: clarity, distinctiveness and harmony of forms are decisive factors for a successful design (Figure 4.7).

The parameter relating to the calligraphic style is instrumental for checking the consistency and adherence of the typeforms to the chosen calligraphic style.²² In Islamic calligraphy, there is a clear distinction between styles, which traditionally can be used side by side in the same work, but never mixed in the same text. This should also occur in the typographic reproduction of the script; however, early Arabic typefaces often contain a mixture of letterforms belonging to different calligraphic styles (Figure 4.8). It is not clear why this happened: it is possible that due to the limited knowledge of Arabic in Europe in the sixteenth century, the separation of calligraphic styles was not as obvious to type-makers to make conscious choices when setting out to make an Arabic fount. The influence of the models may account for the mixture of styles: the punch-cutter would fundamentally rely on the models he was supplied with, trying to replicate as faithfully as possible what he saw in the particular manuscript (including the style, the shape of the letterforms, the ligatures and so on). If the model was poor to begin with (i.e. already containing modifications of the script), he would unknowingly repeat the same shortcomings of the text he was following. This would most likely happen if the punch-cutter was supplied with a copy of a manuscript made by an inexpert hand that debased the original text by adding alterations and introducing errors. In the unlikely chance that the punch-cutter had access to original and authentic calligraphic models when he was cutting an Arabic fount, it is possible that he interpreted what he saw, *de facto* introducing himself the deviation from the correct model. Especially for what concerns the mixture of styles, perhaps he picked different letterforms from a manuscript carrying more than one style – or from various individual calligraphic samples used as inspirations to draw his own letterforms – unaware of the inappropriateness of this practice.

Because this study focuses mainly on Arabic printing types for long texts, it is likely that they were mostly modelled on *nash*, the style of choice for the Qur'ān²³ and also very popular for writing books. Nonetheless, influences from other styles can be found, particularly from *tulut*, a larger style often used in conjunction with

Arabic type-makers were not necessarily conscious of or concerned with, due to many factors discussed in this thesis. The underlying hypothesis is that good imitation of calligraphy was a critical requisite for the acceptance of Arabic typography to native readers, and for an Arabic type to be successful.

22. The issue about style consistency has been extensively discussed by Thomas Milo. In his words, '[...]script styles can be identified by the sum of specific isographs. The more isographs [i.e. key selected letterforms] of the writing under consideration match those of a listed style, the more precise the style identification. In cases where isographs match across two or more listed styles, a corresponding degree of hybridisation can be defined'; from 'Arabic Typography'. Milo also illustrates this concept with 'Islamic script identification tables' which have been adapted by the author for the analysis of Arabic types in this study. See also 'Thomas Milo: Bodoni's Arabic, Some Observations', 2013, accessed 6 March 2017, <http://www.compulsivebodoni.com/?portfolio=thomas-milo-bodonis-arabic-some-observations>.

23. It replaced kufic in the late ninth or early tenth century, § 1.4.

nash, and sometimes from maḡribi, a style used particularly in North-West Africa and Muslim Spain.²⁴

4.1.3 Letter-joining and multilevel composition

The criterion of letter-joining and multilevel composition aims to assess some important features of the Arabic script relating to the connection of letterforms and their vocalisation. Observations are made according to two parameters. The first assesses how letters join horizontally and vertically, either on the notional baseline or above it. The second assesses the position of diacritical marks above and below the letters.

As previously noted in Chapter 3, the punch-cutter's approach towards the methods of connecting letterforms affected the way the sorts were later cast and composed. From a production point of view, horizontal joins between letters along the notional baseline could be achieved in print by the simple adjacent alignment of movable sorts, ideally adapted to minimise the visible gaps between letters (Figure 4.9). For the most frequently recurring combinations, ligatures were designed and then cast on single sorts (Figure 4.10).

The vertical joins presented more difficulties because connecting characters from top to bottom required some letterforms to be raised from the notional baseline. This implied that the joining line could not coincide with the notional baseline, but had to be broken over different levels of printing, as many as required to represent the stacking of letterforms typical of calligraphic practice, also known as the cascading feature of the Arabic script (Figure 4.11). This happened regularly with the ǧīm letter group in medial and final position but also in other instances. The characters requiring connections elevated from the baseline affected the position of their neighbouring letters: solutions were devised in typography in the attempt to represent the script adequately (Figure 4.12). Some combinations of vertically joined letters could also be more successfully reproduced with ligatures without interfering with the rest of the text, especially for the combinations that stand isolated (Figure 4.13). However, as discussed in Chapter 3, making ligatures had its disadvantages and limitations, therefore type-makers could not rely exclusively on that method for the representation of the cascading connections required by the Arabic script.

The parameters for the observation of horizontal and vertical letter-joining guide the assessment of the visual quality of typographic connections. The appearance of the joins inevitably prompts additional considerations about the technical solutions adopted to achieve them, which might have also affected their functionality.

Similarly, the parameter for the assessment of diacritical marks guides the evaluation of their accurate positioning (Figure 4.14): in discussing the correct alignment of the marks in relation to the base-forms (for the dots) and whole characters (for vowels and other orthographic signs), evaluations about their size and weight are also included. Nonetheless, observations about the placement of marks raise questions about their making to establish in which stage they were added (e.g. included with

24. The maḡribi style is discussed more in depth in § 5.2.2.

the base-forms/characters, either during the making of punches or in the making of matrices; added later in composition as separate sorts).

4.1.4 Regularity of fitting

The criterion that assesses the fitting of a type includes the parameters for the horizontal and vertical spacing and the kerning of the characters. While the horizontal spacing refers to letters and words, vertical spacing occurs between lines of type (i.e. leading); the kerning instead relates to the adjustment of space between two specific characters. In Arabic, the regularity of the fitting – which affects both the colour and the visual texture of a type, as explained in the following section – is also observed when non-joining characters create a sequence of joined and unjoined letters, which can also recur within a word.

It seems timely to point out that the Arabic script does not provide orthographic spaces between words, leaving final forms to mark the end of words. As Milo explains, this is also accentuated by another characteristic of the script: in manuscript form, the string of Arabic letters that create words relate to the notional baseline as a whole, but are written on a secondary slanted baseline, whose angle depends on the calligraphic style: thus the end of words can be more easily identified with final forms that occur ‘at the cutting point between the two baselines’ (Figure 4.15).²⁵ According to Milo, with the adaptation of Arabic written letterforms to the typographic environment, the slanted baseline was abandoned, and the strings of letters forming words were forced to align to a notional baseline. Requiring an enhancement of the final forms to mark the ends of words, typographical spaces were introduced, in line with the practice used for the Latin script (Figure 4.16).²⁶ The absence of interword spacing in written Arabic (either in calligraphy or chirography) creates lines of continuous looking text: the composition – which often appears very dense and tightly fitted – allows characters to invade the space above or below their neighbouring letters, creating an overlap. For the typographic reproduction of this particular trait of the script, kerning was required (Figure 4.17); if the fount did not allow for kerned cast characters, the composed text would generally look rather stretched out. On the other hand, spacing irregularities generated by the improper use of kerned sorts and typographic spaces could also create incorrect typographic interruptions within and between words. In both cases, the characteristic fluidity of the script would be compromised, and with it the preservation of its authentic appearance.

Furthermore, the strong horizontal rhythm that in written Arabic created the overlapping of letters, in calligraphy allowed for heavy kerns to the extent of letters nesting into each other. As discussed in Chapter 3, replicating this behaviour typographically was quite challenging. It was not simply a matter of kerning pairs of distinct letters to reduce the white space between them; new solutions had to be found in order to insert letters inside one another where necessary (e.g. in the presence of elongated letters, overlapping on neighbouring letters, see Figure 3.55). In some instances, the nesting of letters was the result of a higher freedom in the composition and arrangement of the text – allowed by particular calligraphic styles, like *tulut* and *jali tulut* – which was incorrectly echoed in typography (Figure 4.18 and Figure 4.19).

Finally, to ensure the correct fitting of Arabic text composition it was required to reproduce not only the stretched/extended variants of characters (see Figure 2.6), but also the elongation (شیده, *kašida*) of joins between letters. The typographic

25. See Milo, ‘Arabic Script and Typography’, 120. The angle for *nash* is approximately five degrees.

26. Ibid.

adaptation generally compromises the visual appearance of this element, which is often forced by repeating modules to a straight rigid line rather than the characteristic round and flowing form of manuscript practice (Figure 4.20).

4.1.5 Evenness of texture and colour density

For a type to have an even and consistent texture, all the letterforms 'should be readily differentiated and yet form a cohesive whole'.²⁷ Furthermore, this provides the internal harmony required by a typeface, for which 'a coherent and stylistically consistent treatment to all characters' is essential.²⁸ On a printed page, an even texture is provided by elements that repeat with regularity, creating a particular pattern or effect in the type. Evenness of texture gives the type an even colour: this term refers to the tone (i.e. darkness) of type set in mass on a page.²⁹

The texture and colour density of type on the page are affected by various elements, and although individually defined, they are treated simultaneously because they relate to each other, and influence one another. The rhythm created by the overall fitting and interlinear spacing affects both the visual texture and the colour of a type: generally, a tightly spaced fount tends to have a darker colour than a loosely spaced one. In evaluating Arabic foundry type, other factors that can affect the colour and texture – and also the appearance of letterforms – must be taken into consideration: the body height, depth and counter sizes; the distribution of weight and stroke modulation; the density of colour along the joining line; the use of vocalisation; the quality of printing (i.e. the properties of the ink and of the paper it is printed on); and the evenness and control of the impression (which can also indicate a printer's lack of skill).

Finally, visual textures vary according to languages, even within the same script: different letter frequencies create varying textual patterns, firstly due to the use of language-specific letterforms. 'Regional preferences, cultural sensitivities and stylistic trends' should also be taken into consideration, as they may require adjustments to meet the expectation or preference of readers for particular genres (e.g. secular and religious work; books and newspapers).³⁰

27. Ross, *The Printed Bengali Character*, 2.

28. Ross, 'Aspects of Typographic Communication,' 75.

29. See Bringhurst, *The Elements of Typographic Style*, 324 and Tracy, *Letters of Credit*, 13.

30. Ross, 'Aspects of Typographic Communication,' 73.

5.1 Beginnings of Arabic printing: wood types

The first European Arabic grammar appeared in Granada in 1505 was *Arte Para Ligamente Saber La Lingua Arauiga*, written by Friar Pedro de Alcalá.¹ In the prologue of the work the author addressed the purpose 'to speak and teach the language of the common people and not the refinements of Arabic grammar'.² With the Spanish territories recently conquered and under Christian rule, the conversion of Muslims was a priority; the instruction of Catholic priests to the Arabic language was thus instrumental for their missionary activity. Containing Arabic in the vulgar dialect of Granada, this grammar was of little aid for sixteenth-century scholars who wished to read texts of classical Arabic, however, some of them did make use of it, perhaps due to the lack of more suitable alternatives. Commissioned by the Archbishop of Granada, Fernando de Talavera, and published by Juan Varela, this primer presents a woodcut block print of the Arabic alphabet (Figure 5.1); additional individual letters also appear throughout the book. The letterforms reveal a magribi style inspiration (common in Spain at the time), at least for the pointing of the letters fā' and qāf, which is different from other calligraphic styles (Figure 5.2). Most characters have forms for the isolated and initial positions, whereas 'ayn, ġayn, fā', qāf and hā' also present forms for the medial position; yā' and mīm have two additional final forms each; lām-alif has three forms.³

Before Alcalá's grammar, two other books published in Europe contained Arabic, with heavily distorted letterforms. The first is *Peregrinatio in Terram Sanctam* of Bernhard von Breydenbach, printed in Mainz in 1486 by the artist Erhard Reuwich; the second is *Hypnerotomachia Poliphili*, attributed to Francesco Colonna and printed by Aldo Manuzio in Venice in 1499. The *Peregrinatio* contains a table of Arabic letters, produced by Reuwich himself, which shows influences of Gothic ductus (Figure 5.3).⁴ The *Hypnerotomachia* presents the first printed Arabic words from an unknown engraver:⁵ the first woodcut is a bilingual inscription in Greek and Arabic (Figure 5.4) with incorrect spelling; the second is a quadrilingual inscription, whose Arabic texts are mismatched with the Hebrew, Greek and Latin equivalents (Figure 5.5).⁶

Arabic wood types continued to be used in Europe even after the first printed book with movable metal type had appeared in 1514.⁷ In Italy, two works containing wood-

1. The work was attached to a Spanish-Arabic dictionary, the *Vocabulista Aravigo En Letra Castellana*, but printed in Castilian characters.
2. James T. Monroe, *Islam and the Arabs in Spanish Scholarship (Sixteenth Century to the Present)* (Leiden: E.J. Brill, 1970), 6.
3. The grammar contains very little information on how the letters should combine. See Jones, 'Learning Arabic in Renaissance Europe', 142.
4. Krek, *Typographia Arabica*, 4.
5. Or engravers, considering that the two inscriptions present very different Arabic characters. See Giorgio Vercellin, *Venezia E L'origine Della Stampa in Caratteri Arabi* (Padova: Il Poligrafo, 2001), 54.
6. Roper, 'Early Arabic Printing in Europe', 130. For a more in depth analysis of the Arabic inscriptions, see Angelo M. Piemontese, 'Le Iscrizioni Arabe Nella Poliphili Hypnerotomachia', ed. Charles Burnett and Anna Contadini, *Islam and the Italian Renaissance/ Warburg Institute Colloquia* 5 (1999).
7. For a complete listing of all the works known, see Rijk Smitskamp, *Philologia Orientalis 3: Sixteenth and Seventeenth Centuries: A Description of Books Illustrating the Study and Printing of Oriental Languages in Europe* (Leiden: E.J. Brill, 1991), 257–260.

blocked Arabic alphabet tables are Giovanni Antonio Tagliente's writing manual, *La Uera Delo Excellentissime Scrittura*, printed in Venice in 1524 (Figure 5.6), and Giovanbattista Palatino's *Compendio Del Gran Volume De L'arte Del Bene Et Leggiadramente Scrivere*, published in Rome in 1566 (Figure 5.7). While Tagliente's Arabic letterforms – although poorly executed – are overall correctly shaped, Palatino's rendering is more imaginative than realistic, especially for letters like dāl/dāl, šād/šād, tā'/zā'. The 'alphabetical order' is also incorrect.⁸

Amongst other works of this kind that appeared in Europe, Robert Wakefield's *Oratio De Laudibus & Utilitate Trim Linguarum Arabicæ Chaldaicæ & Hebraicæ* – published in London in 1524 by Wynkyn de Worde – is the first scholarly academic printed work to contain Arabic. The few characters used are 'mis-shapen and lack cursiveness'⁹ and, according to historian Miroslav Krek, the types appear to be individually cut (Figure 5.8).¹⁰ In Paris, Geofroy Tory's *Champ Fleury* appeared in 1529: it contains an improved wood-cut Arabic alphabet compared to those of Breydenbach and Alcalá, 'clearly based on calligraphic models, into which some angularities have been introduced' (Figure 5.9).¹¹ Nearly a decade later in 1538, French Orientalist Guillaume Postel published his first work, a treatise on Oriental languages entitled *Linguarum Duodecim Characteribus Differentium Alphabetum* (Figure 5.10): each language covers five pages, whereas Arabic covers sixteen in total. For the first time in a printed book, the table for the Arabic alphabet contains more forms of the letters for different positions. Furthermore, Postel includes forms inspired by various calligraphic styles and letter combinations: 'the Turkish *p* and *ng* with three points – and the difference in the pointing of the *f* and *q* between the maghrebine and usual Arabic script is clearly indicated'.¹² It is also reported that in this work Postel apologises several times for the handwriting of his tables (for the oriental languages), emphasising that he had written all the texts mirrored for the carver of the wooden blocks.¹³ Also in 1538,¹⁴ Postel published in Paris his *Grammatica Arabica* (Figure 5.11). In this work, he used new Arabic movable wooden types, 'a poor substitute'¹⁵ for the Arabic movable metal types employed by Alessandro Paganini to print the Venice *Qurān* in 1537–8, which Postel had endeavoured to obtain with the help of the Italian Orientalist Teseo Ambrogio degli Albonesi.¹⁶ The table of the Arabic alphabet shows a simplified approach towards the script. The minimum of four forms – necessary to represent the letters in isolated, initial, medial and final positions – is reduced to two (e.g. ġīm) or even one (e.g. tā'). Letters that typically need at least two forms for isolated and final positions (e.g. dāl and rā') are also reduced to one form. Only the letters 'ayn and ġayn have four forms. The result is of a 'highly clumsy wood-cut type',¹⁷ due to the simplification, the poor design of the letterforms and the failed rendering of letter-joins, which present gaps between each character.

8. Vercellin, *Venezia E L'origine Della Stampa*, 84. See also Angelo M. Piemontese, 'Venezia E La Difusione Dell'alfabeto Arabo Nell'Italia Del Cinquecento'. *Quaderni di Studi Arabi* 5/6 (1987–1988): 641–60.
9. The work is dated 1524, but it was probably printed in 1528 or 1529, see Roper, 'Early Arabic Printing in Europe', 132–33.
10. Krek, *Typographia Arabica*, 7.
11. Roper, 'Early Arabic Printing in Europe', 133.
12. Smitskamp, *Philologia Orientalis* 3, 241g.
13. Vercellin, *Venezia E L'origine Della Stampa*, 94.
14. Or a year later, see Krek, *Typographia Arabica*, 7.
15. Roper, 'Early Arabic Printing in Europe', 133.
16. See § 5.3.1.
17. Roper, 'Early Arabic Printing in Europe', 155.

Towards the end of the sixteenth century, two more works were published in Germany using the wood-block method. The first by Jakob Christmann, *Alphabetum Arabicum*, printed by Matthäus Harnisch in Neustadt in 1582 (Figure 5.12); and the second by Rutgher Spey, *Epistola Pauli Ad Galatas*, printed by Jacob Mylius in Heidelberg in 1583. The two works present similarities in the Arabic letterforms used: Spey's work employs wood-blocks for whole pages of Arabic text, certainly not elegant but mostly legible; this can also be considered the first Arabic book printed in Germany (Figure 5.13 and Figure 5.14).¹⁸

Finally, it should be noted that resorting to Arabic wood types for multilingual publications was one of the solutions used by printers to overcome the shortage of Arabic movable metal type in sixteenth-century Europe. When Albonesi printed his polyglot work in 1539, he used the Syriac characters available in movable metal type to set Arabic text; in other instances, the Arabic letters had to be added by hand after printing, in the white spaces left in the text by the compositor (Figure 5.15).

18. Ibid., 135.

5.2 The first two Arabic movable metal types: pioneers

5.2.1 Gregorio de Gregori in Fano

The *Kitāb Ṣalāt As-Sawā’i*,¹ printed in 1514 by Gregorio de Gregori,² is the first known publication containing Arabic characters reproduced in movable metal type (Figure 5.16). The edition of the *Kitāb* survives today in thirteen copies in various libraries around the world.³ The book is an octavo in 120 leaves, measuring 165×108 mm;⁴ most pages have 12 lines enclosed in plain double borders, except for the nine pages that divide the book's sections. These have 6-7 lines of text adorned with wood-cut borders displaying floral or avian motifs. Everything is in Arabic, with the text printed in black ink; the rubrics, punctuation marks and some of the borders in red. While according to historian Miroslav Krek the *Kitāb* has no title-page, like in Arabic manuscripts, bibliographer Giorgio Montecchi argues that there is one, but is not complete (Figure 5.17): it only contains the title of the book in Arabic to give more solemnity to the work, a common practice at the time that can also be seen in some of Aldo Manuzio's editions.⁵ All the other information is in the colophon at the end of the edition (Figure 5.18).

There is little factual information about the *Kitāb* and many hypotheses – particularly relating the commission of the book, the intended readership, the place of publication and the authorship of the Arabic types – that scholars are still debating.⁶ According to the most recent studies,⁷ the *Kitāb* is an edition for commercial purposes, because there is no indication of a papal commission in the primary sources.⁸

1. Also known as *Septem Horae Canonicae, Horologion, Precario Horarii, Preces Horiae* and usually translated as *Book of Hours*. See Miroslav Krek, 'The Enigma of the First Arabic Book Printed from Movable Type', *Journal of Near Eastern Studies* 38, no. 3 (1979): 203.
2. Also referred to as Gregorio de Gregoriis, Gregorius de Gregorii.
3. The copies are located in Milan, Biblioteca Ambrosiana (SP/II/74); Modena, Biblioteca Estense (α.u.2.1, object of analysis in this study); Paris, Bibliothèque Nationale (Rés. B. 3597); London, British Library (two copies: OR.70.aa.11 and OR.70.aa.12); Oxford, Bodleian Library (Vet. Or. f. Arab.1); Leiden, University Library (876 g 27; the copy that once belonged to Scalinger); Monaco, Bayerische Staatsbibliothek (Rar. 1348); Nuremberg (Rar. 1348); Rostock, Zentralbibliothek Sonder-sammlungen (Cie-2370); Uppsala, Carolina Library (Manuell utl. 1. Litt. Arab. Kristlig [Officium]); Cairo, Dār al-kutūb (khusūṣī 1977-34136); Princeton, Princeton University Library (Rare Books (Ex) 2272.715.1514). See Vercellin, *Venezia E L'origine Della Stampa*, 62.
4. While the single leaves are unnumbered, the 15 gatherings forming the book are numbered with the use of serially repeated commas, as shown in Figure 5.53. See Giovanni Galbiati, 'La Prima Stampa in Arabo', in *Miscellanea Giovanni Mercati*, VI (Città del Vaticano: Biblioteca Apostolica Vaticana, 1946): 410.
5. Giorgio Montecchi, 'Analisi Bibliologiche Sulla Prima Stampa in Lingua Araba: Horologium, Fano, Gregorio De Gregori, 1514', in *Le Mille E Una Cultura: Scrittura E Libri Fra Oriente E Occidente*, edited by Maria Cristina Misiti, (Bari: Edipuglia, 2007), 71–72.
6. The analysis of the printed artefact and considerations about the context in which the book was produced can inform hypotheses when additional primary archival sources are lacking.
7. The most comprehensive – and also up to date – account of the *Kitāb* is contained in Celeste Gianni and Michele Tagliabacci, 'Kitāb Ṣalāt Al-Sawā’i: Protagonisti, Vicende Ed Ipotesi Attorno Al Primo Libro Arabo Stampato Con Caratteri Mobili', *Culture Del Testo E Del Documento* 13, no. 38 (2012): 131–85. Other important texts worthy of note are by Montecchi, 'Analisi Bibliologiche'; Vercellin, *Venezia E L'origine Della Stampa*; and Galbiati, 'La Prima Stampa in Arabo'.
8. See Gianni and Tagliabacci, 'Kitāb Ṣalāt Al-Sawā’i'. The mention of Pope Leo X in the Arabic *colophon* of the book (and in the Latin preface dated 1517) indicates that the book was printed or completed under his reign, rather than under his order or at his expenses. The difference of opin-

the hypothesis of some historians that the funding of the book should be attributed to Pope Julius II awaits supporting documentation.⁹ Regarding the readership of the *Kitāb*, it is safe to say that it was intended for the Christians in Syria – as stated in the Latin preface that accompanies one of the surviving copies¹⁰ – and in particular to the Orthodox Melkites of Greek-Byzantine rite, who used Arabic and Greek in their liturgy.¹¹

Although the *Kitāb*'s colophon attributes the place of publication to the city of Fano, it seems more likely that the book was printed in Venice and only formally declared elsewhere to bypass the patent restrictions in the Venetian Republic.¹² Features of the paper watermark, the binding and the woodcuts contained in the book also suggest that the *Kitāb* was of Venetian production. Furthermore, de Gregori did not print any other title outside the Venetian Republic apart from the *Kitāb*. There is no archival evidence of his activity or residence in Fano, which can instead be found for other printers in the same period, like Gershom Soncino.¹³

Originally from Forli, Gregorio de Gregori started a printing office together with his brother Giovanni in 1480, which was in activity until 1517, but he continued printing on his own beyond 1529. His first *privilegio* for books had been granted only in 1494. More privileges followed, but only intermittently. His next was not granted until 1507. In 1508 he received a licence from the Council of Ten to print a theological work, and in 1512 he was granted another *privilegio* for a new way to print missals and breviaries.¹⁴

ions derives from the divergence in the translation from Arabic of the root *h.k.m.* (in the text of the *Kitāb* vocalised as *hakam* instead of perhaps the more obvious *hukm*).

9. In favour of this hypothesis Philip K. Hitti, 'The First Book Printed in Arabic', *Princeton University Library Chronicle* IV, no. 1 (1942): 147; Balagna, *L'Imprimerie Arabe En Occident*, 19; Vercellin, *Venezia E L'origine Della Stampa*, 60; Krek, 'The Enigma of the First Arabic Book': 203. It should be noted that the *Kitāb* was published only eighteen months after the papal coronation of Leo X, to whom the book is addressed; the conception of the work should be therefore considered under the papacy of his predecessor, Pope Julius II. See Gianni and Tagliabracci, 'Kitāb Ṣalāt Al-Sawā'ī'.
10. Held at the British Library, BL [OR.70.aa.12]. The letter dedicated to Pope Leo X is signed by Gregorio de Gregori and dated 1st December 1517. The letter was perhaps added on the occasion of a second distribution of the same edition of 1514, whereas a reprint of the *Kitāb* can be discounted. The original text of the letter in Latin is reproduced in Vercellin, *Venezia E L'origine Della Stampa*, 69; an Italian translation is in Montecchi, 'Analisi Bibliologiche', 75.
11. A variety of other opinions in the previously cited sources exists. However, further evidence in favour of this statement comes from a recent analysis of the text of the *Kitāb*: the collection of prayers is indeed the same as an *Horologium* printed in 1985 and still used by the Melkites in Rome for the Sunday liturgy. See Gianni and Tagliabracci, 'Kitāb Ṣalāt Al-Sawā'ī', 146.
12. The special concession 'to print books in esoteric languages such as Arabic, Moorish (*Maghribi*), Syriac, Armenian, Indian (Abyssinian), and the "Barbary languages", was granted to Democrito Terracina in 1489 for a period of 25 years, due to expire in 1514. When Terracina died in 1513 without having published any books, a renewal of the printing privilege was then granted to his nephew, Lelio Paolo Massimo for another 25 years. It is possible that finding himself unprepared for the unexpected events, de Gregori preferred to resort to an illicit ploy rather than to wait for the new term of the privilege. See Krek, 'The Enigma of the First Arabic Book': 208–9; Gianni and Tagliabracci, 'Kitāb Ṣalāt Al-Sawā'ī', 182.
13. Gianni and Tagliabracci, 'Kitāb Ṣalāt Al-Sawā'ī', 175, 182–83.
14. Christopher L. C. E. Witcombe, *Copyright in the Renaissance: Prints and the Privilegio in Sixteenth-Century Venice and Rome* (Leiden: Brill, 2004), 107. It would be worth looking in greater depth at the text of the *privilegio* to see if there is any more information on the new way of printing, or about the *Kitāb*, which was published only two years later.

The printing office of de Gregori was known for an extraordinary availability of types: twenty-five Gothics, eight Romans, two Italics, two Greeks and one Hebrew.¹⁵ Many of his editions were valuable for the illustrations – woodcuts of title-pages and initials – apparently carved by him. Amongst numerous publications, of particular relevance, were the academic books in science and medicine, works in high demand at the time. Some of these publications were Latin translations of Arabic authors, like Ibn Sīnā's *De Animalibus*, about 1500; al-Qabīṣī's *Mudkhal Ilā Ṣanā'at Aḥkām Al-Nujūm* and Ibn Zuhr's *Pharmacopoeia* in 1491.¹⁶ In the following years, the two brothers specialised in illustrated liturgical and devotional books known as the 'rossi e neri' ('reds and blacks') because of the lines of text printed alternately in the two colours ink. This characteristic – also found in the *Kitāb* and other religious booklets printed in non-Latin types, like Greek, Armenian, and Cyrillic – implied higher costs for the production and required greater technical expertise.¹⁷

In the Latin preface of 1517, de Gregori stresses the difficulty of facing a venture never attempted before and the obstacles of printing with Arabic letters as incomparable to any other, asking the people who know the language to point out any mistake they might find in the text.¹⁸ This suggests that de Gregori was aware of the shortcomings of this first attempt at printing Arabic, and hoped to produce improved works in the future.¹⁹ In recognising that the *Kitāb* was only a small work, de Gregori also reveals the plans of printing bigger and more important liturgical works, although not specifying whether in Arabic.²⁰ These editions were probably never published, as there is no record of them; equally, it is not known of any other work in Arabic published in Fano.²¹

Finally, the hypothesis that the book was the product of collaboration rather than the individual work of Gregorio de Gregori has also been considered. This practice was common in the early days of printing, either to distribute tasks to differently skilled people, to find the capital to fund the work or to share the risks, particularly for one-off publications.²² While the mention of Soncino as the possible editor of the *Kitāb* has no historical evidence, it is certain that de Gregori had previously collaborated with Paganino Paganini, although nothing can be proven with regard to the *Kitāb*.²³ Equally without foundation is the hypothesis that de Gregori used the

15. Tiziana Pesenti, 'De Gregori, Giovanni e Gregorio', *Dizionario Biografico Degli Italiani*, XXXVI (Rome: Istituto della Enciclopedia Italiana, 1988).

16. Krek, 'The Enigma of the First Arabic Book', 209.

17. An octavo booklet, like the *Kitāb*, is made of eight full sheets, each of them folded across the middle three times, to have eight leaves, namely 16 pages. The Arabic script runs from right to left, which means that the paper folding and impression would be mirror-like compared to the traditional way for Latin books. The printer Gershom Soncino had experimented and perfected this practice with the printing of Hebrew. According to Montecchi ('Analisi Bibliologiche', 83), de Gregori certainly imitated Soncino to overcome this problem. Moreover, the printing of the colour red required a second impression. This necessitated a good method for the registration, so that the second colour could print aligned with the rest of the text in a continuous flow.

18. See Montecchi, 'Analisi Bibliologiche', 75.

19. In the letter de Gregori uses the expression *Semper Dies Posterior Meliora Affert*, 'The following day always brings better things', approximate translation by the author.

20. He mentions a work of hymns prepared for the same Christians of Syria for whom the *Kitāb* was destined.

21. Hitti, 'The First Book Printed in Arabic': 7.

22. Vercellin, *Venezia E L'origine Della Stampa*, 64.

23. Ibid., 64, 66. Paganini and de Gregori printed together Aristotle's *Opera* in 1501, and the latter also appears in Paganini's will document. It has been suggested that the paper for the printing of the *Kitāb* was supplied by Paganini printers, who published the Venice *Qur'ān* in 1537–8 (discussed in § 5.3.1).

technical ability of the punchcutter Francesco Griffo – like Manuzio and Soncino did before him – for the making of the Arabic types. It is known that during his stay in Venice Griffo contributed to a Latin alphabet for de Gregori²⁴ and that later he travelled to the papal cities on the Adriatic coast: in 1512 he was working in the town of Fossombrone, not very far from Fano.²⁵ Nonetheless, in the years 1513–5, it seems certain his collaboration with the Florentine editor F. Giunta.²⁶ Until new evidence surfaces, the type-makers of the *Kitāb*'s Arabic types remain unknown.

About the type

The *Kitāb* has three Arabic types but only the movable metal types used for the body text (GDG1) are the object of analysis.²⁷ Regarding the other two types, it is worth noting that the first appears only once on the title-page to print the title in red (see Figure 5.17).²⁸ The second occurs in the same form eight times (Figure 5.19)²⁹ as a heading of the nine pages with woodcut borders that divide the book's sections, except for one; in this occasion, the text *Bism Allāh al-Hayy al-Azāl*³⁰ is set with GDG1 (Figure 5.20). Both these types are not complete alphabets, but two phrases carved in wood blocks as a whole; for this reason, they are not discussed in detail.

As the first attempt ever made to print Arabic from movable metal type, GDG1 represents the ideal starting point to analyse the problems in the translation of the script from written to printed form. References to GDG1 in the sources are very scarce. In describing it, scholars have used different terms to convey a similar evaluation, such as 'crude', 'primitive', 'inelegant', 'unbalanced', 'ill-formed', 'unpleasant' and 'virtually unreadable'.³¹ Montecchi, on the other hand, seems the only scholar to highlight the type's surprisingly elegant forms – at least to a Western eye – especially taking into consideration that it was the first attempt at printing Arabic.³²

It is evident that GDG1 is not the most subtle design. The rather big body size of the type – in relation to the line length and the page itself – allowed the punch-cutter more room to shape letterforms with clear contours and bigger counters, to achieve better legibility. Inconsistencies in the treatment of stroke contrast, in the styling of stroke terminations, counter shapes and the general proportional rela-

24. 'Griffo's first identifiable work for the brothers Giovanni and Gregorio de Gregorii was in 1492', see Barker, *Aldus Manutius*, 44. He had also great experience with the making of Greek punches for the Aldine founts.

25. Montecchi, 'Analisi Bibliologiche', 77–78.

26. Paolo Tinti, 'Griffo, Francesco', *Dizionario Biografico Degli Italiani*, LIX (Roma: Istituto della Encyclopedie Italiana, 2002).

27. Montecchi indicates this type as A204 (A=Arabic and 204 are 'the millimetres which measure in height 20 lines of text printed with this character, following a convention commonly used by bibliographers to easily record old editions', approximate translation by the author), see Montecchi, 'Analisi Bibliologiche', 79. It should be noted that the 20 lines method is commonly used for Roman types, but its validity to measure Arabic types should be questioned, see § 6.1.4, note 22.

28. Montecchi designates this type as A408.

29. Montecchi designates this type as A250.

30. 'In the name of God, the Ever Living, the Eternal'. This sort of *Basmalah* is used instead of the usual Muslim version, *Bism Allah Arrahman Arrahim* ('In the name of God, the Most Gracious, the Most Merciful'), a formula that is recited before every sūrah of the Qur'ān. Vercellin, *Venezia E L'origine Della Stampa*, 62.

31. Krek 'The Enigma of the First Arabic Book', 207; Vercellin, *Venezia E L'origine Della Stampa*, 63; Paul Lunde 'Arabic and the Art of Printing', in *Saudi Aramco World* 32, no. 2 (1981), 21; Roper, 'Early Arabic Printing in Europe', 131.

32. Montecchi 'Analisi Bibliologiche', 79. He adds that the type was not inferior to those used in the Latin, Glagolitic, Cyrillic or Armenian breviaries printed by Venetian and European printing offices of the time.

tionship between characters, suggest that the type was cut by an uncertain hand, due to either lack of skills or lack of experience with an unfamiliar alphabet, or possibly both. The uneven and inaccurate impression affected the appearance of the typeforms causing the loss of letter parts and diacritical marks, overlapping errors in the registration of the colour red, and noticeable ink stains. Furthermore, the combination of the ink with the grain of the paper was rather troublesome: the red ink in particular – perhaps of poorer quality and with a greater tendency to expand – compromised the appearance of both letters and borders that, compared to those in black, resulted bolder and with less neat outlines. There are also recurring imprecisions with the filing off of diacritical dots, and possibly poorly cut letters, that caused the printing of parts of exposed metal that were not supposed to be visible (Figure 5.21).

Calligraphic properties and diversification of letters

Although there is no record, the punch-cutter of GDG1 evidently followed a manuscript, to grasp the essence of the script and establish the rudiments of Arabic typography. In Ross' words, 'the manuscripts would have provided essential typographic information regarding the letterforms required; their frequency of occurrence in text; the relative proportions of the letter-shapes; the need for compound characters and initial, medial and final forms of certain vowel signs; the positioning of the subscripts and superscripts; and the amount of interlinear spacing'.³³ The manuscripts would have also exposed the punch-cutter to a style of writing – calligraphic or not depending on the nature of the manuscript³⁴ – influencing the punch-cutter in making the type, whether he was copying or interpreting the model.

Although not very refined, the *Kitāb*'s main text type seems to carry features belonging to different calligraphic styles, with some letterforms closer to *tulut* and other to *nash* (Figure 5.22). A similar observation can be made for the few vowel signs, whose rather light weight compared to the main text resembles their use in *tulut/muhaqqaq* style manuscripts (Figure 5.23). In GDG1 some letters seem to be cut better than others, appearing sharper in the imprint (Figure 5.24) rather than blurry and rough-edged (Figure 5.25), besides the already mentioned problems with the impression. Issues with the treatment of the strokes and the weight distribution are also the primary causes of the type's colour unevenness. The combination of *alif* followed by initial *lām* (which occurs very often in Arabic, as it indicates the definite article 'the'), is particularly unsuccessful: the two vertical strokes look like they belong to different types, and their combination emphasises their difference (Figure 5.26). Although the impression influences the appearance of the weight and colour of letters considerably, some are cut with higher stroke contrast than others (Figure 5.27). Moreover, some letterforms have a more cursive design, which is particularly noticeable in letter combinations cut together on the same punch. This method enabled the better replicating of the ductus of the writing hand that connects letters with rounder and more fluent joins, and the avoidance of the straight and rigid connection produced by two or more adjacent metal sorts (Figure 5.28).

33. Ross, *The Printed Bengali Character*, 4. Although Ross is referring here to some specific features of Bengali founts, the idea applies to other non-Latin script, with due script-related adjustments.

34. Krek suggests that GDG1 could be based on the handwriting of one of the Fifth Lateral Council's participants, convened by Pope Julius II and continued by Leo X (1512–5). These were mostly Christian dignitaries from the Middle East, who could have provided an Arabic translation of the text: 'it would probably be worthwhile to compare the handwriting of some of these persons with the type used in our work, particularly since the type is unique in many ways'. See Krek 'The Enigma of the First Arabic Book', 207.

GDG1 is not well proportioned and lacks balance particularly in the size of particular letters and counters, which look too wide compared to the rest; this is a further cause for the type's lack of consistency in the texture (Figure 5.29).

Degree of simplification

As mentioned in Chapter 4, the size of the character set gives valuable information about the type-maker's approach to the script. Choosing the route of simplification potentially implied reducing costs, time and the number of punches, matrices or sorts required, but not without compromises. Perhaps, it was simply a matter of what was possible to accommodate at the time of production. The fount repertoire indeed gives clues regarding what was prioritised – or considered too important to be overlooked, even if not perfectly shaped or not performing well in composition – what could be compromised, and what could be left out – because considered either not important, or too difficult to achieve.

It is worth recalling that, particularly with the first experiments of Arabic typography, there were no previous standards to follow. The pioneering punch-cutters of Arabic typeforms – most likely with no knowledge of Arabic – had a limited understanding of the script's system and no clear idea of how to approach it or regarding the most efficient methods to adopt. It has already been mentioned that de Gregori expressed the difficulty encountered in printing with Arabic letters: this suggests that, lacking relevant experience, a process of trial and error was necessary to resolve the issues of an unfamiliar script.³⁵

Lack of consistency, in particular, is a shared feature of early Arabic foundry types, both in the approach to the design and to the methods for production. As previously said, the shaping of characters or the inclusion of particular letterforms – ligatures and other oddities found in the printed text – could be explained with the punch-cutter's interpretation or attempt to replicate the model at hand. It is possible that, in making choices, the punch-cutter failed to understand the consequences of some decisions on the overall design, compromising the homogeneity of forms and the harmony of the composition. Similarly, the adoption of different technical solutions may indicate the type-maker's difficulty to combine the need of meeting the requirements of the script with the most convenient and efficient method of production for the technology at hand. It is not surprising, especially in the early experimentations, to find *ad hoc* solutions to solve specific problems that could not be rendered with the standard approach. Inconsistencies (e.g. different designs for the same letterform present in the same text) might also be evidence of makeshifts added at different stages to provide a 'quick fix' to something not carefully planned out, or to improve what did not perform as expected. The second case, in particular, could indicate a progress made by the same type-maker or the intervention of a different hand.

The analysis of the *Kitāb* has provided a total estimate of at least 147 sorts³⁶ for the character set of GDG1 (Figure 5.30), with a detailed listing of the Arabic *abjad* as follows:

35. No records of GDG1 have survived other than in the *Kitāb*. It should also be noted that it was common practice at the time to reuse proof papers for the binding of books produced in the printing office, therefore this kind of material, even if existed, has hardly survived.

36. Other notes about the characters set: there is no hamzah, either as a letter or separate accent, but only in combination with the letter kāf. In this instance, the hamzah is considered to be on the same punch of the base-form and not added separately at a different stage.

alif | 1 sort (isolated), 1 sort (final)
bā' | 1 sort (isolated/final), 1 sort (initial/medial)
tā' | 1 sort (isolated/final), 1 sort (initial/medial)
ṭā' | 1 sort (isolated/final)
ġim | 1 sort (isolated), 1 sort (initial). In medial and final position there is always a ligature (with connection from above)
ḥa' | 1 sort (isolated), 1 sort (initial). In medial and final position there is always a ligature (with connection from above)
ḥa' | 1 sort (isolated), 1 sort (initial). In medial and final position there is always a ligature (with connection from above)
dāl | 1 sort (isolated), 1 sort (final)
ḍāl | 1 sort (isolated), 1 sort (final)
rā' | 1 sort (isolated/final)
zā' | 1 sort (isolated/final)
long rā' | 1 sort (isolated/final)³⁷ (Figure 5.31)
long zā' | 1 sort (isolated/final)
sīn | 1 sort (isolated /final), 1 sort (initial/medial)
šīn | 1 sort (isolated/final), 1 sort (initial/medial)
ṣād | 1 sort (isolated/final) 1 sort (initial/medial)
dād | 1 sort (isolated/final) 1 sort (initial/medial)
ṭā' | 1 sort for all positions (isolated/initial/medial/final)
zā' | 1 sort for all positions (isolated/initial/medial/final)
'ayn | 1 sort (isolated), 1 sort (initial), 1 sort (medial), 1 sort (final)
ġayn | 1 sort (isolated), 1 sort (initial), 1 sort (medial), 1 sort (final)
fā' | 1 sort (isolated/final), 1 sort (initial/medial)
qāf | 1 sort (isolated/final), 1 sort (initial/medial)
kāf | 1 sort (isolated), 2 sorts (initial), 1 sort (final – with connection)
long kāf | 1 sort (isolated/initial/medial/final)
lām | 1 sort (isolated/final), 1 sort (initial), 1 sort (medial)
mīm | 1 sort (isolated), 1 sort (initial – small), 1 sort (initial/medial) 1 sort (final)
nūn | 1 sort (isolated/final), 1 sort (initial/medial)
ha' | 1 sort (isolated), 1 sort (initial), 1 sort (medial), 1 sort (final)
tā' marbūṭa | 1 sort (isolated), 1 sort (final)
wāw | 1 sort (isolated/final)³⁸
yā' | 1 sort (isolated/final), 1 sort (initial/medial)
lām-alif | 1 sort (isolated), 1 sort (final)

The total of 68 sorts is the minimum established for the Arabic *abjad*; 11 additional sorts were allocated for vowel, punctuation³⁹ and ornaments, as follows:

fathah | 1 sort
fathahtan | 1 sort
dammah | 1 sort

37. Historian Adam Gacek identifies this character with the calligraphic term **مبسوطة** (*mabsūṭah*, stretched, extended). See Adam Gacek, *Arabic Manuscripts: A Vademeicum for Readers* (Leiden: Brill, 2012), 319. The term is used in calligraphic tradition to indicate different letter designed with that particular feature. Moreover, this particular form of long or stretched rā' / zā' is peculiar to *ṭulut/ muhaqqaq* calligraphic styles rather than *nashl*, proving a furter lack of coherence to the calligraphic style in the design of this typeface.

38. It is possible that there are two sorts for wāw, one with short and one with longer tail.

39. The spacing material is not taken into consideration in the enumeration; it is likely that it was borrowed from the typographic material already available in the printing office used for other types, and that therefore was not exclusive to the Arabic fount.

šaddah+fathah	1 sort
ornamental mark	1 sort ('v' shape mark to fill up gaps)
empty circle	1 sort
full circle	1 sort
comma	1 sort
others	1 sort (4 commas), 1 sort (oblique lines), 1 sort (straight lines border)

The aim of the fount synopsis is to list the minimum amount of identifiable units because there is no certain way to establish how they were executed in the type-making process.⁴⁰ Moreover, the number could also vary depending on the nature of some inconsistencies highlighted and discussed later on in the analysis. For the reasons explained in § 4.4.1, the characters that share the same base-form – and that differ for number of dots or other features (i.e. in GDG1 single and double small lines above the characters) – are counted separately for the letters of the *abjad*, whereas for the ligatures only 1 sort is counted for each (Figure 5.32). According to this method, GDG1 counts at least 81 ligatures.

It seems safe to say that the general approach of the punch-cutter was to reduce as much as possible the number of forms necessary for each letter, reusing sorts to indicate the same character in different positions. As a consequence of this decision, the forms for the medial position had to be designed without joining stroke on the right-hand side – to connect with the previous letter – so they could be used also in initial position (Figure 5.33). Likewise, the forms for the final position were reusable as isolated (Figure 5.34). Only the letter kāf shows the makeshift of having a joining stroke for the final form, to be filed off when in isolated position: the technique required additional work with no real benefit in print as the gap between sorts was still an issue. The hypothesis that the connecting stroke was included to allow more space and avoid clashes with the previous letter – especially in case of an ascender – has also been considered but it is too short to make a difference for that purpose; moreover, the combination lām-kāf was supplied as a ligature (Figure 5.35).

According to the historian Giorgio Vercellin, there are two different final yā': 'one has the tail curved towards the right and it is used at the end of lines where there is not sufficient space for the normal form, which, moreover, has always two dots under'.⁴¹ It was not possible to find this practice in the text of the *Kitāb* during the analysis. Perhaps, Vercellin was misled by the different appearance of the final yā' in some ligatures, one of which has the yā' with a 'returning tail': this letter is known as *Bariyā'*, a variation used in Urdu and some other Indian languages (Figure 5.36). It is also possible that Vercellin was observing the behaviour of a different letter (Figure 5.37). Another feature of GDG1 highlighted by Vercellin 'are the two horizontal lines (similar to a *tanwīn*) placed above the *sīn* to distinguish it from *šīn*, a feature that is encountered in some manuscripts'⁴² (Figure 5.38). This information is reported from Krek, who additionally mentions the line placed above 'ayn to distinguish it

40. For instance, not as many as 66 punches would have been cut for the individual letters if the technique of filing off of the dots was used for the characters sharing the same base-form (see § 3.2.2).

41. Approximate translation by the author from the original: 'quella con la parte terminale incurvata verso destra è usata alla fine delle righe in cui non vi è sufficiente spazio per la variante normale, che peraltro ha sempre due punti sotto'. Vercellin, *Venezia E L'origine Della Stampa*, 63.

42. Ibid. Approximate translation by the author from the original: 'sono i due trattini orizzontali (simili ad una *tanwīn*) posti sopra la *sīn* a distinguere la *sīn* dalla *šīn*, una peculiarità che si incontra in alcuni manoscritti'. The double lines appear only of the initial *sīn*, whereas the isolated always carries one line.

from *ghayn*.⁴³ A single line is also found above other letters, which, following the same rule, should distinguish them from their dotted counterparts; however, this 'code' for differentiation has inconsistencies (Figure 5.39). It is possible that these derive from irregularities copied from the manuscript used as the model, or simply due to a system not so well organised: since the small lines seem to be cut or cast together with the base-form, it seems unlikely that the inconsistencies represent compositor's errors during the typesetting. Anyhow, it seems clear that the small lines do not represent vocalisation marks (Figure 5.40).

The compositor was perhaps responsible for other irregularities in the text, like using some letterforms in incorrect positions (Figure 5.41) or irregularly filing off dots to obtain the same letterforms or character combinations (Figure 5.42). The only reference to the compositor of GDG1 is found in Hitti's work, who vaguely suggests the hypothesis of a Christian immigrant from Lebanon, in which case we could cautiously assume that he knew Arabic.⁴⁴ Lacking any other reference in support of this information, this is disregarded in the analysis' considerations. As for the punch-cutter, his identity is unknown.

A peculiar inconsistency found during the analysis is the occurrence of different designs of the same letterform found in the text, an issue particularly important for the count of the character set. As mentioned in Chapter 3, the general rule to establish if different designs of the same letterform should be counted separately in the character set is whether or not the noticeable differences are so unambiguous to dispel any doubt about their provenance from different punches. If doubts remain due to other factors, only one design is considered and counted. On the other hand, if the designs seem to clearly originate from individual punches, then they are included separately in the enumeration. For example, in the analysis of the *Kitāb*, the letter alif and dāl/đāl often appear different in the text. However, doubts remain due to the poor quality of the outlines and the impression; thus only one sort for each was counted. The differences occurring in the case of the initial nūn clearly derived from two different designs; nonetheless, only one sort was counted in the character set, since the other is obtained from initial tā', already included in the enumeration (Figure 5.43).

Letter-joining and multilevel composition

Ligatures are extensively used in GDG1 to achieve the horizontal and vertical joining of letters. Their considerable number suggests that greater effort went in reproducing certain letter combinations than in a more accurate or exhaustive reproduction of the single base-forms. It is likely that the punch-cutter chose the combinations to cut on individual punches following a manuscript of the text, perhaps prioritising what seemed to recur more often or attempting to introduce more cursive-looking forms. It is also likely that the punch-cutter selected combinations otherwise difficult to render with single sorts: solving troublesome combinations should also improve the appearance of the fount and at the same time ease the composition.⁴⁵ Nonetheless, the confused system caused more problems than it solved as much as the lack of homogeneity and precision in the design. Furthermore, the number

43. Krek 'The Enigma of the First Arabic Book', 207–8.

44. The copy of the *Kitāb* analysed by Philip Hitti, held at the Princeton Library, was marked in Syriac and Arabic 'by some hand, an Oriental one. Could it be the hand of the typesetter, some Christian immigrant from Lebanon, or was it the hand of a reader, one of those Maronite Lebanese scholars who in the sixteenth and seventeenth centuries labored in Rome introducing and popularizing Oriental studies?' See Hitti, 'The First Book Printed in Arabic': 7–8.

45. Ligatures can also contribute in economising the space and consequently the amount of paper.

of ligatures complicated the case-lay and slowed down the work of the compositor, resulting in many errors and irregularities.

The analysis of GDG1 has highlighted the following pattern in the recurrence of ligatures, which also benefited their identification and grouping for the character set (Figure 5.44):

- a) ... + medial گـim/هـā'/هـā'
- b) ... + final گـim/هـā'/هـā'
- c) ... + final یـā'
- d) ... + final alif
- e) init لـām + ...
- f) tooth letter + ...
- g) ... + final مـīm

One of the characteristics of GDG1 is the imprecision in the joining of letters, which results in noticeable gaps between the letters. Additionally, the alignment of sorts is far from faultless, adding jumps and interruptions in the continuum of the joining line: this problem occurs both on the notional baseline and on the second level of alignment (Figure 5.45). A further issue on the joining line is caused by the insertion of some ligatures which have more cursive joins between letters than the rigid ones resulting by adjacent sorts (see Figure 5.28), adding to the discordant and chaotic look of the page. In this regard, also the diacritical marks contribute negatively. The diacritical dots are not homogeneous in form, size and position (Figure 5.46); as previously mentioned, much of their appearance also depends on the type-making methods and the uneven impression.

The vowel marks are only partially supplied, light in weight and rather out of proportion (Figure 5.47): their size was probably increased to ease the cutting and casting and improve their handling in composition. The position of the vowels is generally very high above the ascender height; often they are closer to the line set above, nearly clashing with the descending characters (Figure 5.48). Nonetheless, there are too many exceptions to make this the rule: the placement is not along the same line even when above the ascender height; there are cases where the vowels are placed much closer to shorter characters (Figure 5.49).⁴⁶ Furthermore, their alignment with the characters is inaccurate, causing confusion regarding which letter they belong to. From the analysis, it seems clear that the vowels were added separately in composition and that were not cast together with the base-forms (which were already carrying the diacritic dots and the small lines for the differentiation of characters). The erratic positioning also seems to confirm this hypothesis and the repetition of similar combinations does not show consistent behaviour (Figure 5.50). It should also be noted that the vocalisation is only supplied above the letters, and not below: this appears to be a simplification choice to avoid an extra line of composition below the characters.

There is not a systematic method in the setting of GDG1: whether or not the knowledge of the language had an influence, the presence of unusual and inconsistent solutions scattered around the text suggests different attempts to solve problems faced for the first time. As mentioned, pioneering the field of Arabic metal type, GDG1 had no specific standards to follow or improve, other than the manuscript copy of the text. This implies that highly-customised solutions would be employed if necessary to replicate it faithfully as possible, or tested to find the best approximation to the model. Temporary solutions would also be employed in those instances

46. The slight shifts could also be caused by sorts not being filed to the same height.

where the standard method devised for the composition of the fount did not provide a satisfactory result.

It should be borne in mind that these considerations originate from the observations of the printed page; thus, they are made without having access to the metal sorts, which would greatly contribute to a better understanding of the type-making and typesetting methods of GDG1. At the present stage of the research, some issues remain unclear and would require further investigations (Figure 5.51).

Regularity of fitting

Compared to manuscripts that are traditionally tightly fitted, GDG1 is overall loosely spaced. Nevertheless, the main problem is the irregular space distribution, which causes letters to be at times too close or too wide apart (Figure 5.52). The interlinear spacing is also quite generous to allow enough room for the positioning of marks, although this does not prevent clashes. Moreover, the leading is inconsistent, contributing to the overall unbalanced look of the pages (particularly the ones with woodcut borders). The rhythm created by the uneven overall fitting and interlinear spacing affects both the visual texture and the colour of the type, compromising the legibility.

GDG1 does not provide kašida characters for the elongation of joins between characters to help with the text justification. Decorative sorts are used at times at the end of lines to fill up space, and perhaps also the punctuation marks are used beyond their standard function to separate words and sentences (Figure 5.53).⁴⁷ In terms of horizontal kerning, GDG1 allows it occasionally and with some particular letters (Figure 5.54). Moreover, the letter alif forms deeper kerns and nests inside other characters (Figure 5.55); evidently, this behaviour attempts to replicate handwritten practice, rather unsuccessfully. The generous leading prevents vertical kerns, but they recur between the descenders of some characters and the vowels belonging to the line below (see Figure 5.51).

The analysis of the first Arabic movable metal type has highlighted the type-maker's rather uncertain approach, revealed by the inconsistencies in the design, the adoption of different technical solutions and the overall approximate representation of the script. Whereas he chose to simplify the Arabic *abjad* by reusing sorts for the same letters in different positions, he adopted a relatively extensive set of ligatures to render particular letter combinations. The گim group in medial and final position is also represented with ligatures, although there are multilevel connections achieved on different levels of alignment by using individual sorts. The mixture of styles, poor shaping and proportioning of letterforms result in a low-quality rendering of the script that widens the gap from manuscript practice. Other factors such as the poor joining and alignment of characters, uneven fitting, inconsistencies in design, errors in composition, and poor impression, contribute to compromising the appearance of the type.

47. The punctuation is often printed in red, generally used to separate words and sentences. Nonetheless, at times it is doubled or used in combination. Only in one case, it is known that the serial repetition of commas at bottom of certain pages indicates the enumeration of the gatherings forming the book.

5.2.2 Agostino Giustiniani in Genoa

The polyglot *Psalter*,¹ published in Genoa in 1516, is the first of its kind containing text in Arabic.² Its editor was Agostino Giustiniani (1470–1536), an Italian patrician who embraced the ecclesiastical career at eighteen years old, joining the Dominican order and eventually becoming Bishop of Nebbio in Corsica.

According to his biography,³ the book was printed at his expense in 2,000 paper copies and an additional 50 copies on vellum.⁴ With the publication of this work Giustiniani hoped to receive praise and a reasonable profit; nevertheless, the printing resulted in commercial failure. The book was well received and highly praised by scholars but 'left to rest' – with only a quarter of the copies sold – producing a return that barely covered the capital invested in the printing.⁵ The *Psalter* was part of a bigger plan, intended as a forerunner of a complete polyglot Bible – Old and New Testament – for which Giustiniani required a more substantial financial support.⁶ Discouraged by sales of the *Psalter*, he abandoned his plan to proceed with the publication of the rest of the Bible, although he had already prepared the manuscript text.⁷

Following this failure, and after taking part in some of the sessions of the Lateran Council (1516–1517), Giustiniani withdrew to France. His reputation as a profound linguist, Orientalist and scholar⁸ had earned him King Francis I's invitation to become the professor of Hebrew at the Dominican college of Saint Jacques. During the five years spent there and occasionally travelling to England and the Low Countries, he became acquainted with illustrious exponents of European humanism, such as

1. Original title: *Psalterium, Hebreum, Graecum, Arabicum, & Chaldaeum, Cum Tribus Latinis Interpretationibus & Glossis*. A Psalter is a volume containing the Book of Psalms, the only biblical book recognised in various forms by all monotheistic faiths.
2. This is possibly the first edition of a biblical polyglot work, certainly the first [part of a] Bible to contain 'exotic' languages. Furthermore, it was the only of this kind appeared in Italy in the sixteenth century. The *Complutesian Polyglot Bible* – which was technically the first polyglot Bible to be printed from 1514 to 1517 – received its papal privilege in 1520 and therefore appeared for sale only in 1522. It did not contain Arabic. The project was initiated in about 1502 by Cardinal Francisco Jiménez de Cisneros; it was well received by the scholarly community and used for later printings of the Bible, including the Plantin Polyglot of 1569–1572. See Vercellin, *Venezia E L'origine Della Stampa*, 72.
3. Agostino Giustiniani, *Castigatissimi Annali Con La Loro Copiosa Tavola Della Eccelsa & Illustrissima Repubblica Di Genoa, Da Fideli & Approvati Scrittori* (Genoa: A. Bellono, 1537), 224v–225r, cit. from Angela Nuovo, *Alessandro Paganino* (1509–1538) (Padova: Editrice Antenore, MCMXC), 32. Giustiniani spent five years working on his biography and it was published posthumously.
4. The latter were presentation copies offered to 'all kings of the world, either Christians or Pagans', approximate translation by the author from Giustiniani, *Castigatissimi Annali*, 224v–225r.
5. The historian Angela Nuovo suggests that the print run was too large for the circuit of European Orientalists and biblical scholars, to whom it was addressed. Moreover, Nuovo claims that the *Psalter* was also marketed in the East, although it is not known how successfully. Nuovo, *Alessandro Paganino*, 122, 35.
6. Giustiniani published the *Psalter* with a dedication to the Pope Leon X in the hope to eventually reach his court. This position would have granted him greater exposure and secured the financial support – of wealthy prelates or reigning heads of state – that he needed for the continuation of his project. But, due to political events, Giustiniani's plan remained unfulfilled and with it the publication of the polyglot Bible.
7. Like the *Psalter*, the Bible was meant to be set in Latin, Greek, Hebrew, Arabic and Chaldean. Angela Nuovo, *Alessandro Paganino*, 32.
8. He devoted himself to training in philosophy and theology, but also in the comparative study of Greek, Hebrew, Arabic and Chaldean.

John Fisher, Thomas More, Thomas Linacre and even Erasmus.⁹ He continued his typographic activity publishing scholarly work also in collaboration with other editors. In 1522 he returned to Genoa, dedicating his final years to ecclesiastical activity and pastoral work in his diocese in Corsica; he drowned during one of his trips there, in 1536, at the age of 66.

The *Psalter* is a folio edition in five languages and four scripts,¹⁰ arranged in eight columns¹¹ across facing pages with parallel text – from left to right – in Hebrew, Latin (three versions),¹² Septuagint Greek, Arabic and Aramaic (Chaldean). The eighth column, which is often left empty or spreads across the page's width, contains the editor's occasional notes, also known as scholia or gloss.¹³ The book's title is printed – in all languages – in alternated red and black blocks, contained within an elaborate woodcut border (Figure 5.56).¹⁴ The first opening of the text with the eight columns (Figure 5.57) has headings printed in red and woodcut initials for each paragraph (a *ta'* letter for the Arabic). A bigger letter of this kind (an *alif*) is at the beginning of the previous Arabic section: those are the first ornamental letters printed in Arabic (Figure 5.58).¹⁵

Historian Giorgio Vercellin reports that Battista Cigala assisted Giustiniani for the Arabic text of the *Psalter*.¹⁶ Angela Nuovo, instead, mentions Benedetto Cigala – or Cicala – as a collaborator of Giustiniani, describing him as a Genoan humanist of whom little is known; he was perhaps involved in the press work as a proof-reader, curator of the text or editorial consultant.¹⁷

The *Psalter* is considered a significant scholarly and typographical achievement for the time – despite the lack of success of the publication – that contributed to the European scholars' knowledge of Arabic; it is known that the Flemish grammarian Nicolas Clénard and the German theologian Wolfgang Musculus used it as a manual to learn the language.¹⁸ The *Psalter* remains today an important legacy of Giustini-

9. In his youth he had also met the philosopher Pico della Mirandola.
10. The Aramaic was printed using Hebrew letters, instead of the Syriac alphabet; this was a common practice for sixteenth-century printers, due to the lack of Oriental characters. See Duverdier, 'Les Impressions Orientales', 238.
11. For this reason the book is also known as *Psalter Octaplium*.
12. Respectively, a literal Latin translation of the Hebrew text, the Vulgate version of the Psalms, and a Latin translation of the Aramaic text.
13. These notes are of different nature and include, amongst others, references to Christian, classical authors, and cabalistic texts from the Zohar. One extensive note (Psalm 19, verse 5) is famously known as the first ever printed biography of Giustiniani's fellow Genoan Christopher Columbus' achievements. This note caused controversy with Columbus' son Ferdinand, who 'took his complaints to the Genoan Senate, which ordered that all copies of Giustiniani's Psalter be burned'. See 'Psalterium - Museu-Mário Barbeito de Vasconcelos', 2009, accessed 6 December, 2016, <http://arquivohistoricomadeira.blogspot.co.uk/2010/02/psalterium-museu-mario-barbeito-de.html>.
14. According to Smitskamp, the general idea of the woodcut border for the title-page may have come from Fano's *Kitāb*, although they are different in style. Smitskamp, *Philologia Orientalis* 3, 236i.
15. Camille Aboussouan, 'A Grenade Et à Gênes, Au XVIe Siècle. Le Premiers Pas de l'Imprimerie Arabe', in *Le Livre Et Le Liban Jusqu'à 1900: Exposition* edited by Camille Aboussouan (Paris: Unesco, 1982), 115.
16. However, he was not able to find historical evidence on this person (probably because of a mistake in the name, as explained shortly), see Vercellin, *Venezia E L'origine Della Stampa*, 73.
17. Giustiniani briefly mentions him in the *Psalter*, see Nuovo, *Alessandro Paganino*, 54, 58. Further research is needed to clarify the name mismatch in the two sources.
18. Duverdier, 'Les Impressions Orientales', 239.

ani's perseverance and devotion as a pioneer Orientalist and a 'sublime monument of his learning'.¹⁹

About the type

The *Psalter* was printed by Pietro Paolo Porro (Figure 5.59). Giustiniani summoned him to Genoa around 1515, to work in the house of his brother Nicolo Giustiniani Paulo, where he had set up a press. Born in Milan, Porro was one of the finest typographers in Italy at the time; goldsmith by trade, 'he had a reputation of chiselling metals with consummate art'.²⁰ Porro was Master of the French Royal Mint – for the Duke of Savoy – and was actively printing in Turin in 1512; here, he had a press with two of his brothers, who helped him cut the characters that they employed.²¹

The Arabic type of the *Psalter* (PPP) was manufactured expressly for that edition.²² It is considered the second Arabic type to be made – following GDG1 – although some sources refer to it as the first.²³

According to the Lebanese scholar Kāmil Abū Ṣawān (Camille Aboussouan), the *Psalter* predates in the making – and possibly in the printing – the *Kitāb*.²⁴ To sustain his hypothesis, he argues that the Fano work could not have required a long time to be prepared and that it did not pose the same problems as Giustiniani's polyglot edition. The *Psalter* was indeed a much more substantial work both from a practical and intellectual point of view – including the translations and the various scholia – and presented a bigger challenge also in its composition: the Arabic text itself covers one column of 41 lines with an average of 160 words per page, on 246 pages. On the other hand, the *Kitāb* had only 120 pages, containing twelve lines of about forty words.²⁵ Aboussouan mentions the statement '[...] nous avons travaillé pendant longtemps'²⁶ – found in the dedicatory preface of the book – that might suggest the lengthy task of composing and correcting this masterful work, for which 'several proofreaders were essential, who had to know at least three non-European languages'.²⁷ He also suggests a possible misprint of the date (1506 instead of 1516), although with reservations;²⁸ other sources mention that the *Psalter* was completed in only ten months.²⁹ Whether or not the Arabic type of the *Psalter* (PPP) was produced be-

19. Approximate translation by the author from Nuovo, *Alessandro Paganino*, 34.

20. Balagna, *L'Imprimerie Arabe En Occident*, 22. Approximate translation by the author.

21. Giuseppe Fumagalli, *Dictionnaire Géographique D'Italie Pour Servir À L'histoire De L'imprimerie Dans Ces Pays* (Florence: Olschki, 1905), 170.

22. Ibid. There is no explicit reference if Porro designed and cut the types himself or if others produced them under his direction.

23. Angela Nuovo and Christian Coppens, *I Giolito E La Stampa Nell'Italia Del XVI Secolo* (Genève: Librairie Droz, 2005), 51–52, note 130. The *Psalter* is generally referred to as the second book to be published containing significant amount of Arabic text, but according to some theories the production started before the *Kitāb* from Fano. This is probably why Nuovo and Coppens refer to it as the first Arabic type. This is discussed in greater depth later in this section.

24. Aboussouan, 'A Grenade Et à Gênes', 114. Balagna supports this idea in *L'Imprimerie Arabe En Occident*, 7.

25. Aboussouan, 'A Grenade Et à Gênes', 114–115.

26. '[...] we worked for a long time', approximate translation by the author from Aboussouan, 'A Grenade Et à Gênes', 114.

27. Ibid. Approximate translation by the author.

28. Ibid., 115. Giustiniani was already working on the texts for the *Psalter* ten years before the publication date. Aboussouan suggests it is unlikely that he waited 8 more years (until after 1514 date of publication of the *Kitāb*), to start making the Arabic types. It is almost sure that Giustiniani had gathered the materials for the edition well before 1514, and that delays were caused for the sake of rigorous corrections, typesetting and typefounding.

29. Fumagalli, *Dictionnaire Géographique*, 170 and David Werner Amram, *The Makers of Hebrew Books*

fore that of the *Kitāb* (GDG1), it is certain that they are two entirely different designs, but they share ' [...] une raideur, une touchante maladresse qui ont dû frapper les lecteurs arabophones habitués à l'aisance de multiples écritures manuscrites'.³⁰

The size of PPP is quite small – although still bigger in comparison to the Greek in the same book – thus more challenging to cut compared to GDG1. The *Psalter*'s Arabic type represents a great improvement compared to the Arabic wood types seen in Europe at the time, and according to Smitskamp, also compared to the Fano type. However, he still describes it as 'fairly rough and clumsily connected'.³¹ The PPP type is not vocalised.³² It is not clear why this choice was made, if because considered unnecessary or because it would have implied a longer, more costly, and more complicated work. Surely, this decision was script-specific and did not apply to the project as a whole. In fact, whether the Greek and Hebrew types were made *ad hoc* for the *Psalter* – like for the Arabic – or purchased already made, those were set with some form of vocalised text.

There is no certainty of the source or the model used to design the PPP type. Vercellin mentions some notes, found in a copy of the *Psalter*,³³ from which it is possible to gather that Giustiniani 'had at least two Arabic manuscripts of the Psalms, one from Syria and one from Egypt, with variations duly recorded in the text itself'.³⁴ The typeface has 'a distinct maghrebine appearance'³⁵ suggesting the influence of manuscripts in the maḡribi style. According to Smitskamp, 'this may have been due to the greater accessibility of manuscripts from North Africa and Arabic Spain, or, in the case of Giustiniani, to the Moorish extraction of his informant'.³⁶ It is known that Giustiniani spent some years in Valencia before 1487 when he joined the Dominican order, from where he could have imported some manuscripts. Moreover, it is worth recalling the trading links between Genoa and the North Africa, where this particular style was widespread. The maḡribi style developed from the evolution of Western Kūfi³⁷ and has distinctive features.³⁸ Written on a horizontal baseline with a free flow, it is often described as light and gracious. This style does not apply strict rules; therefore the calligrapher has more freedom in the design of the letters, and various possibilities (also with regard to the regional styles that developed from it).³⁹

in Italy (Philadelphia: Press of Edward Stern & Co., 1909), 227.

30. ' [...] a common stiffness, a touching clumsiness which must have struck the Arabic readers, accustomed to the ease of various handwritings', approximate translation by the author from Balagna, *L'Imprimerie Arabe En Occident*, 22.

31. Smitskamp, *Philologia Orientalis* 3, 236d.

32. A diacritical mark similar to a fathaqtan recurs in few instances (see Figure 5.70).

33. He is looking at a copy available at the Biblioteca Marciana in Venice, Membranacei 14.

34. Approximate translation by the author. There is no other information on the manuscripts; the text of the notes is reported in Latin in Vercellin, *Venezia E L'origine Della Stampa*, 73.

35. Rijk Smitskamp, *Philologia Orientalis I: Sixteenth Century: A Description of Books Illustrating the Study and Printing of Oriental Languages in Europe* (Leiden: E.J. Brill, 1976), 28a.

36. Ibid.

37. From the 10th century in the city of Kairouan (now in Tunisia) and then spread to the North-West Africa and Muslim Spain.

38. For references on this style see Safadi, *Islamic Calligraphy*, 78; Ghani Alani, *La Calligraphie Arabe: Initiation*, 2nd ed. (Paris: Fleurus, 2001), 71; Albertine Gaur, *A History of Calligraphy* (London: The British Library, 1994), 95–96; Nico van den Boogert, 'Some Notes on Maghribi Script', *Manuscripts of the Middle East* 4 (1989): 30–43; and the online source Calligraphy Qalam, 'Kufic-Maghribi', accessed 6 December, 2016, <http://calligraphyqalam.com/styles/kufic-maghribi.html>.

39. Like western kūfi, the maḡribi script does not apply a system of calligraphic rules for its proportioning (like the Ibn Muqlah system). The purity of the style is maintained through copying the calligraphy of acknowledged masters.

The Maḡribi style rounded appearance derives from the preparation of the pen,⁴⁰ and it is characterised by open and sweeping curves (large bowls also referred to as loops or flourishes). They are usually a quarter or half circles and recur in characters when in final or isolated position. The strokes tend to be of uniform thickness,⁴¹ with the verticals and downstrokes slightly curved to the left. The depth of the descending strokes extends under the character sometimes touching the letters of adjoining words on the same line or reaching right down to the line below. The vowel markings are often flat rather than slanted (Figure 5.60). A peculiar characteristic of maḡribi style is that the letter qāf is written with one dot above and the letter fā' is written with one dot below (see Figure 5.2).⁴² Nonetheless, the letter fā' and qāf in PPP 'are dotted according to eastern orthography'.⁴³

A final consideration from Smitskamp also highlights that 'the Maghrebine script, which most resembles the original Cufic script, is by dint of his hieratic character, and restricted number of ligatures, better suited to typography than other styles of writing'.⁴⁴

One of the most evident issues of the PPP type is the quality of printing. The impression is uneven, causing different problems: some letters look at times bolder or lighter than others (Figure 5.61); counters close up filled with ink (Figure 5.62); parts of letters, or diacritic dots, disappear in print causing confusion in recognising the letterforms (Figure 5.63). The unevenness can be caused by letters that are not sitting flat on the form – thus receiving different pressure during printing – or that are not held together tightly enough in the form, hence moving when transferred on the printing surface. A further indication is given, for instance, by space characters that show in print (Figure 5.64). Moreover, in PPP the edges of the metal sorts show often in print, increasing the 'dirty' and 'messy' appearance of the composition (Figure 5.65). This latter issue reflects a general lack of accuracy and tidiness in the execution of the work. A comparison of the Arabic column with those of the other languages shows a striking difference, as they look much tidier, cleaner and more evenly printed. This fact may suggest that these problems are peculiar to the Arabic type and do not apply to the printing of the book as a whole (Figure 5.66); furthermore, that issues perhaps concern more the punch-cutting stage, rather than composing or printing.

There are also numerous marks of ink – not related to any particular letter – that add 'noise' to the composition and can be mistaken for diacritical dots, which are often poorly printed (Figure 5.67).

40. The tip of the pen has its corners rounded. Also the cut in the pen's tip to supply ink is obtained differently than the pens used for other styles, in order to create a kind of ink tank. See Alani, *Calligraphie Arabe*, 71.
41. Due to the sharp pointed pen used to write this style. Boogert, 'Some Notes on Maghribi Script': 30.
42. According to Boogert, the distinctive features of maḡribi script are the following: 'the final *alf* is drawn from top to bottom; the stems of *alf*, *lām*, *lām-alf* and *tā'zā'* have club-like extinctions to the left of their top point; the loop of *ṣād/dād* is identical with that of *tā'zā'*, i.e. it has no 'tooth'; the stem of *tā'zā'* is drawn diagonally; final and separate *dāl/dhāl* are very similar to initial and medial *kāf*, especially in earlier mss; more differentiated forms developed later'. See Boogert, 'Some Notes on Maghribi Script': 30.
43. Roper, 'Early Arabic Printing in Europe', 132.
44. Smitskamp, *Philologia Orientalis* 1, 28a.

Degree of simplification

As for GDG1, also for the PPP type no other historical evidence has survived beside the *Psalter*. The analysis of the latter has provided the following estimate for the character set of PPP (Figure 5.68):

alif	1 sort (isolated/final)
ba'	1 sort (isolated/final), 1 sort (initial/medial), 1 sort (extended)
ta'	1 sort (isolated/final), 1 sort (initial/medial), 1 sort (extended)
ṭa'	1 sort (isolated/final), 1 sort (initial/medial), 1 sort (extended)
ğim	1 sort (isolated/final), 1 sort (initial/medial), 1 sort (extended)
ḥa'	1 sort (isolated/final), 1 sort (initial/medial), 1 sort (extended)
ḥa'	1 sort (isolated/final), 1 sort (initial/medial), 1 sort (extended)
dāl	1 sort (isolated/final)
dāl	1 sort (isolated/final)
rā'	2 sorts (isolated/final – small and big bowl)
zā'	2 sorts (isolated/final – small and big bowl)
sīn	1 sort (isolated/final), 1 sort (initial/medial)
śīn	1 sort (isolated/final), 1 sort (initial/medial)
ṣād	1 sort (isolated/final) 1 sort (initial/medial)
dād	1 sort (isolated/final) 1 sort (initial/medial)
ṭā'	1 sort (isolated, initial, medial, final)
zā'	1 sort (isolated, initial, medial, final)
‘ayn	1 sort (isolated), 1 sort (initial), 1 sort (medial), 2 sorts (final), 1 sort (extended)
ğayn	1 sort (initial), 1 sort (medial), 1 sorts (final), 1 sort (extended) ⁴⁵
fā'	2 sorts (isolated/initial/final), 1 sort (medial), 1 sort (extended)
qāf	1 sort (isolated/initial/final) 1 sort (medial), 1 sort (extended)
kāf	1 sort (isolated/final) 1 sort (initial/medial)
lām	1 sort (isolated/final), 1 sort (initial/medial)
mīm	1 sort (isolated/final), 1 sort (initial/medial)
nūn	1 sort (isolated/final), 1 sort (initial/medial), 1 sort (extended)
hā'	1 sort (isolated/final – closed), 1 sort (initial/medial), 1 sort (extended)
wāw	1 sort (isolated/final)
yā'	1 sort (isolated/final), 1 sort (initial/medial), 1 sort (extended)
mağribi hā'	1 sort (isolated) ⁴⁶
mağribi tā' marbūṭa	1 sort (isolated)
tā' marbūṭa	1 sort (isolated/final)
lām-alif	1 sort (isolated/final)

A minimum of 72 sorts was established for the Arabic *abjad*.⁴⁷ Besides the lām-alif, already included in the basic character set, other 6 ligatures were identified in PPP.⁴⁸

45. There seem to be no sorts for gayn in isolated position: it is possible that the letter was indicated with the dotless sort of ‘ayn, as no examples could be found in the text. The same could be said for ğayn in final position, although at least one recurrence was identified and, therefore, counted.

46. This isolated hā', in mağribi style, is like the closed version in nash. See Boogert, ‘Some Notes on Maghribi Script’: 40. See Figure 5.60 for use in manuscript practice.

47. Designs that have slight variations are still been counted as one sort, because the nature of these variations is not been established and the identification of all design is somehow a difficult task in the time frame of this research (i.e. for the letter ‘ayn in final position 2 sorts have been count, one with short bowl and one with long bowl, although inside these two main groups there are still many differences in the designs). The count of the sorts aims only to give a rough idea of the minimum number available in the compositor’s case.

48. Ligatures sharing the same base-form but with different dots are counted as one sort.

Additionally, 1 sort for the ornamental mark (Figure 5.69) and 1 sort for the fathahtan should be counted (Figure 5.70), bringing the total to at least 80 sorts.

From the analysis of the character set, it seems clear that the type-maker's approach is to simplify the setting by having fewer compartments in the compositor's case. Sorts were reused to fit different purposes, representing the same letterforms in different positions in a word; as a consequence, the connecting devices necessary for letters in medial and final positions to join are removed (Figure 5.71). This simplification approach is differently applied depending on the letters: while the characters 'ayn/ğayn required more forms for all positions (Figure 5.72), for ڭڭ/ڙڙ one form fits all (Figure 5.73). From a design point of view, key letterforms are not sufficiently differentiated to avoid confusion with other characters, thus resulting in less distinguishable letters (Figure 5.74, Figure 5.75). These poor design decisions combined with the substandard print quality and the extensive simplification compromise the legibility of PPP. Moreover, the unbalanced overall fitting also affects the characters and word's recognition, contributing to a decrease of the typeface's readability.

Calligraphic properties and diversification of letters

Although PPP is far from being an accomplished design, it shows a certain effort to adhere to the mağribi calligraphic style; this is especially noticeable in some details rather than in the typeface's overall visual quality on the printed page. For instance, the final yā' carries the diacritic dots inside the bowl rather than underneath, as seen in manuscript practice (Figure 5.76); the final alif, in mağribi, is designed from top to bottom:⁴⁹ the join with the previous letter is therefore achieved by ending the stem into the horizontal stroke of the adjacent character. In PPP the alif typeform replicates this behaviour, even if it is not always correctly represented (Figure 5.77). A lack of homogeneity, however, reflects inadequate design execution or, perhaps, style inconsistencies. For example, the treatment of some stroke terminations⁵⁰ at the head of the ascenders⁵¹ does not coherently replicate the trait of the mağribi rounded (pointed) nib: instead of club-like finials, some letters have wedge-like terminations – henceforth designated as barbs⁵² – typical of different calligraphic styles⁵³ (Figure 5.78).

As previously mentioned, the mağribi style does not follow strict calligraphic rules; nonetheless, it has developed a certain degree of conformity and characteris-

49. See Boogert, 'Some Notes on Maghribi Script': 30.

50. For want of a better term, the word termination (or finial) is used to designate the point where the stroke ends. Whereas in calligraphy the distinction between entry and exit stroke is more pertinent due to the movement of the pen to form letters, in typeforms this is not so appropriate.

51. Historian Adam Gacek defines the stroke termination 'located at the heads of the ascenders, shafts or stems of various letterforms' with the term 'head-serif' whereas in this thesis the term 'barb' is used. Gacek adds that it is a helpful element in determining the label of a given script, in particular for its frequency, its position, its length and its shape. See Gacek, *Arabic Manuscripts: A Vade-mecum*, 122–23.

52. The calligraphic term تَرْوِيس (tarwīs, heading) is used to indicate the barbs typical of the tulut style; it refers to starting the letter with a dot made with the full width of the reed pen as on top of the alif. See Al-Ḥalawani, Anwar 'Abdul Salam, مَعَالِمُ خطِّ الثُّلُثِ: تَارِخٌ، قَاعِدَهُ، أَسْرَارُهُ (Ma'alim Ḥat Al-Thuluth: *Tarijuh, Qawaiduh, Asraruh*, Guide to Thuluth Calligraphy: Its History, Guides and Secrets), 1st ed. (Aleppo: Dar Al-Qalam Al-'Arabi, 2007).

53. The barbs are produced with an obliquely cut nib, used for calligraphic styles like tulut and nash. According to Boogert, these terminations (which he describes as a 'top-serif inclined to the right') belong not only to the tulut style, but can be also found in *mağribi mujawhar* or more commonly called *tulut mağribi*. See Boogert, 'Some Notes on Maghribi Script': 31.

tic features, like in the proportioning of some letters (e.g. the initial 'ayn/ġayn letters are unusually oversized compared to standard nash, Figure 5.79).⁵⁴ Whilst the PPP type attempts to replicate some of these characteristics, it falls short elsewhere: for example, the letters rā' / zā' variants with sweeping bowls, according to manuscript practice, result oversized in the type when compared to other descending letters, like ḥā' and yā' in final position (Figure 5.80). The characteristic even thickness of the pen strokes in maḡribi is not consistently reflected in PPP, where many letters show stroke contrast (Figure 5.81). Differences in the treatment of strokes can be noticed in the weight distribution (Figure 5.82) and in the angle of some ascenders; in the latter case, the poor setting of the text could be deceptive (Figure 5.83).

Although it was mentioned that the substandard impression of the Arabic text in the *Psalter* influenced the characters' appearance,⁵⁵ it seems safe to say that the varying design of the same letterforms in PPP is attributable to more factors, whether additional punches, casting problems or other issues not yet established. When differences are evident but their nature is unclear, only one sort was counted in the character set (Figure 5.84); when the diversity seems more obviously due to separate designs, then they were enumerated individually (Figure 5.85). However, it should be noted that these decisions were not straightforward, as the variations in PPP are numerous and difficult to narrow down. Due to inconsistent use, further analysis might provide information for a more definite classification.⁵⁶ While the need to have an alternative shape for the same character is understandable in specific circumstances, it is not clear why in PPP there are so many letterforms that present differences (subtle or evident variations in their design). It does not seem beneficial to have different shapes if these are not applied consistently to solve particular problems, or difficult letter combinations (Figure 5.86). Moreover, as previously discussed,⁵⁷ there is evidently no gain in making different punches for slightly different designs of the same letter – instead of replicating the same one. This is especially true if the punchcutter's approach is to simplify the script by 'optimising' the design to allow the reuse of the same sorts and thus reduce the number of punches.⁵⁸

The shortage of ligatures in PPP (Figure 5.87) could be attributed to the restricted number of ligatures characteristic of the maḡribi style, as stated by Smitskamp.⁵⁹ However, it is evident from Boogert's work that the variety of ligatures in maḡribi is much higher than what is represented in PPP.⁶⁰ The selection of the seven ligatures to be reproduced in metal types might be a further confirmation of the punch-cutter's simplification approach or – if he was following a specific manuscript – it might represent the only used in the model, or those occurring more frequently.

The identification of the ligatures in the PPP type required close observation of the printed book, as many letter combinations are deceptive (Figure 5.88).

54. 'The height of the loop of the initial 'ayn may be equal to that of the lām'. *Ibid.*, 38.

55. See Figure 5.61.

56. See for instance Figure 5.100: are these all different designs of yā' or they only appear different? How many punches are attributable to these variations of the letter? How many sorts should be counted in the character set?

57. See § 3.1.2.

58. Both number of punches to cut and of compartments in the type-case.

59. See note 44.

60. Boogert, 'Some notes on Maghribi script'.

Letter-joining and multilevel composition

As previously mentioned the connecting strokes to join separate characters is not present in PPP. The joins are achieved only by positioning letters as close to each other as possible – to disguise the gaps between metal sorts – either on the notional baseline or shifted to a higher position, next to the following letter or on top of it (Figure 5.89). Nonetheless, this technique causes multiple issues, like combinations of letters that become extremely tight (Figure 5.90). When the bā' letter group⁶¹ in initial position is joined with the ǵim letter group⁶² the shape of the bā' for the isolated/final position seems to be used instead of the initial/medial to benefit from the longer and straight baseline (Figure 5.91). Nevertheless, a straight line can be noticed on other occasions (i.e. after mīm), which is probably added to improve the connection. The lack of consistency in the application of this practice suggests that it might have been an experimental solution (Figure 5.92).

The shift above the baseline is not very common in PPP and the composition remains mostly aligned on the notional baseline; this is applied even when the same letter combinations occur, showing inconsistency in the method (Figure 5.93). The shift above the baseline often affects characters that precede the ǵim letter group in medial or final position (Figure 5.94); it applies also in other instances (e.g. letters preceding medial or final mīm, Figure 5.95). It is safe to say that the multilevel connections attempt to replicate manuscript practice. The lack of a systematic approach is only one of the reasons for its failure: the presence of unusual combinations also seems to suggest the adoption of *ad hoc* solutions that add further problems (Figure 5.96).

The diacritical dots are extremely irregular in form and size. Much of their appearance is influenced by a non-homogeneous design and the effect of the uneven impression.⁶³ However, their position raises questions about whether they were cut as part of the base-form or added separately. Taking into consideration the simplification approach which seems to have been used in PPP, the inclusion of the dots on the sort would have avoided complications during the composition. The analysis of the text gives different indications. In most cases, when the same letter is compared across various pages, the diacritical dots seem to recur in the same position, which suggests that they were included with the base-form (Figure 5.97). Moreover, the dots are often too close to the letter to allow for two pieces of metal to be positioned next to each other: it would have required a high level of precision and tidiness, qualities that are not found in the print of this Arabic text. The marks of ink caused by the edges of the metal sort showing in print – for which many examples can be found in the text – also suggest that the dots were cut together with the letter: they do not seem to occur between the letters and the dots, but above or below the entire character (Figure 5.98). Nevertheless, there are instances where these dots appear in a different shape or in a different position, which might suggest they were independent from the base-form (Figure 5.99). Evidence to confirm these particular instances should be searched in occurrences of same letterforms showing noticeable differences in the dots. Furthermore, the same letterform with missing dots could be

61. The bā' letter group includes those letters that share the same base-form: bā', tā', tā'. In this occasion also the letter nūn and yā' are included, intended when in initial and medial position.

62. The ǵim letter group includes the letters ǵim, hā', hā'.

63. The difference between the dots of the Arabic text compared to the diacritical marks of the Hebrew and Greek is striking. In those languages, these are more consistent in form and position, possibly suggesting a more skilled punch-cutter or a better casting/composing technique (see Figure 5.66).

counted separately or not, depending if the dots were filed off from existing dotted sorts after casting (Figure 5.100). An indication that the dots might have been cut and cast separately is found in the text (Figure 5.101). In this instance, a sort of a single dot seems to show in print.

Regularity of fitting

The PPP type has considerable spacing problems, which add confusion to the already disjointed appearance of the type. The leading between the lines is not generous but it is dictated by the layout in which the columns with different languages have parallel rows of text. The size of the various types influenced the layout: the width of the columns is much shorter for the Hebrew (which is more compact as a script); for the Greek, the small size of the letters allowed full vocalisation and a text that looks airier. For the Arabic, the leading is the minimum possible to allow descenders and ascenders and avoid vertical clashing (Figure 5.102). Moreover, the Greek and Latin texts are aligned to the left, while the rest of the columns seem to be justified: this is not consistent throughout the book, where the columns with Hebrew and Arabic often change to be aligned on the right-hand side. The attempt to justify the text might be due to the need for running parallel texts for all languages; finding an answer to this particular aspect is beyond the scope of this study.

To achieve the desired fitting of the composition, the Arabic script allows for extended variations of certain letters or elongations – using the *kašida* – of the joins between different characters. In typography, the *kašida* element is usually represented by a straight line on an individual metal sort to be inserted between two characters to extend their horizontal connection. Whilst in GDG1 no *kašida* was used, in PPP the lengthening is obtained by using extended forms for certain characters (Figure 5.103). It should be noted that this was a lengthier solution: while a single *kašida* sort could have been applied to different letters combinations, the extended forms (at least 11 in PPP) required the cutting of extra punches. The model perhaps inspired the selection of forms.⁶⁴

The unbalanced fitting of the sorts results in an extremely irregular, messy and somehow floating text, with considerable gaps in the lines of text. It is very challenging to understand the method behind the setting of Arabic's columns in the *Psalter*. In some instances, it seems clear that the justification was prevented by the non-recurrence of letters with the extended versions in the particular line. However, at times the extended letter was not added – even if available – to justify the line or to improve the general fitting. In other instances, it seems that the compositor placed two words at the extreme ends of a line, leaving a wide gap between them, only to respect the justification of the column, but left two lines aligned on the right side (Figure 5.104). It is possible that he was following the line break of a particular manuscript text, or that he was making arbitrary decisions as the composition progressed: further study of the text is required to find some answers.

The problems with the spacing are not only between words but also between letters. The lack of devices to help the joining of characters resulted in a very tight fitting, with combinations where letters look squashed against each other. On the other hand, the justification of the line produced loosely spaced text – with no possibility or need for kerning: it is often challenging to recognise the space between two letters or two words, and the lack of punctuation does not help. Moreover, the inconsistent fitting of the same letter combinations shows a defective method or a

64. Other letters can be extended, like the *ṭā'* and *ẓā'*, but they were not included in PPP.

lack of skill, care and accuracy.⁶⁵ There are some instances of kerning pairs – or nesting letters – especially between characters with extended descenders and the letters that precede or follow them (Figure 5.105). This practice suggests that those letters had to be cut and cast accordingly to allow for such spacing adjustments. The marks left by the edge of the sort provide evidence for understanding what solution was possibly used: it seems that some letters had parts overhanging the body in order to kern. This suggests that kerned variants were included in the character set in addition to the same letters cast on the full-body (i.e. not allowing kerns) (Figure 5.106).

Evenness of texture and colour density

The texture of the PPP type is uneven and inconsistent. The way letterforms are differentiated without an attempt of unifying common strokes does not give the type a cohesive appearance. This is not achieved even at text-composition level, where the lack of regularity creates a very disjointed aspect and no pattern in the text. An unbalanced fitting breaks the rhythm of the composition, affecting the colour of the type and the density of colour along the joining line.

The analysis of the second Arabic type of the *Psalter* highlighted similar features and issues to those discussed for the *Kitāb*. The reduced character set of the PPP type (less the half than GDG1) shows even more evidently the type-maker's mindset for simplification. The poor shaping and treatment of letterforms prove no sensibility towards the aesthetic of the script and its requirements. The handling of multilevel connections, kerning, fitting, appearance of diacritic dots, amongst other things, is evidence of the type-making and composing challenges. The lack of consistency in the approach and the presence of different variations of same letterforms with no apparent purpose still proves difficult to explain the type-maker's plan. On the other hand, the analysis of typeforms proves to be an important starting point to find evidence and raise questions. Interestingly, the type of the *Psalter* shows features of a different calligraphic style, the *māgrībi*, giving clues about the handwritten models that might have been used to make the type.

The first two Arabic movable metal types were the initiative of individual printers for printing religious Christian texts. The third Arabic type was produced in a similar context, but it was used to print the first Muslim, and most sacred, text: the Qur'ān. It is discussed in the following section.

65. See Figure 5.83.

5.3 The first type to print the Qur'ān: progression

5.3.1 Paganino and Alessandro Paganini¹ in Venice

The Venice *Qur'ān*² (Figure 5.107) was published in 1537–38³ by the Paganini printers and it is the first printed edition of the Muslim's Holy book with Arabic movable metal types. Its recent rediscovery⁴ has invalidated the debate regarding the existence of the book, although much of this *Qur'ān*'s history remains a 'bibliographic mystery'.⁵ Today the book is located in the library of San Francesco della Vigna in Venice, where it was moved in 2008.⁶

The evidence of the *Qur'ān*'s existence – and the few contemporary testimonies – come from the restricted circle of the first European Arabists,⁷ with the most significant recorded by Albonesi. In his *Introductio*, he mentions the *Qur'ān* in three instances,⁸ one of which makes an explicit reference to a particular page of the edition, leaving no doubt that the book existed and that he had access to it (Figure 5.108). The *Qur'ān* found in Venice is indeed thought to be Albonesi's personal copy used for his studies,⁹ hence the handwritten notes and the interlinear translation present in some of the pages. Furthermore, the surviving copy carries his note of

1. The Italian scholar Angela Nuovo refers to them as Paganino Paganini (where Paganini is the surname; the full name is Paganino de' Paganini), and Alessandro Paganino (where Paganino is the surname). She refers to them together as 'i Paganini', translating 'the Paganini' in English. See Nuovo, *Alessandro Paganino*.
2. The italic emphasises this particular work, rather than any other *Qur'ān*.
3. Between 9th August 1937 and 9th August 1938; for the reasoning and evidence behind this dating see Angela Nuovo, 'A Lost Arabic Koran Rediscovered', *The Library* 12, no. 4 (1990): 273–92.
4. The only surviving copy was found by Nuovo on the 2nd of July 1987 at the Biblioteca dei Frati Minori di San Michele in Isola, Venice, while she was investigating Alessandro Paganino, also editor of this work. The library was unaware of its possession, although their catalogue correctly listed an *Alcoranus Arabicus Sine Notis*. The first article published soon after the discovery of the edition was: Angela Nuovo, 'Il Corano Ritrovato', *La Bibliofilia* 89 (1987): 237–71, later translated in English: 'A Lost Arabic Koran Rediscovered'. Her latest article on this topic is 'La Scoperta Del Corano Arabo, Ventisei Anni Dopo: Un Riesame', *Nuovi Annali Della Scuola Speciale Per Archivisti E Bibliotecari* 27 (2013): 9–24.
5. Nuovo, 'La Scoperta Del Corano Arabo', 13. Discussed in greater depth below.
6. In 2008 the Franciscan Friars moved from the convent in San Michele in Isola to relocate in San Francesco della Vigna. The entire library of the convent was moved to the new premises, where resides today as the collection named 'S. Michele in Isola', which includes the *Qur'ān*.
7. Amongst the most important: Teseo Ambrogio degli Albonesi Albonesi, whose references to the *Qur'ān* are discussed in note 9; Guillaume Postel, in a letter addressed to Andrea Maes on the 4th March 1568, states that the *Qur'ān* was printed in Venice about thirty years before; Thomas Erpenius about fifty years later mentions, in his work *Rudimenta Linguae Arabicæ* (Leiden, 1620), the 'Alcoranus Arabicæ', stating that 'sed exemplaria omnia cremata sunt'. Nuovo, 'A Lost Arabic Koran Rediscovered', 277.
8. In the first one (f.11r) he mentions the *Qur'ān* as 'dudum pubblicitus', namely just published; in the second (f.83v–85v) he refers to the specific page of the edition 'in quinto quinternio Alcorani typis impressi, folio antepenultimo'; and in the third one (f.200v) he attributes the printing to Paganino Paganini (father of Alessandro), in discussing his attempt to buy the punches and matrices of the *Qur'ān*'s types on Postel's behalf. Nuovo, 'A Lost Arabic Koran Rediscovered', 275–77.
9. Besides Arabic, Albonesi learnt Hebrew, Syriac, Armenian and Ethiopic.

ownership,¹⁰ and a second annotation added a few years later:¹¹ it is the stamp of Arcangelo Mancasula, Vicar of the Holy Office of Cremona. No other mark of possession has been applied since. The events regarding this *Qur'ān* – between the death of Albonesi, shortly after 1540, and the discovery in 1987 – are still unknown.

Erpenius was the first to attribute the loss of copies of the *Qur'ān* to a destruction by fire;¹² although he makes no mention of those responsible, the imputation of the Pope must have seemed an obvious choice to those who later hypothesised it, particularly in the Protestant environment of sixteenth-century Europe. Nevertheless, this supposition appears not to have much foundation: according to Nuovo, the papal burning is even contradictory, considering the presence of the Vicar's stamp on the survived copy.¹³ Furthermore, her argument is supported by the vernacular translation of the *Qur'ān* printed a few years after Paganini's work, which was potentially a bigger threat than an Arabic edition:¹⁴ why would the Church allow the circulation of a volume in a language accessible to many and destroy a book that only very few people could read?¹⁵ The loss of the *Qur'ān* might be attributable simply to the fact that it was never distributed in Europe, rather than to a mysterious disappearance.¹⁶

If the Koran did not circulate in the West, where it might have been preserved, it must have circulated in the East, where it was definitely destroyed: thus we can explain the loss of the edition, of which perhaps the only copy remaining on Christian territory was saved.¹⁷

There are more hypotheses, but none provide historical evidence. Maurice Borrmans suggests that Alessandro Paganino decided to destroy the evidently faulty edition, keeping one or more copies for his Orientalist friends – perhaps his advisors – who were potentially interested in the Arabic types for their works.¹⁸ A German source allegedly reports of a ship sent to Constantinople by Paganini, containing the printed copies of the book and the characters, in an attempt to establish themselves there. The hope for the Sultan's approval resulted instead in an order to accompany the ship out of port and scuttle it in deep water with all its content because the work was 'a blasphemy of the infidels'.¹⁹

10. The note of ownership might be the only reason why this copy was saved from Albonesi's personal library: the content of the work in itself was pretty much inaccessible and therefore could have been dismissed as not interesting. Nuovo, *Alessandro Paganino*, 110.
11. That is the second half of the sixteenth century. Nuovo, 'A Lost Arabic Koran Rediscovered', 273.
12. As cited in note 7.
13. Which proves that the *Qur'ān* passed the Inquisition.
14. By Andrea Arrivabene, 1547.
15. Nuovo, 'A Lost Arabic Koran Rediscovered', 281.
16. Nuovo, *Alessandro Paganino*, 118.
17. Nuovo, 'A Lost Arabic Koran Rediscovered', 286.
18. Maurice Borrmans, 'Observations À Propos De La Première Édition Imprimée Du Coran À Venise', *Quaderni Di Studi Arabi* 8 (1990): 3–12.
19. Alessandro M. Magno, *Bound in Venice: The Serene Republic and the Dawn of the Book* (New York: Europa Editions, 2013), 95–6. The eighteenth-century source was originally mentioned by Nuovo in a personal conversation with the author (1 July 2014, Milan) but it is currently not verifiable. Nuovo's memory is confused, but it seems that the source – that she consulted in 1980s – is different from the one mentioned in Magno by Wilhelm Ernst Tenzel from 1692 (available and checked by the author, but with no mention of Constantinople). Moreover, it is suspicious that Nuovo, having seen the eighteenth-century source, never mentioned it in her works: it is possible that she has previously dismissed it as unreliable. Nuovo's only reference to the *Qur'ān* and Constantinople is reported in note 34.

The *Qur'ān* has 232 unnumbered leaves, printed entirely in Arabic.²⁰ There are various disagreements amongst scholars regarding this edition even after its finding, and the discussion is very much alive.²¹ According to Mahmoud Salem Elsheikh,²² the book is a printing proof rather than a finished edition – which might also explain the significant amount of mistakes that it contains²³ – and the project was blocked due to the inability to achieve an acceptable text.²⁴ However, various elements convincingly invalidate this hypothesis.²⁵ The missing division of the verses is also a cause of diverging opinions. Nuovo observes that ‘the traditional division of the text was still respected by means of an enhanced typographic space that evidently, although rather small, was to receive the addition by hand of decorative devices to separate the text’.²⁶ On the contrary, Elsheikh argues that the separation between verses is not even marked with minimum space.²⁷ The analysis of the *Qur'ān* proves that there is truth in both statements.²⁸

The hypothesis that the edition was printed for export to the Arab-Turkish market seems to be the most creditable:²⁹ the market in the West for such an elaborate work was far too small to justify a similar enterprise. The restricted circle of European Orientalists – to whom the book might have been accessible – was not even ready to approach an edition entirely in Arabic; lexicons and grammars to support the learn-

20. Besides the manuscript marginalia in Latin and the annotations previously mentioned. The absence of any introduction or other words in Latin seems an additional evidence that the edition was intended for a non-European market.

21. An exhaustive account is beyond the scope of this research: only the relevant issues are discussed.

22. Mahmoud S. Elsheikh, ‘I Manoscritti Del Corano Conservati Nelle Biblioteche Pubbliche Di Firenze’, *La Bibliofilia* 115, no. 3 (2013): 553–61. Previously published in Arabic: Elsheikh, *Muṣṭafā Paganini Bayna Taḥmīnāt Al-Mādī Wa Aḥqāt Al-Hādir* (Cairo: National Library of Egypt, 2012).

23. Scholars Angelo M. Piemontese and Maurice Borrmans share this opinion; the latter also considers the ‘unfinished’ aspect of the edition a further confirmation: see Maurice Borrmans, ‘Présentation À Propos De La Première Édition Imprimée Du Coran À Venise’, *Quaderni Di Studi Arabi* 9 (1991): 93–126.

24. He argues that the sūrah wrongly numbered by Albonesi as 115 (which is instead a repetition of the first four verses of the second sūrah Al-Baqarah, *The Cow*), proves the attempt at correcting the text: however, the effort was unsuccessful, because while one mistake is corrected, a new one is made. See Elsheikh, ‘I Manoscritti Del Corano’, 553–55.

25. Nuovo observes that the edition is printed on luxurious paper never used for any other Paganini publications; it is unlikely that the entire volume would be composed before blocking it as an unsatisfactory experiment; there is evidence that the book was distributed, reaching Constantinople. See Nuovo, ‘La Scoperta Del Corano Arabo’, 17.

26. Nuovo, *Alessandro Paganino*, 198, approximate translation by the author: this passage is also included in Nuovo’s article ‘A Lost Arabic Koran Rediscovered’, but the translation from Italian into English is incorrect and misleading. Nuovo hypothesises that the copies of the *Qur'ān*, once exported, would be illuminated locally, according to the traditions and the customer’s taste. See Nuovo, ‘La Scoperta Del Corano Arabo’, 17.

27. Elsheikh criticises Nuovo’s statement arguing that in Muslim countries, the practice of enumerating the verses started with printing (i.e. with the first edition of the Būlāq Press at the beginning of the XIX century); therefore, it is unlikely that there was a manuscript with numbered verses in the early 1500s. See Elsheikh, ‘I Manoscritti Del Corano’, 557. However, Nuovo talks about division of verses, not about their enumeration.

28. See Figure 5.159.

29. Sustained by Nuovo and previously advanced by Maria Nallino, ‘Una Cinquecentesca Edizione Del Corano Stampata a Venezia’, *Atti dell’Instituto Veneto Di Scienze, Lettere Ed Arti. Classe Di Scienze Morali, Lettere Ed Arti* 124 (1965): 1–12. This theory is also supported by Hartmut Bobzin, ‘From Venice to Cairo: On the History of Arabic Editions of the Koran’, in *Middle Eastern Languages and the Print Revolution: A Cross-Cultural Encounter: A Catalogue and Companion to the Exhibition* (Westhofen: WVA-Verlag Skulima, 2002), 151–76.

ing of Arabic were at that time still limited.³⁰ Moreover, scholars of Oriental languages preferred polyglot books as tools for their languages studies, since they allowed the application of a comparative method. If the *Qur'ān* was not printed to answer a demand in the Western world, why attempt such a daring and expensive operation?

It is sufficient to observe this splendid folio of more than two hundred and thirty pages printed on fine paper, to understand that this is very different from a simple trading experiment in a new market: on the contrary, it is clear how a real breakthrough was expected with a public which, though without printed works, was culturally superior in regard to exquisite manuscripts, and accustomed to the sumptuous presentation of their sacred text.³¹

The competitive mindset developed by the European printing industry, especially in Venice, seems to be an evident reason behind this risky enterprise: the potentially significant number of new readers must have been an attractive (and achievable) perspective, considering that trading routes with the East were already secured.³² The hypothesis that the book was a commission – probably by some powerful Venetian – as a political and cultural operation to earn the favour of the sultan was also advanced.³³

A sixteenth-century testimony – originally in a work attributed to Jean Bodin³⁴ – reports of a merchant facing a death sentence for bringing the faulty *Qur'ān* to Constantinople.³⁵ Considering the circumstances,³⁶ the reception of such work would have been controversial even if faultless. Therefore, it is hardly surprising that an edition of the 'sacred text' made by 'infidels'³⁷ – altered by countless mistakes

30. The first Arabic work of this kind was Postel's *Linguarum Duodecim* in 1538, later expanded into the *Grammatica Arabica*, 1543. Bobzin, 'From Venice to Cairo', 154.

31. Nuovo, 'A Lost Arabic Koran Rediscovered', 283. Her latest findings support the hypothesis that the printing of the *Qur'ān* was a typographic enterprise in the editorial policy of a mercantile transnational society, formed by the Paganini and the Gabiano/Vuković company. The second included two families of book merchants and printers (from Italy and Montenegro, based in Venice), specialized in the production of liturgical and religious books in non-Latin scripts to export in the Venetian Levant. While Paganini contributed with their fine printing skills, the Gabiano/Vuković company offered political connections and a strong commercial network to distribute the *Qur'ān*, which stretched as far as Constantinople. See Nuovo, 'La Scoperta Del Corano Arabo'.

32. The Paganini were also paper-manufacturers, trading their highly prized paper all across the East: 'a scheme to circulate printed sheets along with blank sheets may readily be envisaged'. See Nuovo, 'A Lost Arabic Koran Rediscovered', 285.

33. Elsheikh, 'I manuscritti Del Corano', 560.

34. *Colloquium Heptaplomeres De Rerum Sublimium Arcanis Abditis*, 1588. See Nuovo, 'La Scoperta Del Corano Arabo', 17.

35. '[...] a certain merchant brought the printed *Qur'ān* to Constantinople, where he was sentenced to death by the authorities, both because the printing of the *Qur'ān* was prohibited and because the text was full of errors. Only through the intervention of the Venetian delegate the sentence was commuted to the amputation of the right hand; all the books were destroyed'; approximate translation by the author from Nuovo, 'La Scoperta Del Corano Arabo', 18.

36. In the Ottoman Empire, the printing of religious texts in Arabic was still forbidden even after the sultan's firman in 1727, see Chapter 1.

37. Nuovo ('A Lost Arabic Koran Rediscovered', 286) refers to the 'infidels' as non-believers approaching the sacred book. The scholars' controversy about the *Qur'ān* being forbidden to non-believers is caused by different interpretations of the following *Qur'ān*'s passages. The first (56:79) states: '*Lā yamassuhou illal-muṭahharoun*' ('Which none can touch but the purified'). The second (9:28) says: 'O you who believe [...]! Verily the *Mushrikūn* (polytheists, pagans, idolaters, disbelievers in the Oneness of Allāh, and in the Message of Muhammad ﷺ) are *Najasun* (impure)'. It should be noted that [...] the word *Najas* is used only for those who have spiritual impurity (e.g. *Al-Mushrikūn*). See Dr. Muhammad Taqī-ud-Dīn al-Hilālī and Dr. Muhammad Muhsin Khān, *Translation of the Meanings of The Noble Qur'ān in the English Language* (Madinah, K.S.A.: King Fahd

and replicated in many copies – would be rejected, whether or not it was aesthetically pleasing. The *Qur'ān* was a failure, both typographically and commercially, and it was Paganini's last published work: its unfortunate fate ultimately affected the printing shop, which suspended activities in 1538 (the same year of Paganino de' Paganini's death). Whilst for some the reason of such debacle was mainly 'the ugliness of the printed characters,'³⁸ for others the edition failed simply because it was unsaleable: the aversion towards print in the territories where it was exported, the 'primitive forms' and the 'aesthetic deficiencies' of the printing characters, although valid arguments, are insufficient to explain it.³⁹

The printers and collaborators

Paganino de' Paganini, printer and editor,⁴⁰ started working in Venice with the Italian typographer and publisher Giorgio Arrivabene in 1487, publishing religious works – culminating with a Bible in 1495 – and books for universities, primarily juridical, but also medical and philosophical works. From 1509 he partnered with his son Alessandro, who turned his attention – almost exclusively – towards literary works.⁴¹ During his career, Alessandro demonstrated his love for experimentation and an extravagant and open-minded character, in contrast with his father's religious and conservative nature;⁴² he was described as one of the best typographers of the post-Manutio era.⁴³ It seems safe to claim that Alessandro was responsible for the idea of printing the *Qur'ān* and 'had all along been as much involved as his father in the preparatory stages', mainly because the edition needed all his technical expertise and competence.⁴⁴

The two previous books printed with Arabic movable types (from Fano and Genoa) seem to have very little connection with this edition – the typefaces and the contents are different – although it is possible that the publication of Giustinianni's *Psalter* inspired Alessandro to venture into Arabic printing. The two not only

Complex for the Printing of the Holy Qur'ān, n.d.), 213, 600.

38. 'The real obstacle met by the spread of printing in Arabic [...] was the ugliness of the printed characters in comparison to calligraphy, whence 'the disaster' of Paganino dei Paganini!', approximate translation by the author from Sergio N. Noseda, 'Il Corano Che Riappare', *Il Giornale*, March 3, 1989, 3.
39. 'If it failed, it was because the book was merely unsaleable: no Muslim could or wanted to buy it, whatever was at the time his desire (if it existed) to acquire and to finally own a printed copy of the Qur'ān in Arabic. The text is in fact full of faults, both concerning typography and the content itself: it falls immediately under the charge of falsification (*taḥrīf*) which is known to be unacceptable to Muslims', approximate translation by the author from Borrman, 'Présentation', 6.
40. The Paganini' family were above all paper-manufacturers: Paganino invested in land and mills in the renowned hand paper-making district of Toscolano-Maderno (also known as the 'valley of the paper-makers'): their excellent products supplied printers in Venice and were traded from Venice throughout the East.
41. The Paganini are strictly connected with Luca Pacioli: Paganino initially published his *Summa De Arithmetica* in 1494, while Alessandro debuted in 1509 with the *Euclide* and *De Divina Proportione. Nuovo, Alessandro Paganino*, 34–35.
42. Nuovo, 'A Lost Arabic Koran Rediscovered', 287.
43. ' [...] Alessandro is certainly one of the best, the most virtuosic typography's technician of the post-Manuzio era. He prints with Latin, Greek and Hebrew characters. He develops a small book format, the 24mo, in which he publishes an entire textbook series. He draws and casts various series of types, hybrids between roman and italic, in search of the perfect italic', approximate translation by the author from Nuovo, 'La Scoperta Del Corano Arabo', 20. The new italic was meant to replace the Aldine.
44. Nuovo, 'A Lost Arabic Koran Rediscovered', 287.

knew each other for a long time but were also connected by a working relationship.⁴⁵ Nevertheless, a collaboration for the printing of the *Qur'ān* is unfeasible: Giustiniani died about two years before its publication. Whilst it seems clear that the Paganini must have had some advisors to handle the printing in Arabic – particularly for a complex and delicate text like the *Qur'ān* – their identity is still unknown. According to Borrman, it must have been an Italian humanist with a flawed knowledge of the Qur'ānic text: he suggests Albonesi's name.⁴⁶ Elsheikh firmly excludes this hypothesis – but fails to give an alternative suggestion – on the basis that the Italian Orientalist declared on multiple occasions his deficiency in the knowledge of Arabic, and expressed the desire to learn.⁴⁷ On the other hand, Nuovo suggests that for a job of this magnitude some assistance from people of Arabic origins must be assumed:

[...] various Arab workers will have been indispensable in the printing-house (at the very least, the composer and proof-reader), but Venice was certainly full of Moors, and finding such help should not have been difficult.⁴⁸

The level of expertise of the Arabic-speaking advisors is perhaps the most critical issue to address; furthermore, it seems safe to exclude the collaboration of Muslim people, for whom the vast amount of errors – and also their nature⁴⁹ – would have been intolerable. A different hypothesis puts forward the idea of some involvement of the Jewish community, due to the presence in the text of 'errors typically made by Jews who speak Arabic'.⁵⁰

About the model

The Italian Arabist Angelo Piemontese advances the only hypothesis about the model used for the *Qur'ān*, discussing a manuscript that seems to share some common ground with Paganini's edition. In his works,⁵¹ Piemontese suggests that the *Qur'ān* is sampled from a manuscript of the Sicilian Guillelmus Raimundus Monchates,⁵² the most learned scholar amongst the converted Jews of the fifteenth century, also known as Pico della Mirandola's teacher of Arabic and Aramaic. The manuscript in

45. Giustiniani entrusted Alessandro Paganino with the printing of two works, both published in 1513: the *Aenas Gazaeus* and his *Precatio*. Nuovo also attributes the design of the *Precatio*'s Hebrew types to Alessandro. See Nuovo, *Alessandro Paganino*, 26, 29, 34–35.

46. 'Their consultant certainly could not have been a Muslim, Arab or Turkish, or even a Jewish scholar of Mediterranean origin or some Christian Arab of Levantine origin, but rather some Italian humanist who had not yet mastered the perfect knowledge of the Arabic text of the *Qur'ān* and that was not aware of the requirements of the Muslims with regard to the reproduction of their holy book', approximate translation by the author from Borrman, 'Présentation', 124.

47. Elsheikh, 'I Manoscritti Del Corano', 560.

48. Nuovo, 'A Lost Arabic Koran Rediscovered', 285. She also interestingly points out that even Manutius, who was an excellent Hellenist himself, needed the assistance of Greeks and Cretans for his publications.

49. Amongst other errors that change the meaning of the text, there is also the omission of the name of Allah, considered outright blasphemy.

50. Magno, *Bound in Venice*, 99.

51. Angelo M. Piemontese, 'Il Corano Latino di Ficino E i Corani Arabi di Pico E Monchates', *Rinascimento* 36 (1996): 227–73, and Angelo M. Piemontese, 'Guglielmo Raimondo Moncada Alla Corte Di Urbino', in *Guglielmo Raimondo Moncada Alias Flavio Mitridate: Un Ebreo Converso Siciliano*, edited by Mauro Perani. Palermo: Officina di Studi Medievali, 2008.

52. Also known as Guglielmo Raimondo Moncada, Flavius Mithridates, or just as Mithridates. Flavius is the academic name of Monchates, and Mithridates, pseudonym usually exotic or of esoteric appearance, indicates the ability of polyglotism', approximate translation by the author from Piemontese, 'Il Corano Latino Di Ficino' 254.

question⁵³ (Figure 5.109) – today in the Vatican library⁵⁴ – contains two extracts in Arabic, deemed to be handwritten by Monchates:

[...] i caratteri arabi impressi di A.V.22⁵⁵ si confrontano agevolmente con la grafia delle due citazioni coraniche attestate nel ms. Barberini Lat. 1775, f.100. La corrispondenza dei tratti scrittori è chiara e precisa. Per es. nel corano impresso, sura V. 109, le parole «Maryam» 'Maria' e «al-injîl» 'Evangelo' sono scritte con tratteggio identico a quello visibile nel codice dell'orazione di Monchates. Come documento paleografico, la scrittura araba del ms. Barberini Lat. 1775 rappresenta l'antigrafo dei caratteri usati nell'esemplare coranico impresso a stampa. Si può pertanto congetturare che A.V.22 fosse esemplato su un'edizione del Corano preparata a cura di Monchates. Si ha notizia che l'edizione completa del Corano, con il testo originale e in versione, era stata da lui progettata e proposta verso il 1482.⁵⁶

The two extracts⁵⁷ contain defective texts compared to the traditional Qur'ānic one. In particular, the second extract seems to relate more closely to a manuscript Qur'ān in Hebrew – the Vat. Ebr. 357, also in the Vatican collection – that Monchates consulted from his library.⁵⁸

Varie caratteristiche scrittorie e testuali del corano impresso a stampa, quali anomalie concernenti la resa di alcune lettere arabe, titoli delle sure e l'assenza di numerazione dei versetti, possono però compararsi con quanto reca di analogo il ms. Vat. Ebr. 357.⁵⁹

The first extract in Arabic, instead, seems to come from a different manuscript, which Piemontese does not identify.⁶⁰ In order to verify Piemontese's hypothesis, it is necessary to compare the two extracts of Monchates' manuscript with the same passages from the *Qur'ān*, focusing on the corresponding sections. Piemontese points

53. This manuscript contains the *Sermo De Passione Domini*, a prayer held by Monchates in 1481 in the presence of Pope Sisto VI. Piemontese 'Il Corano latino di Ficino', 255.

54. The catalogue number of the manuscript is Barberini Lat. 1775.

55. The catalogue number of the *Qur'ān* at the library of San Francesco della Vigna in Venice.

56. [...] the printed Arabic characters of A.V.22 easily compare with the handwriting of the two Qur'ānic citations attested in the manuscript Barberini Lat. 1775, f.100. The correspondence of the handwritten traits is clear and precise. For instance in the printed Qur'ān, surah V. 109, the words «Maryam» 'Maria' and «al-injîl» 'Evangelo' are written with the identical outline seen in the codex of Monchate's prayer. As a palaeographic document, the Arabic writing of the manuscript Barberini Lat. 1775 is the antigraph of the characters used in the printed Qur'ān. It can therefore be speculated that the Qur'ān was modelled (based) on an edition of the Qur'ān prepared by Monchates. It is known that the complete edition of the Qur'ān, with the original and translated text, was prepared by him and proposed around 1482; approximate translation by the author from Piemontese 'Il Corano latino di Ficino', 258.

57. In Figure 5.109. The first Arabic extract (from Qur'ān IV. 157) inserted between the Latin words *pe* and *pendisse* is: «lâ 'Isâ' k-ânam akinna shabah lahu». The second Arabic extract (from Qur'ān V. 46–7) inserted between the Latin words *loquitur* and *dedimus* is: 'wa âtayna li-'Isâ'ibna Maryama masadiqa al-injîla fîhi hudan wa nûrun wa masadiqan wa la-yahkum ahlû al-injîla wa man lam yâ minu bî l-injîl hum al-fâsiqûn'. Piemontese 'Il Corano latino di Ficino', 256.

58. For instance, the title given to the surah V (i.e. 'quinto volumine') is 'il hacud' (in Arabic *al-'uqûd*), rather than the traditional *al-Mâ'ida*. The title *al-'uqûd* is used in the Qur'ān in Hebrew mentioned above, f. 64. Piemontese 'Il Corano latino di Ficino', 256 (for more examples, 257).

59. Various features in the writing and the texts of the printed Qur'ān, like anomalies concerning the appearance of some Arabic letters, the titles of the *suwar* [plural of *sûrah*] and the absence of numbering of the verses, however, can be compared with what bear similarities in the manuscript Vat. Ebr. 357; approximate translation by the author from Piemontese 'Il Corano latino di Ficino', 257.

60. The text of the first extract is incorrect compared to its traditional version in the Qur'ān, surah IV. 157: «'Isâ' [...] lâkin shubbiha lahum'. Piemontese 'Il Corano latino di Ficino', 256.

out two words in particular that, in his opinion, have 'identical outlines' in the two sources: *Maryam* and *al-injīl* (Figure 5.110). Observing the words, the resemblance of some characters (mīm, lām-alif ligature) is more evident than others (lām, rā'). The combination of the letters nūn-ğīm (rendered as a ligature in APQ1) also reveals the same intention in the shaping of the letterforms. These considerations remain valid when more characters are compared (Figure 5.111). Although they appear far from being identical, the letterforms show a certain correspondence in their skeletons and in the way they join, confirming the overall impression that whilst they share a similar approach, they differ in the execution. However, it is important to note that such limited examples cannot make a solid case: a longer handwritten piece in Arabic by Monchates would be necessary for a more thorough and accurate comparison; a collaboration with a palaeographer could also benefit the assessment.

An additional testimony regarding Monchates comes from the Orientalist Giorgio Levi della Vida. In one of his works,⁶¹ he refers to another Vatican manuscript (Urb. lat.1384, f.3v), which seemingly shows Monchates' Arabic handwriting, which Levi della Vida does not consider to be very high-quality:

[...] l'ortografia e la vocalizzazione sono delle più scorrette: vi si scambiano di continuo la ض e la ظ, spesso la ص e la س instead of صورۃ (صورة), la ة è quasi sempre scritta ت ecc.⁶²

This observation sounds interesting enough, knowing that errors caused by consonants' substitution and vowel problems do occur in the *Qur'ān*. Nonetheless, there is some confusion: the manuscript Urb.lat.1384 (Figure 5.112) contains the astrological work *De Ymaginibus Coelestibus*⁶³ and a Qur'ānic section⁶⁴ consisting of sūrah XXI *al-Anbiyā'* and sūrah XXII *al-Haġg*, both arranged in two columns with the Arabic text and the corresponding Latin translation. Not only Levi della Vida does state that '[...] è difficile che la parte Araba del codice urbinate non sia autografa del Moncada (dove avrebbe trovato egli un copista?)',⁶⁵ he adds that the Arabic writing is the same of the manuscript Barberini Lat. 1775. On the other hand, Piemontese states that the Arabic text of the Qur'ānic section of the manuscript Urb.lat.1384 '[...] è in buona calligrafia *naskh* orientale nera e rossa. La fattura calligrafica esclude che la parte araba del codice sia stata eseguita per mano di Monchates'.⁶⁶ Furthermore,

61. Giorgio Levi della Vida, *Ricerche Sulla Formazione Del Più Antico Fondo Dei Manoscritti Orientali Della Biblioteca Vaticana* (Città del Vaticano: Biblioteca Apostolica Vaticana, 1939), 94.
62. Ibid. '[...] spelling and vocalisation are of the most inaccurate: there is a continuous substitution of ض and ظ, often س and ص instead of صورۃ (صورة), the ة is almost always written ت ecc.', approximate translation by the author.
63. There is a second astrological essay in the manuscript, but it has only a Latin version.
64. This is the first edition of the Qur'ān made in the fifteenth-century in Christian Europe. Monchates planned to do a complete edition in six languages: Latin, Arabic, Hebrew, Chaldean, Syriac and Turkish. Piemontese, 'Il Corano Latino Di Ficino', 259.
65. '[...] it is unlikely that the Arab part of the codex of Urbino it is not autograph of Moncada (where would he find a copyist?); approximate translation by the author from Levi della Vida, *Ricerche Sulla Formazione*, 93–94, note 2. Levi della Vida also states that the Arabic handwriting of this codex is it not the kind expected from someone who learned Arabic in Spain or according to the Spanish tradition but is clearly of Syrian-Egyptian tradition. He, therefore, suggests that Monchates' family was probably of Egyptian provenance. Moreover, Levi della Vida adds that the quality of Monchates' translations (regarding grammar and lexical explanations) shows that he was not very familiar with the Arabic scholarly tradition.
66. '[...] is in good black and red oriental *naskh* calligraphy. The calligraphic execution excludes that the Arab part of the codex has been executed by Monchates' hand', approximate translation by the author from Piemontese, 'Il Corano Latino Di Ficino', 259.

he adds that the Arabic contained in the astrological essay appears to be written by different hands. The Arabic inscriptions in the 28 medallions are seemingly by Monchates; whilst in the Arabic of the main text, Piemontese seems to recognise two different hands: the first is a calligrapher and the second is a copyist/proof-reader with a handwriting '[...] tipica di un cristiano vicino-orientale'.⁶⁷

It is clear that more research is needed to clarify the conflicting statements of these two Orientalists. Establishing whether the Arabic handwriting in the manuscript Urb.lat.1384 belongs to Monchates would also provide more handwritten samples to be compared with APQ1; this could potentially contribute in finding more evidence to validate or disprove the hypothesis that Monchates' handwriting was indeed the model for APQ1.

Finally, the involvement of Monchates seems to be rejected by Angela Nuovo (the only scholar who has, so far, commented on this suggestion). Her argument is exclusively based on the fact that Monchates belongs to the learned and erudite society, which has not proved – in any other scholar's previous research – to have had any connection or involvement in the making of the *Qur'ān*.⁶⁸

The errors in the Venice Qur'ān

Borrmans carried out the most in-depth examination of the shortcomings of APQ1, from a technical and linguistic point of view. According to his investigation, the text proves illegible and incomprehensible. A diverse list of examples of content errors is supplied in his article:⁶⁹ most of them are due to a consonant substitution or a wrong vowel; there are also different types of errors, where the wording appears entirely different, with missing or added words in the text.

It is important to note that Borrmans compared the text of the *Qur'ān* with the Fu'ād edition (according to the reading of 'Āsim b. 'Alī al-Naġūd, transmitted by Hafṣ b. Sulaymān, both from Kūfa).⁷⁰ The French scholar suggests that the content errors in APQ1 are so numerous that they are not attributable to simple variants which fall under one or the other canonical reading: 'il s'agit bel et bien d'erreurs de copiste ou, plutôt, d'imprimeur'.⁷¹ Without the original text used as a model for the setting of the *Qur'ān* it is difficult to establish with certainty who was responsible: was the model faultless and misinterpreted by the Paganini or their advisors when they attempted to reproduce it in print? Or the errors had already been introduced in the manuscript?

Tout laisse à penser que l'imitation du texte qui servait de modèle a été des plus serviles et que le 'conseiller technique' n'était guère un expert 'ès sciences coraniques'.⁷²

67. '[...] typical of a Christian from the near East', approximate translation by the author from Piemontese, 'Il Corano Latino Di Ficino', 261.

68. As mentioned, Nuovo supports the hypothesis that it was purely a commercial speculation. See Nuovo, 'La Scoperta Del Corano Arabo', 16.

69. Borrmans, 'Présentation', 103. Elsheikh also highlights some errors in, 'I Manoscritti Del Corano', 556–57.

70. There are various readings (قراءات, *Qirā'āt*) of the *Qur'ān*, according to different methods of recitation, named after the leader of a school of *Qur'ān* reciter. There are slight differences in these readings, for instances in the stops and the vowelling of some letters.

71. 'They are indeed errors of the copyist or, rather, the printer', approximate translation by the author from Borrmans, 'Présentation', 104.

72. Ibid. 'Everything suggests that the imitation of the text which served as the model was of the most servile and that the "technical advisor" was hardly an expert "of Qur'ānic science", approximate translation by the author.

It is clear that more research on the text is necessary and a joint effort of various experts would also be advisable to build a better understanding regarding this edition. The present study provides an analysis of the shortcomings of APQ1 carried out from a typographic point of view, particularly to establish if some of these mistakes are the direct result of the structure of the fount itself, and therefore preventable. The findings are discussed below.

The type

The identity of APQ1 type-makers is still unknown.⁷³ The Paganini did not print any other book in Arabic, neither before nor after the *Qur'ān*, and it seems that APQ1 was not used for any other work.⁷⁴ Thanks to an exchange of letters between Postel and Albonesi – included in the appendix of Albonesi's *Introductio* – it is known that the French Orientalist sought to buy the punches or matrices of APQ1 for his grammar.⁷⁵ Albonesi, who was the negotiator, reports that he tried his best to convince Alessandro Paganino to sell his material. When the deal was about to be concluded, Albonesi learnt that Postel had already published his work: although, not finding any other Arabic metal types available in Europe, he had to resort to wooden letters (see Figure 5.10 and Figure 5.11). Albonesi himself had to face the same problem the following year. When releasing his polyglot work in 1539, only some of the scripts needed for the edition had available metal types; these were also re-used as a substitute for some of the missing alphabets (e.g. Syriac for Arabic). In other instances, letters were written by hand in the white spaces left in the text by the compositor (see Figure 5.15).

The *Qur'ān* has two types. APQ1, used for the body text, is the object of the analysis. The second type (APQ2) is used exclusively for the titles of the *suwar*; therefore it will not be discussed in detail (Figure 5.113).⁷⁶ APQ1 is the third known Arabic metal type; following the discovery of the *Qur'ān*, it was possible to establish that it was an original design, with no traits in common with its predecessors GDG1 and PPP. Although APQ1 cannot be assessed against its original model, the analysis can be supported by a comparison with other calligraphic representations of the same

73. During a personal conversation with the author (1 July 2014, Milan), Angela Nuovo confirmed that she does not believe that Alessandro Paganino was the maker of APQ1, mostly on the basis that he did not know Arabic. It is more likely that he commissioned the type – specifically for the *Qur'ān* – from someone with some knowledge of Arabic, at least good enough not to confuse the shapes. On the other hand, the author suggested that Alessandro designed Hebrew characters (there is no evidence that he knew Hebrew), the analysis of which would be possibly helpful to create a parallel case. Did Alessandro created Hebrew with an awareness of the script, or did he just reproduce manuscript, without an understanding of the script requirements (and if so, could this be the case for the Arabic too)?

74. APQ1 measures approximately 256mm; like Montecchi for GDG1, Nuovo uses the traditional method of recording the dimension of 20 lines. Nuovo, 'A Lost Arabic Koran Rediscovered', 291.

75. Postel, after a trip to the East, stops in Venice in the summer of 1537, apparently to look for Arabic types to print his forthcoming work *Linguarum Duodecim*, then published in 1538. Elsheikh, 'I Manoscritti Del Corano', 560.

76. It appears clear that APQ2 is also made of movable metal types, and it is more closely inspired by the *ṭulūṭ* calligraphic style, commonly used for headings in combination with the *nash* style. Although some letters vary in the design, their overall structure and use is similar to APQ1. APQ2 is evidently a titling version of APQ1, and it has been produced almost certainly by the same hand.

Qur'ānic text: the *Muṣṭaf Al Madīna*⁷⁷ was chosen for this purpose because it represents the most renewed and widely distributed *muṣṭaf*.⁷⁸

Roper describes APQ1 as 'still remote from calligraphic norms as to make it quite unacceptable to the Muslims for whom it was intended, particularly since its pointing and vocalisation were inaccurate and incomplete; it also contained errors in the Qur'ānic text'.⁷⁹ A different source, refers to the characters of APQ1 as 'sharp and precise, with no smudges',⁸⁰ a characteristic that can be appreciated with the direct observation of the *Qur'ān*. The high-quality of the print is obtained through the combination of fine materials: luxury paper (very thick and sturdy, white, smooth, glossy and with a wax finish), and a homogeneous black ink. The impression itself appears very sharp and neat without requiring much pressure, whereas the transparent effect is solely due to the paper transparency. Nonetheless, marks of ink dirt (mostly in the shape of tiny dots) can sometimes be noticed around the letters, creating noise on the page, although the difference between those and the letters' dots is still clear. Accumulation of ink also recurs in particular pages, producing darker printed lines of text and closed up letters' counters: however, this is not the norm, and the print is overall quite uniform (Figure 5.114). Even when compared with other books printed by the Paganini,⁸¹ the *Qur'ān* appears to be their best-printed work.

Whilst the quality of print influenced the sharp appearance of APQ1 in the book, it seems clear that this would not have been achievable without equally high-quality types and skilled type-making (including punch-cutting, matrix-making and type-founding processes).

Degree of simplification

The analysis of the *Qur'ān* has provided the following estimate for the character set of APQ1 (Figure 5.115):

alif | 1 sort (isolated), 1 sort (final)
 bā' | 1 sort (isolated/final), 1 sort (initial – tall tooth), 1 sort (initial – short tooth),
 1 sort (medial – short tooth), 1 sort (medial – tall tooth), 1 sort (medial – triangular),
 1 sort (medial – 'step' tooth)
 tā' | 1 sort (isolated/final), 1 sort (initial – tall tooth), 1 sort (initial – short tooth),
 1 sort (medial – short tooth), 1 sort (medial – tall tooth), 1 sort (medial – triangular),
 1 sort (medial – 'step' tooth)
 tā' | *the letter tā' is used in substitution

77. 'The Arabic text of the Qur'an prepared, scrutinised, verified and printed at the King Fahd Holy Qur'an Printing Complex in Medina'. Established in 1405/1985, 135 million copies were printed by 1417/1996–7. The Medina *muṣṭaf* uses a scheme for its *taṣkīl* (vocalisation), *dabṭ* (accuracy) and orthography subtly different from other editions (i.e. the one in use in Muslim South Asia). Moreover, it is known for having a concise exposition of *taḡwid* practice (rules for pronunciation in Qur'ān recitation) at the end of the edition. See 'The Muṣṭaf al-Madīna and the King Fahd Holy Qur'an Printing Complex', *Journal of Qur'ānic Studies* 1, no. 1 (1999): 155–58. The Syrian calligrapher Utman Ṭaha wrote the original copy of the *Muṣṭaf al-Madīna*, then reproduced by means of lithography.

78. The term *muṣṭaf* means written copy of the Qur'ān. According to Mohamed Zakariya, 'it refers to the physical book that contains the text', whereas 'the Koran, or Qur'an, in Arabic, refers to the revealed text as received by the Prophet'. See Zakariya, 'History & Development of Calligraphy'.

79. Roper, 'The History of the Book', 540.

80. Magno, *Bound in Venice*, 91.

81. The author has compared two famous editions printed by the Paganini before the *Qur'ān* (the Bible, 1495 and Luca Pacioli's *De Divina Proprietate*, 1509) and two of the last works printed just before and after the *Qur'ān* (Ovidius Naso's *Epistolæ Heroidum*, 1533 and Tagliente's *Componimento Di Parlamenti*, 1538) at the British Library in London.

ġīm | 1 sort (isolated), 1 sort (initial), 1 sort (medial),⁸² 1 sort (final)⁸³
 ḥā' | 1 sort (isolated), 1 sort (initial), 1 sort (medial), 1 sort (final)
 ḥā' | 1 sort (isolated), 1 sort (initial), 1 sort (medial), 1 sort (final)
 dāl | *the letter dāl is used in substitution
 dāl | 1 sort (isolated – small), 1 sort (final – big)
 rā' | 1 sort (isolated/final)
 zā' | 1 sort (isolated/final)
 sīn | 1 sort (isolated/final), 1 sort (initial), 1 sort (medial)
 sīn | 1 sort (isolated/final), 1 sort (initial/medial), 1 sort (medial)
 ḥād | 1 sort (initial/medial), 1 sort (isolated/medial)
 ḥād | 1 sort (initial/medial), 1 sort (isolated/medial)
 ṭā' | 1 sort (isolated/initial/medial/medial)
 ḥā' | 1 sort (initial/medial/isolated/medial)
 'ayn | 1 sort (isolated), 1 sort (initial), 1 sort (medial), 1 sort (final)
 ḡayn | 1 sort (isolated), 1 sort (initial), 1 sort (medial), 1 sort (final)
 fā' | 1 sort (isolated/final), 1 sort (initial), 1 sort (medial)
 qāf | 1 sort (isolated/final), 1 sort (initial), 1 sort (medial)
 kāf | 1 sort (isolated/final), 3 sorts (initial/medial – long and short join; multilevel)
 long kāf | 1 sort (initial/medial)
 lām | 1 sort (isolated/final), 3 sorts (initial/medial – tall and short; multilevel),
 1 sort (medial)
 mīm | 1 sort (isolated/final), 2 sorts (initial), 1 sort (medial), 1 sort (final – long tale)⁸⁴
 nūn | 1 sort (isolated/final), 1 sort (initial – tall tooth), 1 sort (initial – short tooth),
 1 sort (medial – short tooth), 1 sort (medial – tall tooth), 1 sort (medial – triangular),
 1 sort (medial – 'step'⁸⁵ tooth)
 ḥā' | 1 sort (isolated – closed), 1 sort (initial), 1 sort (medial), 1 sort (final)
 tā' marbūta | 1 sort (isolated), 1 sort (final)
 wāw | 1 sort (isolated/final)
 yā' | 1 sort (isolated), 1 sort (initial – tall tooth), 1 sort (initial – short tooth),
 1 sort (medial – short tooth), 1 sort (medial – tall tooth), 1 sort (medial – triangular),
 1 sort (medial – 'step' tooth), 1 sort (final – used also as isolated)
 lām-alif | 1 sort (isolated/final)

A total of 96 sorts is the minimum established for the Arabic *abjad*. Besides the lām-alif, already included in the basic character set, other 36 ligatures were identified in APQ1. Additionally, the following sorts should be counted:

2 sorts | straight connection (different length)
 1 sort left | left-side raised connection
 1 sort | kašida extension (used singularly or repeated as in *Basmalah*)
 1 sort | fathah mark (not associated with already accented letters)
 1 sort | one dot
 1 sort | two dots

The total of APQ1 character set has at least 139 sorts – but most likely more.⁸⁶ There are no punctuation marks or other signs.

82. Used also as a ligature with bā', tā', nūn and yā' adding dots. The same for ḥā' and ḥā'.

83. As above.

84. As above.

85. This term is used to indicate a bridge-like connection between characters, see Figure 5.127 [A,1].

86. Ligatures sharing the same base-form but carrying different dots are counted as one sort due to uncertainties in the type-making process. It is possible that there was a different sort for each dotted combination, which would increase the total number of sorts (intended as compartments in the

Diversification of letters

A comparison of the first page (sūrah al-Fātiḥah) of the *Qur'ān* and the *Muṣḥaf al-Madīna* (Figure 5.116), shows many of the shortcomings of APQ1. The text is full of mistakes, both concerning typography and content: the only vowel represented (fātiḥah) is placed even on top of letters that should have different vowels or be vowelless, contributing in changing the meaning and readability of words. As Elsheikh observed,⁸⁷ the type does not make distinction amongst letters sharing the same base-form, which means that they are often used interchangeably, even when the sort for the correct letterform was available in the character set. In other instances letters are systematically replaced due to missing sorts: tā' is always replaced by tā'; dāl is always replaced by dāl'; and alif maqṣūra is always replaced by yā' (Figure 5.117). There is no evident reason for this choice; if the punch-cutter's approach was to reduce the character set, then this should have been applied to all the letters sharing the same base-form. Borrman highlights other shortcomings of APQ1, like the absence of vowel marks (except for fātiḥah), although he suggests that the lack of hamzah and maddah is natural as for a very long time the manuscript copies of the Qur'ān ignored them.⁸⁸ The letter sīn always carries a mark above, which scholars interpreted either as a sukūn or a qāmmah tanwīn. Furthermore, when in isolated/final position, sīn is often composed of two separate sorts positioned next to each other, rather than using the available individual sort; on the other hand, isolated/final ḥīn seems not to have an individual sort for these positions, and in the text appears always composed by two sorts (Figure 5.118).

The design of the letterforms avoids all ambiguities between similar letters (see medial fā', qāf, 'ayn, ḡayn and mīm, Figure 5.119). Only five letters have one form for all positions (wāw, rā', zā', tā', zā'), whilst the reused shapes are kept to a minimum and mostly for letterforms that look similar in different positions (e.g. initial/medial ḥād, and isolated/final fā', Figure 5.120). There are few instances where the reuse of a particular shape is particularly unsuitable, and a different design would have been preferable (see final lām-alif and medial kāf, Figure 5.121) also to respect style requirements (Figure 5.122). Few characters have a different design to suit each position (e.g. 'ayn, mīm, hā', Figure 5.123).

It should be noted that, at times, the compositor used the wrong sort of a letter instead of the allocated one for a certain position: for instance, the letter lām has two forms for initial position (tall and short) that are also used in medial position, even if there is a specific shape designed for medial lām (Figure 5.124); the sort for initial sīn is also used as medial and vice-versa (Figure 5.125). Overall, it seems that there is no method in the use of these shapes, which creates not only confusion but also inconsistency in the text's appearance. It is possible that the type-maker, aware of different letterforms' features, decided to integrate them into the design of APQ1: on the other hand, the compositor, who was possibly unaware of these design subtleties, saw the different shapes as interchangeable and used them accordingly.

type-case).

87. Elsheikh, 'I Manoscritti Del Corano', 556.

88. Borrman, 'Observations', 9. It is clear that the problems of APQ1 are much deeper than the failed attempt of vocalisation; concurrently, it is evident that the ill-informed choices at design level in effect damaged the textual content even before the errors caused in composition.

An important quality of APQ1 is the attempt in differentiating the teeth of letters *bā'*, *tā'*, *nūn*, *yā'*⁸⁹ (Figure 5.126) to replicate the behaviour of the script⁹⁰ as it was observed in the model. The failed correct integration of the raised teeth variants proves that there was no real understanding of the structure of Arabic. In terms of design, the 'step' medial tooth and the tall medial tooth should resemble each other, but in APQ1 they create an entirely different effect (Figure 5.127). In terms of application, although there are forms provided to replicate this feature in all positions, their use is erratic and often employed when it is not required (Figure 5.128). In addition to the short teeth in medial position and their tall alternates, there is at least another recurring form in the shape of a triangle. This evidently different design is perhaps intended as a variation of the tall tooth form (Figure 5.129), in which case it was unnecessary; nonetheless, it has been counted separately in the character set, because it clearly originates from a different punch. Other differences have been noted in the design of the teeth, although there is no apparent reason to have more forms with subtle differences: since it was not possible to establish what caused them, these designs were not counted.⁹¹

Another peculiar feature of APQ1 is the re-use of some letterforms in medial/final position (e.g. *gīm*, *hā'*, *hā'*, *mīm*) as ligatures in combination with other letters (generally the toothed letters *bā'*, *tā'*, *nūn*, *yā'*), by adding diacritical dots (Figure 5.130). This approach perhaps originated in the need to reduce the character set, whilst trying to replicate the richness of the script maintaining particular letter combinations. However, by doing so other aspects of the script were affected, sacrificing a more authentic shaping and behaviour of the characters (Figure 5.131).

Calligraphic properties

The manufacturing quality of the fount is significantly improved compared to the previous Italian Arabic type production: the shape of the individual characters is much more refined in APQ1 – testament to a more accomplished punch-cutter – with forms considerably closer to calligraphic traditions (Figure 5.132). Nonetheless, numerous faults are also evident, making inconsistency a significant issue that applies to different aspects of the fount design and setting. The effort demonstrated in adding features that imitate calligraphic practice shows an attempt to replicate the model; however, it falls short in their execution and their use in text, proving a lack of understanding of the script's rule-based system (both by the punch-cutter and the compositor). The handling of recurrent character combinations shows a similar approach: whilst the making of ligatures strives to maintain some of the morphological behaviour of the Arabic script, they result only in approximate representations of the authentic calligraphic forms. Moreover, only 'random' characters combinations are selected, according to the punch-cutter's personal criteria.

APQ1 maintains the upright appearance previously seen in GDG1 and PPP; it lacks the distinctive gentle slant that occurs in calligraphy, which is particularly noticeable in the ascending strokes. Furthermore, the lack of homogeneity in their treatment inhibits the creation of a pattern of repeated vertical lines: some are curved in the opposite direction (isolated/final alif), some are straight (*tā'*) and some are

89. The letter *tā'* would normally be part of the toothed letters, but as previously said, in APQ1 it is always replaced by *tā*; hence it is not mentioned.

90. As discussed in Chapter 2 the morphological behaviour of the Arabic script includes a rule-based system to provide legibility. Amongst the contextually driven shapes, toothed letters can have their strokes raised to disambiguate them when a sequence of teeth occurs.

91. The design differences in the same typeform are discussed in Chapter 2. Irregularities in the casting or the impression, broken/worn out characters are amongst the possible reasons.

slightly slanted (lām), although they all seem to maintain a tapered form (Figure 5.133). Delicate thin strokes characterise some letters of APQ1, presenting a design with a pleasant and successful contrast (e.g. medial long kāf, isolated/final lām, isolated/final nūn, isolated hā', isolated 'ayn, tā'). On the other hand, there are some letters or ligatures that appear more monolinear (e.g. isolated sīn, isolated yā', initial/medial kāf, Allāh ligature (Figure 5.134). The uneven weight distribution affects the appearance of some letters also in terms of colour, and on paper, they look much darker than others, irrespective of the pressure in printing.

The relative proportions of the sorts within the fount are unbalanced. Some characters are generously sized, and therefore tend to stand out on the page (e.g. isolated nūn, isolated qāf, final dāl, isolated lām); isolated bā' and tā' are too narrow compared to letters like qāf, nūn and lām; some letters' counters appear too big in comparison to others (Figure 5.135).

APQ1 mixes elements of mutually exclusive calligraphic styles: letters with distinctive features of *ṭulut*⁹² (e.g. lām-mīm ligature, medial 'ayn, isolated hā') are used in the text alongside typically *nash* forms (e.g. lām-alif ligature, alif, kāf initial position (Figure 5.136). In his writings, Piemontese's discusses APQ1's calligraphic style influence, describing the typeforms as '[...] di tipo *naskh* orientale o asiatico'.⁹³ However, he also points out that Albonesi – in his *Introductio* – refers to the characters in Paganini's Qur'ān using the term 'Punicorum', which Angela Nuovo translates as the 'Maghrebi' characters. In a second instance, Albonesi mentions again the 'Punicarum literarum' with which Paganini's work was printed. This hints at the hypothesis that the Qur'ān published by Paganini used a *mağribi* style fount, which does not match the appearance of APQ1; if this hypothesis is correct, Piemontese concludes that the edition discovered in Venice is not the Qur'ān printed by the Paganini, which therefore would remain to be found.⁹⁴

Letter-joining and multilevel composition

Regarding the letter-joins, the overall impression is that APQ1's punch-cutter attempted to achieve rounder connections between characters, to create a more dynamic notional baseline and to enhance the fluidity of the fount. Although the alignment of the sorts is not faultless, the gaps within letter groups are reduced to a minimum and are at times barely noticeable (Figure 5.137). Both these elements attest a noticeable improvement compared to previous Arabic founts.

Regarding the quality of joins, the combination of some letters is more accomplished than others, because their design influences how successfully they connect with each other. For instance, the letters šād/đād in initial/medial position have a curved horizontal stroke and a curved termination on the left-hand side, which creates a smooth connection only with few characters. On the other hand, the straight horizontal stroke of the letters tā'/zā' creates less problematic connections but compromises more authentically shaped letterforms (Figure 5.138).

The close inspection of APQ1 has revealed an innovative feature of the fount: the horizontal joins along the notional baseline present two independent devices used to add space between combinations of letters that would otherwise be too tight or to support a smoother transition into some letterforms (Figure 5.139). This system

92. Or the closely related muḥaqqaq style.

93. '[...] *naskh* type, Eastern or Asian'; approximate translation by the author from Piemontese 'Il Corano latino di Ficino', 256. He divides the Arabic script into two categories: Eastern or Asian, and *Mağribi* or Punic.

94. Ibid., 258. He adds that the *Punica litera* is indeed geographically opposite to the Eastern or Asian kind.

of connectors/extensions is rather simple, however, it represents a key feature in the structure of APQ1. Furthermore, this method influenced the design of the letters in medial and final forms – which do not incorporate any device to connect with letters that preceded or followed them – but is not applied consistently (Figure 5.140) and it does not always appear to be a satisfactory solution (Figure 5.141).

In the *Qur'ān*'s fount, subtle interventions on the horizontal intraword spacing are also achieved in other ways. For instance, the letter kāf has a 'default' form for initial/medial position with a long horizontal stroke and two additional designs for the same positions with a short horizontal stroke to allow for tighter letter combinations: these designs produce different results in composition (Figure 5.142). The kāf has more interesting features. For no apparent reason, the form for initial/medial positions presents a rather flat stroke on the right-hand side of the body; as a result, the letter looks incomplete. It seemed, at first, that this peculiar feature was intended to facilitate the connection with preceding letters; however, it is not applied coherently to characters with similar curves (e.g. tā'/zā' šād/đād and long kāf have a flat right-end side, but not to the same extent; instead, in the ligature with alif, the initial kāf has a full curve, see Figure 5.143).

In APQ1 the vertical connections are reduced to a minimum and usually recur in the presence of ligatures. Printing on a second level of alignment other than the notional baseline seems to occur before a ligature or when characters precede the ġīm letter group in medial or final position, which features a connecting stroke above the letter to allow for multilevel typesetting (Figure 5.144).

Vocalisation

Full vocalisation is strictly required for the Qur'ānic text; the implementation of vowels in APQ1 is therefore expected, even though it is evidently faulty. The only short vowel present in the fount is the fathah (a), whilst kasrah (i) and ḍammah (u) are missing. Amongst the other diacritical marks, there is no sukūn (vowelless letter), hamzah (glottal stop) or the maddā (vowel prolongation). The šaddah (double consonant) appears in combination with fathah on top of the Allāh ligature. As previously mentioned, another mark is consistently placed above the letter sīn (the first instance is the *Bismillah* in the opening sūrah), in the shape of two ḍammah facing each other. This design usually marks a tanwīn at the end of the word, but here seems to be used to resemble a sukūn – the mark that indicates a vowelless letter – even though the letter should have mostly carried a vowel.⁹⁵ Both these marks are cast together with the letters with which they appear, and therefore they are seen only in those instances (Figure 5.145).

An additional issue with the existence of only one vowel in the fount, the fathah, is that it is placed everywhere: on top of letters that should have been vowelless, that should have carried a different vowel and even above the alif, '[...] qui, par sa nature, ne peut qu'en être la prolongation'.⁹⁶ On the other hand, some letters carry no vowel at all, despite needing the fathah (or other vowels/marks).

Close inspection of the text gives the distinct impression that some letters are always vowelled (e.g. isolated alif, lām, mīm). Moreover, the line that represents the vowel appears different in length, inclination and placement from one to another letter within the fount, but it seems to be consistent when the same letter – in the form intended for the same position in the word – is compared in different occurrences in the text (Figure 5.146). This behaviour proves that the vowel mark is cast

95. Borrman, 'Présentation', 99–100.

96. Ibid., 100. '[...] which, due to its nature, can only be its extension', approximate translation by the author.

together with the letter as a single sort. Furthermore, the variations in the design of the vowels also seem to suggest that these are cut on the same punch with each letter and not added before casting by striking the matrix with two separate punches (one for the letter, one for the vowel). If the latter method were used, the vowel above every character would appear more consistent. Instead, by cutting the vowel on every single punch, the punch-cutter adjusted it to the width of each letter, losing control over the consistency of the mark across the set of vowelled characters. Nonetheless, the technical reason behind the vowel mark variation cannot endorse their poor execution.

APQ1 also has letters that are never vowelled (e.g. isolated/final nūn, dāl/dāl, isolated/final yā', initial kāf, isolated and initial qāf (Figure 5.147): supposedly these letters were cast without a vowel. However, there are very few exceptions to this rule: on rare occasions, letters normally not accented present a vowel above. The position of this mark is not homogeneous: this suggests that there is at least one sort for an independent fātḥah, to be added when considered necessary (Figure 5.148). The irregular and incorrect placement of this mark causes various problems (e.g. it is not clear to which letter it belongs, it is squeezed in odd places, or resembles another sort). Moreover, there is an attempt to use the independent fātḥah sort for placement below the baseline (which in Arabic would represent a kasrah vowel), but this happens extremely rarely (Figure 5.149).

The reason behind the method for handling the vocalisation is not clear: surely, providing each letter cast as a single sort with every different vowel or mark – above or below – would have been laborious and time-consuming (and would have resulted in many more pieces in the composing case). Eliminating two vowels from the character repertoire – which are in fact as important as the one maintained – reduced the work of the punch-cutter and the compositor significantly. However, this choice entailed a far worse compromise for the work, resulting in an irreparably damaged text that impaired its readability. The lack of a complete set of marks, their omission or misplacement – often on top of erroneous letters – culminated in a text where [...] la signification et la fonction des mots en sortent profondément perturbées et le texte s'avère donc falsifié.⁹⁷ For instance, the first line of sūrah Al-Fatiḥah in the Paganini Qur'ān reads as '*b-asma-Llāh ala-raḥamn ala-raḥayma, al-hamad l?llāh [sic] rabb aala'aalam*',⁹⁸ instead of *bi-sm Allāh ar-Rahmān ar-Rahīm* (Figure 5.150).⁹⁹ Moreover, a partial and inaccurate vocalisation defeated the purpose of having vowels in the first place – especially for the Qur'ān – affecting the saleability of the work and the appeal to the intended readership. Perhaps the punch-cutter picked the mark that seemed to be the most recurrent one in the text, possibly dismissing the position below the letter as non-discriminatory in the text, since the shape appeared to be identical.¹⁰⁰ On the other hand, it is also not clear according to which criteria the letters were provided or not with vowels. Amongst other missing marks needed for Qur'ānic setting, the omission of the little alif as a separate sort to place above the letters results in a different treatment of the text: whenever that

97. [...] the meaning and function of words are deeply disturbed and text appears therefore falsified', approximate translation by the author from Borrman, 'Observations', 10.

98. Ibid., 11.

99. Commonly translated as 'In the name of Allah, the Most Gracious, the Most Merciful', from the English translation of the Qur'ān, King Fahd Complex.

100. Perhaps the kasrah was dismissed simply because providing each letter with what seemed to be the same mark as fātḥah below the character would have critically increased the type-maker's work (the same applied to provide characters vowelled with ḍammah). It is possible that the independent fātḥah sort was also intended to be used as kasrah but it resulted too laborious to add compared to the frequency it recurred in the Arabic text (i.e. considerably less than the fātḥah).

mark is required, an alif is integrated into the text, breaking up the words and affecting the composition (Figure 5.151).

Regarding the diacritical dots, they also seem to be cast together with the letter because they appear to occur in the same position when the same letter recurs in the text. The inconsistencies in the positioning of the dots in some characters seem to be caused by the irregular filing of the dots to obtain different letters sharing the same base-form (Figure 5.152). The diacritical dots also appear extremely irregular in form and size (some have diamond shape, others are round, big and small): it is clear that if the dots were added separately to the letters (and originating from a single punch), it would have been easier to achieve a more regular appearance (Figure 5.153). The inconsistent positioning of the dots creates problems when certain combinations of letters occur (e.g. sequence of teeth); moreover, the uneven internal space between the 'two dots' and the 'three dots' (the second only occurring on top of the letter šīn) create unbalanced patterns when letters carrying these diacritics are next to each other (Figure 5.154). The alignment of diacritical dots could also be considerably improved (Figure 5.155).

In the ligatures – particularly in the ġīm letter group in medial and final position – the addition of dots to create ligatures with the bā' letter group is somewhat arbitrary (Figure 5.156). Despite the fact that the dots seem to be cast together with the base-forms for many letters (as previously illustrated), the analysis of the text has revealed some extra dots that do not belong to any character in the composition (Figure 5.157). These independent dots appear to be added to indicate a tooth character in particular letter combinations originally undotted; nonetheless, their poorly handled and unorganised positioning contributes to increasing confusion, affecting the readability of the text (Figure 5.158).

Regularity of fitting

APQ1 presents considerable problems in the fitting. The spacing is not well adjusted, both intraword and interword, resulting in letter groups that appear extremely tight and others that are too loose. Some gaps in the *Qur'ān* text are due to the end of verse (left for the addition of a decorative/separation mark), but this is not always the case (Figure 5.159). There are instances where the final letter of a word almost touches the isolated or initial letter of the following word, in a setting that overall appears rather claustrophobic. The problem is emphasised by the impressive kerning capacity of the sorts, which results in letter combinations with pleasant overlays echoing calligraphic practice. There are other instances where the kerning is too exaggerated, with letters that invade the 'vital' space of others (e.g. a character that invades the nūn's internal space, getting too close to the diacritic dot, Figure 5.160).

Despite the problems, the fount achieves significant results considering the obvious technical limitations. It is apparent that many letters used the overhanging method to sit in the space below the following character, allow kerning and a tighter setting. However, the diverse typesetting of the text raises questions on other techniques that must have been used simultaneously to explain what can be observed on the page. Some instances appear to show highly customised solutions and *ad hoc* adjustments to achieve the most desired text representation (particularly in the occurrence of multilevel settings): many doubts remain and require a more in-depth investigation.

The system of connectors/extensions was clearly fundamental for the fitting of this fount. APQ1 has an additional sort for the kašida; however, it is mostly used (in repetition) to create the long extension typical of the *Basmalah*. The single kašida sort seems to appear only twice in the text and it is not used as a regular method to elongate the connection of letters to justify the lines of text. Furthermore, there

are no additional designs for extended letters as a way of improving blank space balance: only the sort for long kāf is provided, although the design is not stretched as it should be, losing its function (Figure 5.161).

The vertical spacing of APQ1 is much more regular, with a generous leading between the lines that somewhat compensates for the crammed horizontal appearance, and gives the lines of text – with their multitude of non-homogeneous marks – enough space to breathe. Moreover, it supplies enough room for the descenders/ascenders of characters, and for the multilevel text setting to exist without clashes, ultimately balancing the overall aspect of the page.

Evenness of texture and colour density

The problems highlighted in the spacing and kerning of the fount contribute in producing an uneven and inconsistent texture in APQ1, disturbing the rhythm while moving along the reading direction. This is also caused by the irregular slant and position of the diacritical marks. A more coherent treatment of letterforms – particularly regarding their shared features and their proportions – would have resulted in a more balanced appearance and consistent texture on the printed page. A better control over the characters' stroke modulation and weight distribution would have improved the overall colour of the fount, which seems to have an even density along the joining line. It also appears that the type-making methods affected the readability of the composed text (e.g. form and position of diacritic marks), compromising letterforms that are otherwise legible. Overall, the quality of the paper and ink contributed to a rather clear and even impression, which is, however, far from faultless.

Some conclusions

The analysis of APQ1 has highlighted interesting qualities in the fount that attest to a significant improvement in the typographic representation of the Arabic script.¹⁰¹ The letterforms are more sophisticated than those of the first two Arabic types, suggesting the involvement of a more skilled punch-cutter. The APQ1 type shows a more conscious attempt in implementing calligraphic features (e.g. differentiation of teeth, although with no structure); to obtain rounder connections with a system of extensions and a more undulating baseline, with better-joined sorts. The typeforms also show an impressive kerning capacity, although is overly used and poorly handled. The higher quality of materials for printing and a sharper impression also contribute to that of the characters' outlines. On the other hand, it should be stressed that the execution of APQ1 has partly failed some good intentions, creating a fount that was not fit for its purpose. The reuse of letterforms for different positions (e.g. ġīm, hā', hā', mīm) and as ligatures in combination with other letters by adding diacritical dots, compromised a more authentic appearance. This was also due to the mixture of styles in the design of letterforms, unbalanced proportions and issues with the stroke treatment and weight distribution. Inconsistencies (and errors) in the text's composition and in the implementation of calligraphic features shows lack of script sensibility. The attempt of vocalisation is poorly executed in planning, design and placement, defeating the purpose of having it, as it creates more problems than it solves. The kerning and fitting of characters are too irregular, and generally too tight.

101. Borrmans seems to agree, stating that [...] the Paganini, father and son, were 'masters' of the typographic art and although their audacity was poorly rewarded, we must recognize them the merit of having realized exceptional progress in the creation of printing Arabic characters, a rare thing in their time', approximate traslation by the author from Borrmans, 'Présentation', 124.

The shortcomings of the type and of the edition as a whole show a lack of knowledge of the Arabic script of the type-makers but also of their advisors, including the compositor and the proof-reader, which were of critical importance for the correct handling of a very complex text. In the *Qur'ān*, the errors are indeed too systematic to be only a matter of distraction. The findings of the analysis showed that ill-informed decisions at design stage (resulting in a particular structure of the fount) have indeed affected the composition, causing unpreventable errors (e.g. a missing letter or vowel in the character set; vowels cast together with the characters). On the other hand, there are errors apparently made at composition level (whether or not derived from a correct or poor manuscript model), and which could have been fixed manually or avoided employing a better-informed compositor (e.g. consonant substitutions even if available in the character set, missing letters or words). The recurring difference in the wording of the text (besides the obvious spelling mistakes of the compositor) when comparing the *Qur'ān* with the *Mushaf al-Madina* indicates that a more in-depth analysis of the text is necessary for a better understanding of the edition; this could also supply critical information about the manuscript used as a model, explain content errors and perhaps confirm Piemontese's hypothesis concerning a Hebrew 'antigraph.'

5.4 The transitional type of the Jesuit Press: regression

5.4.1 Tipografia del Collegio Romano in Rome

The *Tipografia del Collegio Romano*¹ was the press of the Jesuit College in Rome; it was conceived by St. Ignazio di Loyola – also the founder of the Jesuit Order – and operated for sixty years, between 1556 and 1616. Loyola's intent was to produce low-budget editions to facilitate the studies of those willing to learn but less advantaged; on the other hand, he was concerned with providing obscenity-free classical works for young students.² Not much is known of the organisation of the printing office besides that in 1559 it was headed by a German man, described as an expert typographer but equally ignorant of Latin, and that the students of the College were the proofreaders.³ The press was furnished with Arabic types when Pope Pio IV expressed the desire to diffuse in the East the conclusions of the Council of Trent. For this purpose, he instructed the Jesuit Giambattista Eliano⁴ – teacher of Arabic and Hebrew at the College – to translate the text into Arabic and to procure newly commissioned Arabic types at the papal expense.⁵ In 1577 Hebrew characters were also added to supply the students with the necessary books for learning the language.⁶

Eliano's text – translated in 1564 and printed in 1566 – was the first Arabic work of the Jesuit Press: the *Fidei Orthodoxæ Brevis Et Explicata Confessio* was a 'Confession of faith to be distributed among the Maronites in Lebanon,'⁷ printed in Latin and Arabic⁸ (Figure 5.162). An undated printing proof of the same work survives in Rome (Figure 5.163).

The Jesuit press used only one Arabic typeface during its activity: this fount (TCR1) was the only Arabic type available between 1566 and 1580 when Pope Gregorio XIII and Cardinal Giulio Antonio Santoro commissioned a new Arabic type to substitute it from the renowned French punch-cutter Robert Granjon, who arrived in Rome in 1578.⁹ In 1580 the TCR1 type was still used, although at least thirteen years old,¹⁰ by the typographer Francesco Zanetti to print the *Brevis Orthodoxæ Fidei Professio*¹¹ (Figure

1. Otherwise known as 'Societatis Jesu' or 'della Compagnia di Gesù,' see Fernanda Ascarelli and Marco Menato, *La Tipografia Del '500 in Italia* (Firenze: L.S. Olschki, 1989), 114.
2. Giuseppe Castellani, 'La Tipografia Del Collegio Romano', *Archivum Historicum Societatis Jesu* II (1933): 11. The priest and Jesuit humanist André des Freux managed to edit and 'purify' only a work of Horace and Martial's Epigrams before he died. See also Riccardo G. Villoslada, *Storia Del Collegio Romano Dal Suo Inizio (1551) Alla Soppressione Della Compagnia Di Gesù (1773)* (Romæ: Apud Aedes Universitatis Gregorianæ, 1954).
3. Castellani, 'La Tipografia Del Collegio Romano': 14.
4. Born in Egypt, Eliano was a converted Jew, grandson of the famous grammarian and poet Rabbi Elijah Levita (1468–1549). He learned Arabic during a mission in Egypt in 1562.
5. Balagna seems to suggest that the making of the Arabic type for the Jesuits took only a few months to be made, by claiming that 'Au XVI siècle une fonte et une taille de caractères typographiques prend de quatre à six mois' ('in the XVI century the cut and cast of a fount takes between four and six months', approximate translation by the author), see Balagna, *L'Imprimerie Arabe En Occident*, 30.
6. Castellani, 'La Tipografia Del Collegio Romano': 16.
7. Krek, *Typographia Arabica*, 8.
8. The Latin edition is incorrectly dated in the title-page as 1556. A second undated edition of this work, printed with the same types, has been dated between 1570 and 1578: the work is today at the Vatican Library [R.G.Or. IV 584 (int.5)], see Vervliet, 'Cyrillic & Oriental Typography in Rome, 446.
9. This is discussed more in depth in the following chapter, in § 6.1.
10. Tinto, 'Per Una Storia', 285.
11. This is a third edition of the *Fidei Professio*, but published with a different title.

5.164). Roughly in the same period, a fourth book was impressed with the Jesuit type, the *Muṣāḥaba Rūḥāniyya*¹² (Figure 5.165): the work of 166 pages is the first in Arabic to manifest an opposition to Islam, later translated and published by the English Orientalist William Bedwell in 1616. Finally, TCR1 appears in a fifth and last impression, an undated and anonymous proof, preserved at the Vallicelliana Library in Rome (Figure 5.166). This is a short text apparently pulled from worn characters: Vervliet advances the hypothesis that it was shown to Pope Gregorio XIII and Cardinal Santoro before the decision to cut new types, or used later to compare it with the new Arabic type by Granjon.¹³

About the type

TCR1 can be described as a transitional type for two reasons. Firstly, because it is the only Arabic type available in Europe in the gap of over forty years between the printing of the *Qur'ān* in 1537–8 and the appearance of Granjon's first Arabic type in 1580.¹⁴ Therefore, the Arabic type of the Jesuits represents the transition between the experiments of the first Italian pioneers in Arabic type-making and the new typographic standards for the representation of the script set by Granjon's work, later copied by many others in Europe. Secondly, because the printing of the Jesuits' Arabic work in 1566 marked the transition to Rome as the new centre of Arabic printing – later consolidated by the activity of the *Typographia Medicea* – confirming Italy at the forefront of Arabic type-making, producing, almost exclusively, all the Arabic foundry types of the sixteenth century.¹⁵

Nevertheless, the time gap between the *Qur'ān*'s type and the Jesuit fount did not result in a significant development or improvement for the typographic representation of the Arabic script.¹⁶ Scholars seem to agree that TCR1 is 'a considerable advance on its predecessors'.¹⁷ However, this observation is valid only with regard to the metal types from Fano and Genoa and Postel's wood types, whereas if compared with the *Qur'ān*'s typeface TCR1 is, in fact, a regression.¹⁸ This step backwards is not only visible in the aesthetic qualities of the letterforms, but also in the structure of the fount, which presents a return to a more simplified approach: the medial forms

12. The title is variously indicated as *Mushabat Al-Ālimayn* or *Hadā Muṣāḥabat Ruhāniyya Bayna Al-Ālīmāy* [...], and is also known as 'Spiritual dialogue between Sinān and Ahmād'. The work is undated, but almost certainly printed before 1580, when Granjon's new Arabic types appeared. The author is also uncertain: generally attributed to Eliano, it was more likely the work of Leonardo Abel, the emissary of Pope Gregory XII. See Balagna, *L'Imprimerie Arabe En Occident*, 31; Vervliet, 'Cyrillic & Oriental Typography in Rome', 446; and Tinto, 'Per Una Storia', 285.

13. Vervliet, 'Cyrillic & Oriental Typography in Rome', 446. Vervliet locate this item as [Ms. Val. K 17, f. 174].

14. There is nearly a thirty-year gap between the publication of the *Qur'ān* (dated 1537–8) and Jesuit work printed with new Arabic types in 1566. TCR1 was later used for another 14 years until replaced by Granjon's types from 1580.

15. Only towards the end of the century did two initiatives come from abroad: the Dutch Franciscus Raphelengius in Leiden in 1595 and Guillaume le Bé in Paris in 1599, as discussed in Chapter 7.

16. In 1620 the Dutch Orientalist Thomas Erpenius describes the Jesuit Arabic type as 'inelegantes typi Romæ', an opinion that Vervliet considers 'a little harsh'. See Vervliet, 'Cyrillic & Oriental Typography in Rome', 446, note 156.

17. Roper, 'Early Arabic Printing in Europe', 134. Balagna and Vervliet also agree in the respective sources, previously mentioned.

18. Vervliet is the only one to compare TCR1 with the *Qur'ān*'s typeface, defining Paganini's type (and the later Granjon's Arabics) as 'far superior'. He also observes that the Arabics of the *Propaganda Fide* did return to the more simple style of TCR1. See Vervliet, 'Cyrillic & Oriental Typography in Rome', 446, note 156.

are removed whenever possible¹⁹ (Figure 5.167) and some features of the rule-based system of the Arabic script experimented in APQ1 disappear instead of being further explored (e.g. the tooth differentiation); likewise, for the attempt to reproduce a more fluid and dynamic representation of the script (e.g. the system of connectors, the quality of joins and the multilevel composition).

The type-makers of the TCR1 fount are once again unknown, although it has been suggested that Eliano himself had prepared the Arabic types, with the help of the typographer G. Lutcha and of a punch-cutter named Granier.²⁰ Vervliet observed that TCR1 'is a rather thin type, not contrasty, without tapering, more of a scribe's handwriting than that of a calligrapher'.²¹ It is possible that the typeface was modelled on Eliano's handwriting following his manuscript Arabic translation prepared for printing, but until any evidence surfaces, this remains a speculation.²² On the other hand, the type is not monolinear but presents tapering and a stroke modulation that combines extremely delicate lines with thicker strokes that echo the weight distribution generated by the pen in calligraphic practice (Figure 5.168). However, the execution is not handled with confidence across the typeface; moreover, the uncertain and inaccurate shaping of the letterforms exposes the limited skills and script awareness of the punch-cutter (Figure 5.169).

TCR1 is also still extremely upright like all its predecessors; moreover, the treatment of the vertical strokes is not regimented, inhibiting a homogeneous pattern on the page: the combination of ascending characters exposes more markedly their differences: the initial lām in particular often looks as if it is falling backwards (Figure 5.170). The relative proportions of the sorts within the fount are unbalanced. The character wāw looks at times oversized – mostly due to its extended tail – particularly close to characters that are too narrow, like bā'; likewise, the counters of isolated/final hā' are too big in comparison to mīm, and šād/đād and tā'/zā' are too narrow (Figure 5.171). There is no consistency in the shape of the letter sin: the teeth in initial position are oversized compared to their form in isolated position: the isolated sin is also too close in form to a ligature representing a sequence of teeth (Figure 5.172). As already mentioned, TCR1 lacks a differentiation of the teeth to help legibility, and for the bā' letter group, it re-uses forms for the initial position also for the medial. Moreover, the sequence of two or three teeth are represented with ligatures, but issues with the dotting of characters add to the confusion of the text to the detriment of the reader (Figure 5.173).

One of the most characteristic features of TCR1 is the poor handling of the joins between characters, which are extremely unsuccessful due to a number of reasons. Firstly, the general shortage of medial forms implies the re-use of forms that have no connecting devices, which results in significant gaps between each character (Figure 5.174). Only a few characters present a joining stroke, but it is often too small to be of any advantage for the connection or the overall appearance of the fount. Moreover, the gaps created even by adjacent sorts with connecting strokes also suggests

19. As also observed by Krek in *Typographia Arabica*, 8 and Roper in 'Early Arabic Printing in Europe', 134. The latter describes TCR1 as 'somewhat clumsy and inelegant attempt, insufficiently cursive and calligraphic, and lacking adequate sorts for some letters, especially in their medial forms.

The letter ڻ in its initial/medial form is especially poor, with its feeble top stroke added almost as though it were a diacritic'.

20. See Nasrallah, *L'Imprimerie Au Liban*, XVIII and Gdoura, 'L'Edition Arabe En Europe', 24.

21. Vervliet, 'Cyrillic & Oriental Typography in Rome', 446, note 156.

22. With regard to Eliano's handwriting, a source reports that he learned to write Arabic 'in a suitable manner for the time', approximate translation of the author, see Balagna, *L'Imprimerie Arabe En Occident*, 30.

problems with the casting of the type (Figure 5.175). The alignment of characters creates even more problematic interruptions than the default gaps: for instance, the position of qāf and the orientation of hā' creates many issues with preceding characters (Figure 5.176).

In TCR1 the multilevel composition is reduced to a minimum and the few joins raised above the notional baseline are obtained with the use of ligatures. The vertical joins of different letters with medial/final ǵīm letter group are particularly weak – also considering that they are designed on a single punch – with a straight hair-line connecting the letters.²³ Moreover, problematic interruptions within words are caused by characters that do not shift to a second level of alignment to join correctly with the following vertically-joined combinations (usually represented with ligatures) (Figure 5.177).

As previously mentioned, TCR1 was initially used in 1566 and then for other two publications about 14 years later. By comparing one of the 1580's publications with the first work published, it appears that the fount is mostly the same, although it is possible to identify a few characters that seem to be later additions (Figure 5.178).²⁴ This case shows that it becomes increasingly difficult to have a comprehensive overview of a particular fount when it is used for various works by different printers. Furthermore, the investigations around TCR1 provided new evidence for the discussion of another important issue. The analyses of the first three founts were based on the examination of one individual printed book for each type: although this allowed a rather restricted field in favour of a thorough investigation, it is evident that the books could not provide all the elements for a realistic comprehensive analysis, because there is no access to the punches, matrices or metal sorts of the types. Similar circumstances were expected for the analysis of TCR1, except for having five different editions using the type, as listed in the sources. Nevertheless, a research field trip to the Biblioteca Medicea Laurenziana in Florence in search of Granjon's Arabic punches has brought to light a different set of punches, identified by the present author – for the first time – as being of the Jesuits' types. The only known existing record of this typographic material provides a listing of the punches but no such attribution.²⁵

Even more surprisingly, there are two sets of punches (see Appendix 7 and Appendix 8): the smaller sized punches are identified as TCR1, used in the cited printed books; whereas the other set (TCR2) is clearly a bigger size of the same typeface, although there is no trace of it in the known Arabic works printed with the types of the Jesuits. It is possible that no works using TCR2 have survived, or that have yet to be found. It can be hypothesised that the punches of TCR2 were made first but then considered too big to set the text, so a smaller size was added and used to print the known works; on the other hand, perhaps TCR2 was added later as a titling version

23. A similar approach was found in PPP, see Figure 5.92.

24. The new bā'-nūn ligature also shows for the first time a nūn with a shape also characteristic of Granjon's later founts (see § 6.1): an interesting detail that might need further investigations.

25. The Biblioteca Medicea Laurenziana does not possess any documentation of this typographic material, despite the efforts of the author to trace any sort of cataloguing work in collaboration with the staff of the library. An inventory of the material was done independently by Charles Whitehouse, letterpress printer of The Iron Press in Switzerland, in 1985–6, as a personal research in connection with his interest in the punch-cutting of Robert Granjon. The work is in the forms of personal notes and it was never published; it is entitled *Stamperia Medicea. Material Now Kept with the Biblioteca Laurenziana, Florence*. The author is indebted to James Mosley for providing awareness of such work and to Charles Whitehouse who has kindly shared his findings, which have provided precious information to support this research.

of TCR1 but never used: further research is necessary to shed more light on these punches.²⁶

By observing the cases of punches and comparing them with the printed works it is possible to draw some initial conclusions: the case of TCR1 contains 122 punches (Figure 5.179) and TCR2 contains 72 (Figure 5.180); both seem to be incomplete. Many punches in the case of TCR1 correspond to the *Fidei Orthodoxæ Brevis* printed in 1566 but none to the additional characters that appeared in the publications of 1580: this could confirm that the cases contain the original set of punches and that those particular sorts were included later by a different printer/type-maker. However, it should be pointed out that not every character of TCR1 showing in the work of 1566 finds a corresponding punch in the box and vice-versa (Figure 5.181). While the first circumstance can be explained by the loss of punches, the existence of punches not showing in the book is more difficult to justify, especially considering the amount of non-corresponding characters. It is indeed unlikely that so many punches were made for them not to be used in the publications. The lack of complete correspondence of the printed work with the case of punches is a further evidence that the analysis of the former alone cannot guarantee a comprehensive knowledge of the original typeface: in the case of TCR1 it shows that the character set included many more characters than what is possible to infer from the observation alone of the primary source. Regardless of many questions that remain open, the analysis of the punches provides invaluable evidence that some other assumptions made from the observation of the printed page were indeed correct. For example, the existence of punches of single letters or ligatures that carry all the dots to obtain every character or combination that shares the same base-form by filing off dots after casting (Figure 5.182).

There are a few more interesting observations about TCR1. It is still not clear why only some characters carry a diacritic mark (mostly a fathah and a sukūn over the letter sīn) cut on the punches and not added separately in composition. The hypothesis that these marks were used to differentiate characters that share the same base-form (e.g. as discussed in GDG1), does not seem a valid explanation because, for some letter groups, all the characters are available (Figure 5.183). Like its predecessors, TCR1 also presents characters with features belonging to different calligraphic styles: the alif has a barb (never seen until now apart from APQ2, see Figure 5.113), a feature of the tulut style; likewise, is the shape of isolated hā' with crossing strokes, whereas in final position it has a more typically nash form. The lām-alif ligature also shows inconsistencies (Figure 5.184). Moreover, the form of medial hā' stands out, particularly in its shaping in some of the ligatures visible in the punches (Figure 5.185). Finally, the issue of variants (intended as different designs of the same letterform recurring in the same position) does not seem to be as marked as in the previous founts, although it can still be observed (Figure 5.186).

The shortcomings of TCR1 – quality of letterforms, joins and overall structure – highlighted by the analysis particularly affect the readability of the fount: although problematic, the individual characters are indeed legible. Besides the gaps and more severe interruptions created by the poor joining and alignment of characters, errors in composition contribute to the confusion, by using letterforms in the incorrect position. Observing the first publication of 1566 (see Figure 5.162), the Arabic type is overall loosely fitted, although the texture on the printed page is compromised by the uneven distribution of space, which also creates very tight letter combinations.

26. It would also be interesting to find out how both cases of punches ended up in the collection of the *Typographia Medicea* in the Laurenziana Library.

The justification of the paragraph certainly affects the overall appearance of the type on the page, with lines of text more tightly fitted and other presenting wide blank spaces, only at times filled by various decorative marks. On the other hand, the interlinear spacing in the printed page is generous enough to avoid vertical clashes and is somehow matched in the Latin setting of the text. TCR1 presents sorts with good kerning capacity, which is often too tight: however, this is also sensibly controlled to avoid the problematic extreme nesting combinations seen in previous founts (Figure 5.187). Moreover, the TCR1 type does not use kašida elongations or extended characters, except for two letters, initial šīn and final mīm (see Figure 5.179).²⁷

The quality of the printing seen in the books printed with TCR1 appears to worsen the appearance of the type, but it is not solely responsible for the visible shortcomings. Whilst the uneven impression causes darker spots of colour and also lighter letters with missing parts, the uneven colour of the type on the page is mostly due to the irregular weight distribution in the characters and the inconsistent modulation of strokes. The problems with the joins and the alignment particularly affect the density of colour along the joining line.

The following chapter introduces the Arabic type commissioned to replace TCR1, which paved the way for a new development of Arabic typography through the work of Robert Granjon and later Savary de Brèves.

27. It should be noted that the length of the elongation in the two typeforms does not seem to match that of the punches.

6 SETTING NEW STANDARDS: INNOVATORS

6.1 A 16th-century master at work: Robert Granjon

The renowned printing historian Hendrik D. L. Vervliet describes Granjon as 'the man who was ultimately responsible for the technical perfection of Roman typography at the end of the sixteenth century'.¹ Although the date is unknown, it is believed that Granjon was born in Paris about 1513.² He arrived in Rome at the end of 1578 – when he was 65 years old – with an excellent reputation as a skilled punch-cutter, after having travelled and worked in Paris, Lyons, Geneva, Antwerp, Frankfurt.³ Being towards the end of his career, Granjon was very experienced: he had already experimented with the slope of the italics in his punches and had cut about forty founts for Plantin,⁴ including the Greek and Syriac types for his Polyglot Bible.⁵

An eighteenth-century source⁶ reports that the privileges given to Granjon by Pope Gregorio XIII and the Cardinal Ferdinando de' Medici (accommodation and salary)⁷ prevented his move to Germany, after being approached by Protestant printers and scholars about collaborating on their Oriental publications. The same source reports that the Pope ordered that the Arabic punches should not leave Rome, to avoid 'heretics' using them to disseminate their word in the Oriental countries.⁸ Moving to Rome, Granjon found himself associated with Roman Catholicism that was in an advantageous position over the Protestants for the 'spiritual conquest' of the Near East.⁹ While in Rome, Granjon cut Arabic punches for the Pope and the

1. Vervliet, 'Cyrillic & Oriental Typography in Rome', 433. Vervliet's work is the most complete on Granjon's type production during his stay in Rome. The essay mentioned above, published in 2008, is the most up-to-date and the one mostly cited in this study; previous publications might be used when necessary. The essay was originally published in French in 1967 as 'Robert Granjon À Rome 1578–1589: Notes Préliminaires À Une Histoire De La Typographie Romaine À La Fin Du Xvie Siècle', *Bulletin De L'Institut Historique Belge De Rome* 38 (1967): 177–231. It was then translated into English and published for the first time in 1981 with the title *Cyrillic & Oriental Typography in Rome at the End of the Sixteenth Century: An Inquiry into the Later Work of Robert Granjon (1578–90)* (Berkeley: Poltroon Press, 1981).
2. Vervliet, 'Cyrillic & Oriental Typography in Rome', 430. Granjon states that he is seventy in a printed specimen of one of his Arabic types dated 1583 (see Figure 6.30), which confirms the date of birth.
3. Ibid., 446.
4. Ibid., 431. The Plantin collection still possesses Granjon's types.
5. Ibid., 432. He worked in Rome until 1589, with the last delivery of punches in November as noted by Giovanni Battista Raimondi in his diaries. He died in the spring of 1590 and was buried in the church of Trinità de' Monti on 14 March 1590.
6. Angelo Maria Bandini, *Lettera Del Canonico Ang. Mar. Bandini Sopra I Principi E Progressi Della Biblioteca Laurenziana* (Firenze, 1773).
7. Ibid., 76–8. A salary of 300 scudi from the Pope for each alphabet; 10 scudi each month and the lodging plus 3 scudi in gold for each letter from the Cardinal. See also Vervliet, 'Cyrillic & Oriental Typography in Rome', 447.
8. As mentioned in Chapter 5, the German Protestant Orientalists had to resort to 'unimpressive' Arabic woodcuts, with the attempts of Christmann in 1582 and Spey in 1583. See Vervliet, 'Cyrillic & Oriental Typography in Rome', 447.
9. It is worth recalling that Pope Gregorio XIII's missionary work intended 'reuniting the non-Roman Christians, particularly those of the Near East and Slav countries, and providing books in their own languages and scripts' by forming a printing press to produce Oriental work of a religious nature. Vervliet, 'Cyrillic & Oriental Typography in Rome', 433, 447.

Typographia Medicea; Vervliet has identified five series of them,¹⁰ discussed in detail in the following sections.

6.1.1 The first Arabic type for the Papal Polyglot Press

After the initiative of the Jesuits, a new organised and ambitious project occurred in the second half of the sixteenth century with the pontificate of Gregorio XIII, who established in 1578 a new Papal Polyglot printing Press – referred to as the *Tipografia poliglotta «pontificia»*¹¹ – funded with 100.000 ducati by the Camera Apostolica.¹² The new Press was never an ‘official’ institution as such: the printing was entrusted to the typographer Domenico Basa, who would receive and use the ‘exotic types’ according to the programme of the Press; some of the work was published either with no reference to the printing office or with the designation «ex typographia Dominici Basæ».¹³ Robert Granjon was called from France to cut the types, ‘because in Rome, at that time, there was not a technician able to deal with the delicate and onerous task of engraving punches for Oriental languages’.¹⁴ Granjon started working for the Papal Polyglot Press in 1579, and later for the Typographia Medicea founded in 1584.¹⁵ It seems that between the end of 1583 and the end of 1585 the «pontificia» and the Medicea Presses must have coexisted or collaborated and that some of the workers had moved from the first to the second at the Medici’s expense.¹⁶ A proof of the collaboration of the two Presses appears to be the *Kitāb Al-Bustān Fī Aḡā’ib Al-Ard Wa-L-Buldān* (see Figure 2.14) published in 1584–5 by Granjon and Basa, funded by Cardinal de’ Medici, possibly in collaboration with Giovanni Battista Raimondi.¹⁷ The

10. ‘Two series are identified from original specimens printed by Granjon himself; of the other three, the punches still exist and all five are completely documented by archival sources and by contemporary impressions’, Vervliet, ‘Cyrillic & Oriental Typography in Rome’, 449. Granjon’s Arabic types are referred to in this thesis with the progressive abbreviations RG1, RG2, RG3, RG4 and RG5. The respective names attributed by Tinto and Vervliet are also indicated in each section for ease of cross-referencing.
11. Also addressed to as ‘tipografia universale’, see Alberto Tinto, *La Tipografia Medicea Orientale* (Lucca: Maria Pacini Fazzi Editore, 1987), 8.
12. It is reported that it was possibly the printer Francesco Zanetti (who used the Arabic type of the Jesuits in 1580) who suggested to the Pope the idea for the ‘Tipografia poliglotta «pontificia»’. Tinto, *La Tipografia Medicea Orientale*, 5.
13. Ibid., 5–6. Domenico Basa should be therefore considered as the personal printer of Gregorio XIII – who also paid him – rather than the director of an official Papal press; moreover, Basa had his own printing-editorial business.
14. Tinto, ‘Per Una Storia’: 282, approximate translation by the author.
15. Granjon was initially paid with Papal funds; however, from 1583 he worked and received money from the Medici, through Giovanni Battista Raimondi (director of the Medici Press), who recorded the payments in his diaries. See Tinto, *La Tipografia Medicea Orientale*, 13.
16. Tinto suggests that Gregorio XIII established (although not officially) and financed the «pontificia» Polyglot Press, entrusted to Basa. In 1584 it was attached to it a printing company with the financial backing of de’ Medici and supported by the Pope. The Medici Press became independent only during 1585 (Gregorio XIII also died in the same year). Moreover, payments to Granjon dated 1583 and 1584 in Raimondi’s accounts books, shows that the French punch-cutter was paid with funds of Cardinal de’ Medici even before the founding of the Medici Press. See Tinto, *La Tipografia Medicea Orientale*, 13, 20–22.
17. The work was started in 1584 and finished in 1585. The first date appears in the Arabic title page and the second in the Latin colophon of the book, which states: «Romæ. Ex Typographia Dominici Basæ 1585». Raimondi later described the work as a product of the Medicean Press, claiming that the Arabic type was acquired by the Cardinal de’ Medici from Domenico Basa. This seems to be

book was briefly discussed in Chapter 2, where it was compared with an Egyptian manuscript containing the same work (see Figure 2.13). The *Kitāb Al-Bustān* uses the first Arabic cut by Granjon, completed in 1580 (RG1).¹⁸

A first attempt to refresh the Arabic type of the Jesuits

When Pope Gregorio XIII became interested in Arabic typography in 1578 – and decided to print works in Arabic in accordance with Cardinal Giulio Antonio Santoro – the only Arabic type available was that of the Jesuits. It was thus decided to take the punches and the matrices of TCR1 to Venice, by means of the Jesuit Eliano, to be ‘cleaned’ and ‘refreshed’;¹⁹ some tin was also sent there for the founding of ‘three series of types’. In April of the same year the types had already been cast, only awaiting the authorization to be returned to Rome; in November only part of the types was sent, but not to Basa, as established above. Only in January 1579 were the punches and the matrices eventually recovered – without the boxes or the labels – although badly damaged: it was reported that the matrices were in particularly bad condition, that a large number were missing, and that it would require great effort and expense to remake what was lost.²⁰ For this reason, the ‘old’ Arabic types of the Jesuits were used again in 1580 to publish two more books (Zanetti’s *Brevis Orthodoxæ Fidei Professio* and the *Muṣāḥaba rūḥāniyya*, see Figure 5.164 and Figure 5.165): both works present a few new sorts (see Figure 5.178), which were possibly added as part of the ‘refreshing’ process in Venice.

The first Arabic type of Granjon

The decision to cut new Arabic types – to substitute those of the Jesuits – occurred on the 9th of June 1580, during a Papal audience of Gregorio XIII with Cardinal Santoro.²¹ The new type cut by Granjon, appeared firstly in a single sheet Arabic specimen²² (Figure 6.1), purposely made to showcase the typeface to the Pope.²³ The new type was completed in 1580, whereas ‘the casting of 100.000 letters’ occurred at

an incorrect statement: the types could not have been acquired from Basa, because they were a property of the Pope. See Tinto, *La Tipografia Medicea Orientale*, 21.

18. Also known as *Carattere Arabo* (200 mm.) in Tinto, ‘Per una Storia’; *The Small Arabic (on two-line Great Primer: 200 mm)* in Vervliet, 1981; ‘Arabic on Two-line Pica [Ar 160] or Palestine (1580)’ in Vervliet, 2008. Note that Vervliet’s essay has the same title, so only the year of publication is indicated here to avoid confusion.
19. Approximate translation by the author from the original ‘nettati’ and ‘rinfrescati’. See Tinto, ‘Per una storia’: 284.
20. The original documents – today at the Archivio Segreto Vaticano – record that ‘ve ne mancano, secondo ch’io intendo, da 40 pezzi la maggior parte delle madri’ (‘there are missing, according to my understanding, from 40 pieces the majority of the matrices’), approximate translation by the author, see Tinto, ‘Per una storia’: 284–85. The term ‘pezzi’ is not clearly defined: in this case it could indicate 40 individual pieces of matrices or 40 sets of matrices containing more pieces. Furthermore, it is not clear if the punches were also damaged or lost. As discussed in § 5.4.1, the cases of punches identified as matching the types of the Jesuits seem to be incomplete; however, it is possible that the loss was caused by later events.
21. Vervliet suggests that the decision followed the Pope’s dissatisfaction with the types of the Jesuits when he was shown a copy of Zanetti’s work in April 1580. In addition, Tinto suggests that the problems occurred after the Jesuits’ types were sent to Venice made the decision necessary. See Vervliet, ‘Cyrillic & Oriental Typography in Rome’, 449 and Tinto ‘Per una Storia’: 287.
22. ‘Arabici Charakteres. GREGORII XIII. PONT. OPT. MAX. IVSSV. Nunc Primum Romæ Incisi. Rob. Granjon Parisien. Typographus Incidebat, Romæ, 1580’. An intact copy of the specimen measuring 34×22 cm is preserved at the BNCR [MISC. Val.1827.3], and a damaged copy is at the bv [Inc. 284–285/14] in Rome. Tinto ‘Per una Storia’: note 61.
23. Vervliet, ‘Cyrillic & Oriental Typography in Rome’, 450.

the end of 1581:²⁴ it seems that it was used only to print the already mentioned *Kitāb Al-Bustān*²⁵ (Figure 6.2) and occasionally in the sixteenth century by the press of the Propaganda Fide.²⁶ An additional printing proof sheet containing this type has survived amongst the material of the *Typographia Medicea* available at the Archivio di Stato in Florence, containing a fragment of a geographic text, the *Cosmography* work by Qazwīnī²⁷ (Figure 6.3).

The historian Alberto Tinto describes Granjon's first type 'dal tratteggio sottile e senza forti contrasti chiaroscurali'.²⁸ According to Vervliet, it is also on the same size and 'close enough to that of the Jesuits; it differs noticeably from the more calligraphic Arabics which Granjon cut during the period 1583–6'.²⁹ For Balagna, the Arabic types of the *Kitāb Al-Bustān* are of striking beauty: 'pour la première fois les caractères arabes sont clairement lisibles, ils alliaient la perfection à l'élegance'.³⁰ Observing the first Arabic specimen of Granjon from 1580 *Arabici Characteres*, it is evident how RG1 echoes more closely the calligraphic practice of nash̄ manuscripts, not only in the design of the individual letters but also in the way they combine with one another, in the rhythm and fitting but in a more normalised typographic form. For the first time, the RG1 type shows a definite slant that contributes to creating a pleasant movement in the reading direction, progressing from the upright approach seen in all its predecessors; the characters appear much more dynamic in their individual shapes and connections and are better proportioned. However, the modulation still lacks balance, affecting the colour of the type.

The specimen shows for the first time a fully vocalised type: perhaps, Granjon intended to exhibit to the Pope not only the mastery of his punch-cutting skills but also the potential of what could be achieved in Arabic typography. The set of vowels more complete than what has been seen before; the position and alignment of the vowels to the characters is impressive and quite successful (discussed later, see Figure 6.29); however, there are still issues of consistency – especially in the orientation of the marks, but not in their sizing – and a few mistakes (Figure 6.4). The undated printing proof fragment also shows a vocalised text, whereas the *Kitāb Al-Bustān* is unvocalised. Considering that the book is on a secular subject, it is not surprising to have a text without vowels; however, this case highlights the importance of having different sources with which to compare the type.

24. See Tinto, 'Per Una Storia': 286.

25. RG1 was used for the main text. The book also employed a second Arabic type, bigger in size and used for the titles: scholars do not agree on the identification of this type, as discussed in § 6.1.2.

26. See § 7.1.5, where the type is discussed with the name SCPF2 or *Arabe de la Collection*. According to Vervliet, RG1 was not used in any Medicean publication, Vervliet, 'Cyrillic & Oriental Typography in Rome', 450.

27. The printing proof is anonymous and undated, contained amongst the papers of Raimondi. In Vervliet's work the Medicean Press' material at the Archivio di Stato di Firenze is referenced according to the old marking system; the present specimen is therefore indicated as [Misc.Med. Stamp.Or.4:6 f.18]. The author uses the new system. It should also be noted that the folio indicated by Vervliet is the number that appears on the specific specimen sheet, which does not correspond to the actual folio number of the collection that contains it. For this reason, the author indicates the first as number (n.) and the second as (f./ff.). Another copy of this specimen is bound inside the manuscript BNCF [Mag.III.63]. Vervliet adds that RG1 was never used in a Medicean publication, but that the Propaganda Fide Press used it occasionally. See Vervliet, 'Cyrillic & Oriental Typography in Rome', 450.

28. 'With a meagre trait and without a marked contrast', approximate translation by the author from Tinto, 'Per una Storia': 287.

29. Vervliet, 'Cyrillic & Oriental Typography in Rome', 450.

30. 'For the first time the Arabic characters are clearly legible, they combine perfection and elegance', approximate translation by the author from Balagna, *L'Imprimerie Arabe En Occident*, 35.

The two specimen sheets indeed add critical information about Granjon's first Arabic typeface, which would have been classified as unvocalised with the observation of the book alone.³¹ On the contrary, the first specimen allows not only to appreciate Granjon's first effort in Arabic type-making but is also a significant testimony of the vision with which he set out on his task. Besides the vowels, it should be noted that the Arabic type appeared in the first specimen was perhaps still a work in progress: the book, published four or five years later, shows different designs for some letters, possibly implemented at a second stage; amongst other things, these additions also prove a different approach, as discussed shortly (Figure 6.5).

It has already been mentioned that RG1 represents a remarkable improvement in the sixteenth-century European Arabic type-making: a single glance at the typeface is sufficient to give the distinct impression that Granjon's type looks 'more like Arabic' than any other previous typographic representation of the script. But how did the French punch-cutter achieve it at his first attempt? A close inspection of the typeforms reveals a series of critical elements that contributed to this result.

One of the most significant innovations of RG1 is the solution devised for the representation of the toothed characters in medial position. Instead of designing extra sorts to represent these letters (or reuse the ones for the initial position as often done by previous type-makers), Granjon tweaked the design of the ending and entry strokes of the characters to form a 'peak' when they were positioned next to each other (Figure 6.6). The 'peak' was used to indicate a tooth character in a medial form – when necessary – by adding the required dots (Figure 6.7). In the nineteenth century, one of the compositors at the Imprimerie Nationale described it as follows:

Les difficultés de composition des caractères arabes ont déjà donné lieu à de nombreux essais. Et d'abord, pour remédier autant que possible à l'effet disgracieux qui résulte du morcellement des traits horizontaux, on avait imaginé de terminer par un crochet les formes initiales et médiales de la plupart des lettres, de manière à produire une autre lettre par le rapprochement du crochet gauche.³²

Granjon's solution is possible due to the more calligraphic approach to type-making, which attempts to replicate the movement of the pen: as a result, the character's horizontal strokes and joins are curved rather than sitting flat on the notional baseline, improving the overall appearance of the typeface. The elongations of the connections between letters are treated with the same principle, thus teeth characters can be indicated with the identical method (Figure 6.8): there are 3 lengths of *kašida*, although the longest one visible in the specimen seems to be replaced in the book with a straight line, which is used occasionally to extend joins but not to indicate teeth (Figure 6.9). This particular *kašida* sort – which interrupts the flowing appearance of the type in the book – is used in sequence with the recurrence of long extensions, which would be otherwise difficult to achieve (Figure 6.10). RG1 has also few stretched characters, to help the fitting and the justification of the lines of text on the page (Figure 6.11).

Another critical element in Granjon's innovations is a considerable adherence to the rule-based system for the shaping of Arabic. In terms of script structure, RG1 is

31. Although there is occasional use of vowels in the book.

32. 'Difficulties in the composition of Arabic characters have already given rise to numerous attempts. In order to remedy as much as possible the unsightly effect which results from the fragmentation of the horizontal strokes, it was thought to terminate the initial and medial forms of most letters with a hook, so as to produce another letter by reuniting the left hook', approximate translation by the author from Pihan, 'Note Sur La Nouvelle Méthode, 457.

extremely informed, showing a sophisticated system for representing the behavioural rules that govern the interaction of letters for the formation of words according to calligraphic practice: their correct implementation also contributes to increasing legibility (Figure 6.12, Figure 6.13).

Moreover, Granjon's first typeface is strongly consistent with a particular calligraphic style (*nash*), whereas the mixture of styles had been a recurring problem of European produced Arabic types. RG1 indeed shows an improvement in the shaping of letterforms that usually carried traits from other styles,³³ although some details are still missing (e.g. the barb of the *lām* in the *lām-alif* ligature, and in the isolated *kāf*, Figure 6.14).

The shape of individual letterforms is confidently handled, and although the forms are still not properly calligraphic, they represent a significant step in that direction. The proportions of characters one to another are overall significantly improved, especially in the balance of the counters; additionally, the letters that can be confused are successfully differentiated (e.g. medial 'ayn shows for the first time an intentionally blind counter³⁴ in accordance with the *nash* style, which differentiates it from medial *fā'*/*qāf*) (Figure 6.15).

However, there are still issues with the sizing of some characters: for instance, the letters *ṭā'*/*zā'* and *lām* are too narrow; the *ğīm* group in isolated final position, although the design was changed between the specimen and the book, is smaller in comparison to 'ayn in isolated/final position; the same letters have sometimes differently sized designs (Figure 6.16). The last observation concerning different designs of the same letters also highlights a different aspect regarding variants in RG1: some letters have indeed contextual forms to support the system created to indicate the medial forms of toothed letters, as mentioned above (Figure 6.17). Variants of other letters like *rā'*/*zā'* (especially in final position), show Granjon's meticulousness to represent accurately the Arabic script, particularly to allow the different requirements of joins between letters (Figure 6.18): on the other hand, this approach can be detrimental to the consistency of the forms, which become increasingly difficult to control across all the sorts.

The letter *kāf* is another interesting case regarding variants and in the method used (Figure 6.19). From the observation of the book, in particular, it seems that the *kāf* is obtained with a kind of modular system that uses base-forms – also used independently to indicate different letter combinations – to which is added a separate flag (Figure 6.20).

The existence of some of the variants discussed above and the innovative methods used to obtain an adequate representation of the Arabic script show not only Granjon's vision but, most importantly, an approach that does not rely on simplification, as seen in previous Arabic foundry types. On the other hand, there is a case that does not seem in line with Granjon's *modus operandi*, which raises questions: whilst the *ğīm* letter group is overall confidently shaped and used according to calligraphic practice (Figure 6.21), the addition of three new sorts that appear in the book of 1584–5 seem to break the consistency and harmony of RG1, almost giving the impression of belonging to a different typeface (or originating from a different hand).

33. For the first time the *kāf* shows a correctly shaped isolated form according to *nash* style with a straight baseline. The same can be said for the design of the *lām-alif* ligature in final position.

34. The poor impression can cause the closure of some counters with ink; one of the copies of the *Kitāb Al-Bustān* shows the letters *mīm* and *wāw* with blind counters, although they were originally designed to have white space.

From a design point of view, the new sorts appear more rigid and poorly shaped, losing the cursive quality introduced by Granjon's punch-cutting. From a composition point of view, they compromise the joins and positioning of letters, affecting the correct rendering of the script. The straight connecting stroke of two of the new sorts lowers the join with preceding letters to the notional baseline – instead of having them raised to a higher position according to calligraphic practice – solving, in a simplified way, the composition of certain letter combinations. However, to do so, they drop below the notional baseline (Figure 6.22). The primary function of two of these new sorts (i.e. to lower the connection) was already experimented with another sort of RG1 for the medial *ġim* group: however, this design – appearing in the first specimen and maintained in the book – was used as a ligature of a toothed character with the medial *ġim* group. Perhaps, the new sorts were introduced to replicate the same function, but enable the combination with any other character other than those with teeth.

The most accurate typographic representations of the script are obtained in RG1 with ligatures that also allow for connections above the notional baseline (Figure 6.23). Multilevel composition was also successfully achieved just with ligatures that represented vertical connections of two or more letters, including the ones with medial/final *ġim* group (Figure 6.24).

As already mentioned, the more fluid shape of the letters favours an undulating baseline; there are still visible gaps between letters, but they are reduced to a minimum. The similar treatment of the ascenders creates a homogeneous pattern, and the gentle slant is reflected on the individual shaping of characters that look more cursive. However, the numbers – that appear for the first time in RG1 – are designed less confidently and upright (Figure 6.25).

Compared to previous Arabic foundry types, RG1 presents more consistent diacritical dots, particularly in shape and size; however, their round form is not particularly calligraphic (referring to a different tool than the slanted nib of the reed pen). The position of the dots is also improved, although their alignment to the corresponding character is not faultless and they often sit too far from the letter. For the first time, Granjon also introduces rotated dots pairs (i.e. vertically arranged) as seen in calligraphic practice (Figure 6.26), which he uses in all his Arabic types. Doubts remain on whether the dots were cut/cast together with the base-forms or separately: in RG1 only a few instances seem to confirm the first option with the consistent placement of dots when the same letters or combinations occur. More often, the dots move around proving that they are separate from the base-forms; a few imprecisions in the placement of dots seen in the specimen of 1580 seem to confirm the presence of sorts for independent dots (Figure 6.27). Furthermore, it appears evident that the chosen system for the indication of medial tooth characters previously described contemplated the addition of separate dots at the composition stage. Perhaps, due to a large number of variations included in the type (meaning the cutting of more punches), motivated Granjon to exclude the dots – except for few letters – thus 'reducing' his work by producing only the base-forms, leaving the tedious workload for the implementation of dots to the compositor.³⁵

35. Hypotheses and doubts about Granjon's type-making processes for RG1 can find some answers in the analysis of the punches/matrices survived from his other Arabic typefaces, which might shed some light on the techniques used. Some of these are discussed in the following sections in this chapter.

However, it seems that typesetting Arabic with Granjon's system of 'peaks' was inconvenient and laborious; for this reason it was reportedly abandoned:

Les points diacritiques, gravés et fondus séparément, s'ajustaient au besoin, au-dessus ou au-dessous de ces crochets, dans l'une des deux lignes de parangonnage. Mais ce mode typographique offrait trop d'inconvénients; il exigeait une série de points fondus sur trois hauteurs différentes dans la même ligne, et une autre série de points accompagnés des voyelles et accents orthographiques. Sous le rapport de l'art, l'effet d'ensemble était satisfaisant; toutefois la main-d'oeuvre coûtait fort cher, à cause des lenteurs du travail, et l'ont y a renoncé.³⁶

Granjon's first Arabic shows an improved fitting over previous Arabic printed works – especially in the specimen – with the lines of text tightly spaced as seen in calligraphy. Nevertheless, the need to justify the block of text (both in the specimen and in the book) perhaps created combinations that are either too closely or too loosely spaced (Figure 6.28). The book presents more problems in the fitting than the specimen, also due to the introduction of the straight kašida sort, already mentioned.

RG1 presents sorts with good kerning capacity: this feature together with the system of curved extensions and the different length letters' variants, contribute to reproducing the flowing rhythm and texture of written Arabic, adding to a highly readable type. The kerning is sensibly handled, with the exception of the extreme nesting pairs which are typical of constructed calligraphic compositions and that do not belong to the nash 'linear' style. Moreover, RG1 shows for the first time an attempt to reproduce the gentle slant of the joining line typical of nash calligraphy (Figure 6.29).³⁷

With his first type Granjon set new standards in Arabic typography, which he explores further in the other Arabic types during his stay in Rome, proving – as Vervliet observed – 'what was possible, typographically speaking, in a single decade' with his punch-cutting talent and 'the backing of the pontifical court and of the Medici'.³⁸ The quality of Granjon's Arabic typefaces, and most importantly, the knowledge demonstrated in representing the structure of the script raises questions on the expertise he had access to, whether from manuscripts or advisors, which clearly had a critical influence on his work.

36. 'The diacritical points, cut and cast separately, were adjusted if necessary, above or below these hooks, in one of the two lines of alignment. But this typographic method offered too many inconveniences; it required a series of points cast on three different heights in the same line, and another series of points accompanied by vowels and orthographic accents. From the artistic point of view, the overall effect was satisfactory; but the labor was very expensive, because of the slowness of the work, and it has been waived'; approximate translation by the author from Pihan, 'Note Sur la Nouvelle Méthode', 457.

37. The digital typesetting in Figure 6.29 is realized with WinSoft's Tasmeem, a tool to compose professional Arabic typography. The Arabic text is set on *calligraphic spacing*, which reproduces 'the traditional writing and typesetting with spaces evenly distributed between letter groups' and serves as a good example for the comparison with a line of text set in RG1. See DTP Naskh manual and guidelines: Thomas Milo, *DTP Naskh - the DecoType Professional Fonts Series (1995)*, 2017, accessed 15 January, 2017, [https://www.academia.edu/3291773/DTP_Naskh_-_The_DecoType_Professional_Fonts_Series_1995_](https://www.academia.edu/3291773/DTP_Naskh_-_The_DecoType_Professional_Fonts_Series_1995_.).

38. Vervliet, 'Cyrillic & Oriental Typography in Rome', 432.

6.1.2 The *Typographia Medicea*

Before discussing the work of Granjon for the *Typographia Medicea*,¹ it may be useful at this juncture to give a brief summary of the Press' complex history and to highlight the key figures and events necessary to contextualise the Medicean Arabic editions and their Arabic type production.

The *Typographia Medicea* was founded in Rome on the 6th March 1584 by agreement of Cardinal Ferdinando de' Medici (later Ferdinando I Gran Duke of Tuscany) and the Pope Gregorio XIII, following the suggestion of Giovanni Battista Raimondi.² The Cardinal was the main supplier of all the necessary funds for setting up and running the Press. In exchange, he reserved himself the complete ownership of the Press and everything that belonged to it, including the manuscripts; he would also receive 70% of the earnings from the sale of books, while the remaining 30% was divided amongst a *congregation* of people.³

According to the founding document, besides the monetary gains, the *Typographia Medicea* aimed to spread the knowledge of science and pave the way to the dissemination of the Christian faith.⁴ These three motives reflected the individual interests of the key figures involved in the establishment of the Press, mentioned above. However, it seems evident that the *Typographia Medicea* was primarily a commercial enterprise and that missionary bias – as suggested by historian Robert Jones – was aimed to gain political or financial support and was somehow compulsory in sixteenth-century Rome.⁵ Raimondi's vision for the Press included not only the printing of works but also planning for their successful reception and distribution in the East. On this basis, no expense was spared to provide the Press with all the necessary material, including a large number of Oriental types, 'so imposing that most of them were never used'.⁶ The Press was also provided with a library, initially formed with the manuscripts acquired from the patriarch of Antioch Ignazio Na'matāllah.⁷ From 1584, the travellers Britti and the Vecchietti brothers⁸ were sent on political and diplomatic missions on behalf of the Church, visiting Ethiopia, Egypt, Syria, Armenia, Persia and India. While abroad, they had to gauge whether there was a potential market to sell the Medicean Arabic books; establish which subjects would be better received and allowed through Turkey and Syria; collect information about the expenses, means and permissions necessary to transport and distribute the books from Cairo to Ethiopia by land (on the backs of camels and

1. Also known in Italian as *Tipografia Medicea Orientale*.

2. Tinto, *La Tipografia Medicea Orientale*, 6.

3. The 'Congregazione' included Raimondi, responsible for overseeing the printing of the works in the Press; Cipriano Saracinelli, secretary in charge to liaise with the patriarchates of Alexandria and Antioch; Donato d'Antella (treasurer) and Giovanni Battista Britti (traveller). The Patriarch of Antioch Ignazio Na'matāllah was also included. See Guglielmo E. Saltini, 'Della Stamperia Orientale Medicea E Di Giovanni Battista Raimondi', *Giornale Storico degli Archivi Toscani*, 4 (1860): 260–61; Tinto, *La Tipografia Medicea Orientale*, 7.

4. The document, referred to as 'Instrumento', is in the Archivio di Stato in Florence: ASFI [Misc. Med.719 (1), ff. 1–2].

5. Robert Jones, 'The Medici Oriental Press (Rome 1584–1614) and the Impacts of Its Arabic Publications on Northern Europe', in *The 'Arabick' Interest of the Natural Philosophers in Seventeenth-Century England*, edited by Güll A. Russel, 88–108 (Leiden: E.J. Brill, 1994).

6. Approximate translation by the author. Tinto, *La Tipografia Medicea Orientale*, 8–9.

7. Ibid., 8. Na'matāllah brought the manuscripts with him when he arrived to Rome in the late 1577 or early 1578. He relinquished them to the Cardinal in exchange for a pension, reserving the right to have lifetime access for his studies.

8. Giovanni Battista and Gerolamo.

other animals) or the Red Sea.⁹ During their travels, Britti and the Vecchietti brothers were also entrusted to carry printed proofs of the Medicean editions and, especially of the *Evangelium*, 'di ricercare se tale stampa piacesse, e sentirne i pregi e i difetti, e di agevolarne in quelle parti il commercio'.¹⁰

The travellers also had to search for Oriental manuscripts – to bring back to Rome to enrich the Press's library – which could be instrumental for the planned Polyglot Bible and scientific works useful for the other Medicean publications.¹¹ Vecchietti, in particular, was in charge to find in Persia and its surroundings the manuscripts suggested by Na'matāllah, but also grammars and lexicons of Arabic translated in Turkish and Persian (and vice versa), Arabic versions of Greek and Latin authors and manuscripts of any subject with 'the most beautiful characters', to serve as calligraphic models.¹²

Besides the manuscripts, the *Typographia Medicea* also had a large resource of people to provide assistance in the production of the Arabic publications. As already mentioned, in Rome Raimondi had access – more than any other Orientalist in Europe – to visitors from the Eastern churches of the Levant and Egypt, North Africans and Turkish converts to Catholicism;¹³ moreover, the Neophyte and Maronite colleges in Rome supplied him with Arabic-speaking assistants and scribes. Since its founding, the Press had established an editorial committee responsible for preparing the editions and ensuring the fidelity and correctness of translations for the works to print.¹⁴ The team – supervised by Raimondi – was formed by Na'matāllah, the physician Giovanni Battista of Lucca, the Turkish neophyte Paulo Orsino, the Maronite scholar Gabriel Sionita, the Maltese priest (appointed Bishop of Sidonia) Leonardo Abel, the Dominican friar Tommaso da Terracina and the Spanish Franciscan monk Diego de Guadix. Amongst other people involved, the neophytes Guglielmo (Orsino) Africano from Tunis and Domenico Sirleto Africano from Djerba.¹⁵

Raimondi's editorial programme for the Press included the publication of scientific classics, grammars, dictionaries, holy scriptures and in particular a Polyglot Bible bigger than the *Complutensian Polyglot Bible* (6 volumes, four languages) and the *Plantin Polyglot* (8 volumes, five languages). He planned to print initially six volumes in Greek, Hebrew, Chaldean, Syriac and Arabic with the relative Latin translation (Vulgate text); he then intended to add five volumes in Persian, Armenian, 'Egyptian' (Coptic), Ethiopic and 'Schiavona' (Slavic) plus additional volumes for the grammars and dictionaries for each language. It was an immense project, requiring about 6–7

9. See Fani and Farina, *Le Vie Delle Lettere*, 48–49. The route through Portugal was also considered, so as a possible distribution to India.
10. 'To gauge whether it was liked, to hear its merits and defects, and to facilitate its trade in those places', approximate translation by the author from Angelo M. Bandini, *La Stamperia Mediceo-Oriente. Frammento Di Una Memoria In Parte Inedita Del Canonico Angelo Maria Bandini*, edited by Giuseppe Palagi (Firenze, 1878), [Estratto dall' *Arte della Stampa*], 34. See also Robert Jones, 'The Medici Oriental Press', 98–100.
11. Saltini, 'Della Stamperia Orientale Medicea', 261–62.
12. See Fani and Farina, *Le Vie Delle Lettere*, 49–50.
13. Jones, 'Learning Arabic in Renaissance Europe', 85.
14. For instance for the publication of the *Avicenna*, and for the long-term project of the Polyglot Bible. See Saltini, 'Della Stamperia Orientale Medicea', 263.
15. Both Orsino and Sirleto copied manuscripts for Raimondi and others, like Leonardo Abel. According to Jones, a manuscript exemplar of the printed edition of the Medicean *Evangelium* conserved at the Biblioteca Nacional in Madrid [MS Res 208] provides evidence of its translation being a team effort by showing the signatures of different scholars. See Jones, 'Learning Arabic in Renaissance Europe', 87, 89–90 and note 244. The author could not access this manuscript.

years of work and a significant economic investment.¹⁶ This work was never completed aside from the *Evangelium* published in two editions, in Arabic and with the interlinear Latin translation.¹⁷

The *Typographia Medicea* started to decline even before its first book was published, due to a series of events that in different ways affected its development. In 1587 the Cardinal de Medici became Grand Duke of Tuscany leaving the Press in the hands of Cardinal Gabriele Paleotti. Furthermore, Granjon started to show signs of illness dying three years later, and the newly elected Pope Sisto V – who founded the *Tipografia Vaticana* in 1587 – was more focused on the Counter-Reformation than promoting the missionary activity through printing, as was previously done by Gregorio XIII.¹⁸ The discontent resulting from poor sales brought the Grand Duke to be more prudent with his financial donations to the printing house. Thus, after being convinced by Raimondi that there was no purpose to transfer it to Tuscany where he had relocated, he eventually decided to sell the entire Press to the Orientalist in 1596.¹⁹ According to the contract, Raimondi should have paid the agreed price through the sale of the books and kept the rest of the profit after the debt was settled.²⁰ However, Raimondi never recovered from the financial problems, although he strove to raise new funds that could finally allow the start of the Polyglot Bible.²¹ The contract, and therefore the debt, was eventually cancelled in 1610, after the death of Ferdinando I and thanks to the generosity of his son Cosimo II. Raimondi remained in charge of the Press and was also allowed a pension, but this income and the grant that he still received from the Camera Apostolica were not enough to finance the printing of new work. Nonetheless, the resourceful Orientalist managed to keep publishing, forming temporary companies using Giacomo Luna²² as the printer. However, he had to wait 15 years before issuing a new Arabic work in 1610: the *Liber Tasriphi* – published under the name ex *Typographia Medicea Linguarum Externarum* – was also the last edition of the printing house.

After the death of Raimondi in 1614, the material of the Medicean Press – including the types, punches, matrices and manuscripts – were moved several times from Rome to Pisa and to the Palazzo Vecchio in Florence, where a fire in 1690 caused a significant loss. It is reported that in 1740 Monsignor Evodio Assemanni did an inventory of the 35 cases of types that were kept in Florence.²³ Nonetheless, it should be noted that the Medicean material did not arrive complete in Florence in 1684 because some of the matrices and punches of Arabic, Hebrew and Chaldean types were left in Rome for the newly formed Press of the Propaganda Fide.²⁴ In 1684, Gran

16. Tinto, *La Tipografia Medicea Orientale*, 59–74.

17. Ibid., 79. At least one of the grammars either the *Kāfiya* or *Āğurrūmiyya* (both 1592), could have been the extra volumes to accompany the Bible.

18. Oriental printing gained a new central role with the following Pope Gregorio XV, who founded the Congregation de Propaganda Fide in 1622 and its Polyglot Press founded by Urbano VIII in 1626 for missionary purposes (see See § 7.1.3). Tinto, *La Tipografia Medicea Orientale*.

19. An extract of Raimondi's compelling arguments opposing the move to Florence is given in Saltini, 'Della Stamperia Orientale Medicea', 277–78.

20. Ibid., 297–98.

21. A document in the Medicean Archives reports of a third attempt to sell the Press to the king of Spain. Tinto, *La Tipografia Medicea Orientale*, 76 and Saltini, 'Della Stamperia Orientale Medicea', 280.

22. See below in this section.

23. Bandini, *La Stamperia Mediceo-Orientale*, 18. The author has not found other news about this inventory. An Assemanni catalogue of the Medicean manuscripts was published in 1742 and is still in use at the BML. However, there is no mention of the types.

24. An act to please the Pope, disappointed not to inherit the Medicean Press from Raimondi, who left

Duke Cosimo III loaned a large part of the remaining punches and types to Cardinal Gregorio Barbarigo in Padova, for the new Oriental Press that he intended to open in the seminary of his diocese.²⁵ The most significant displacement of the Medicean material was however in 1811 when, following the French invasion, Napoleon took it to the Imprimerie Impériale in Paris.²⁶ The Oriental types – ‘trovati in un magazzino della stamperia imperiale, tuttora nelle casse in che furono inviati’²⁷ – returned to Florence only in 1815,²⁸ housed by the Biblioteca Medicea Laurenziana until 1860. In that year, these were moved to the Reale Archivio Centrale di Stato for the printing of the *Diplomi Arabici*, by Michele Amari in 1863,²⁹ only to return permanently to the Laurenziana library, where they are still conserved today.³⁰

The sales of editions and the reactions

It is the common opinion that the Typographia Medicea was a financial failure. According to Tinto, the origin of the crisis must be sought in the excessive grandeur of the project and the insufficient availability of funds,³¹ whereas for others the ultimate reason of its downfall was the poor sales of the books, especially in the Middle East, due to the Muslims’ refusal to buy printed editions.³² There is mixed evidence on whether the Medicean publications were intended for the Middle Eastern or the European market. Some features of the books reveal an effort to please the former and disguise their Western provenance, like the lack of prefaces or introductions, the monolingual editions and the imitation of the manuscript’s layout.³³ Further evidence is supplied by the already mentioned concern to ‘investigate the readiness of Muslims to receive printed books’ with proof sheets and presentation copies,³⁴ and to find expedients to facilitate their distribution, like the *firman* in Ottoman

it instead to the Grand Duke Cosimo II, as a sign of gratitude to the Medici family. Saltini, ‘Della Stamperia Orientale Medicea’, 292–93.

25. Ibid. It is not clear if only the punches were loaned, or also the matrices, as stated by Piemontese in ‘La «Grammatica Persiana» di G. B. Raimondi’, *Rivista Degli Studi Orientali* 53, no. 1/2 (1979): 147. See also *Typographia Seminarii, Padua* in § 7.2.1.
26. For a more detailed account of the events, Paul Marmottan, *La Typographie Orientale Des Médicis Et Napoléon* (Paris: Librairie A. Picard, 1923), [Extrait de la *Revue des Etudes Historiques* (Juillet-Septembre 1923)].
27. ‘Found in a warehouse of the Imperial printing office, still in the cases in which they were sent’, approximate translation by the author, from Saltini, ‘Della Stamperia Orientale Medicea’, 294.
28. François Antoine Duprat, *Histoire De L’Imprimerie Impériale De France* (Paris: Imprimerie Impériale, 1861), 260.
29. Ibid., 295. The types had also been used few other times to print works in Florence between 1774 and 1582 as described by Saltini in the same work.
30. As suggested by Professor Neil Harris, before returning to the Laurenziana library in 1912, the Medicean types were located at the ‘Istituto di Studi Superiori’ in Florence, which became the ‘Università degli Studi di Firenze’ in 1923. Neil Harris, e-mail message to author, 3 June 2016. The author attempted without success to find documents cataloguing the types or tracing this displacement both at the University’s Archivio Storico and in the Biblioteca Medicea Laurenziana in Florence. Amongst the Medicean material kept in Florence today survive 39 cases of punches of Arabic, Turkish, Persian, Syriac, Coptic, Armenian, Hebrew, Greek and Latin, listed by Charles Whitehouse in his work *Stamperia Medicea*. It is possible that some of these punches could be identified with the types acquired from the Polyglot Press. Besides the cases of punches (some of them in Appendices 7, 8, 10, 27–29, 43), and cast type, other material from the Press survive, although in poor conditions such as furniture and the labels for the types (Appendix 17).
31. Tinto, *La Tipografia Medicea Orientale*, 83.
32. Gdoura, *Le Début De L’imprimerie Arabe*, 38 and Roper, ‘Arabic Printing in Malta’, 51.
33. Robert Jones, ‘The Medici Oriental Press’.
34. Ibid., 99–100.

Turkish issued by Sultan Murad III at Istanbul in 996/1588 added in the last page of the Euclid.³⁵

On the other hand, there is also evidence that also suggests an interest towards a European readership: the Press released two bilingual editions (the *Evangelium* and the *Professio Fidei*) and added Latin title pages to some editions (the two grammars and the *Geographia*, all from 1592). Moreover, the *Alphabetum Arabicum* was clearly intended for the Western market. But, as observed by Jones, the Medicean editions were 'indulgent and disappointingly unsuitable for European requirements',³⁶ because very few were able to read the unvocalised texts, proving difficult to use as didactic tools.³⁷ The *Alphabetum* was good for teaching beginners, but not enough to support a more advanced reading level and the understanding of the other unvocalised publications. The two Medicean grammars – which addressing this need were of great interests to European scholars – were unvocalised and therefore of difficult access without the assistance Arabic-speaking teachers.³⁸

Jones also reports of the mixed reaction to the Medicean editions by European Orientalists, divided between admiration for the Press' efforts and praise for the types, and criticism for the difficult texts and their many errors, as summarised by the Dutch Orientalist Raphelengius in 1595:

[...] a printing Press at Rome replete with the most elegant type [...] that nothing could be added in the way of greater embellishment. Yet most people passionately complain that they do not slake the thirst of our still ignorant Europeans.³⁹

The Medicean books were certainly sent to Turkey, Lebanon, Egypt and Ethiopia,⁴⁰ without bringing the hoped-for profits. The printed editions proved difficult to sell even at a much cheaper price than their manuscript counterparts, as testified by the French Orientalist Antoine Galland with regard to a copy of the *Avicenna* that he had seen in a bookshop in Istanbul, probably between 1670 and 1673:

J'ai vu à Constantinople dans la boutique d'un libraire, un Avicenne de l'impression de Rome, laquelle surpassé en beauté toutes les impressions en arabe qui ont paru depuis & qui imite le mieux l'écriture des manuscrits, que ce libraire gardoit depuis longtemps quoiqu'il l'eût offert beaucoup meilleur marché qu'il ne se vend en chrétienté, pendant que lui & les autres libraires vendaient fort chérement le même ouvrage manuscrit.⁴¹

As already mentioned, the disappointing sales in the Middle East and Europe weighed heavily on the Press, especially comparing the numbers of the print runs

35. Ibid., 97–98 (see Appendix 39). The edict granted protection to the Italian merchants to trade their goods, including books, in the Ottoman territories. However, there are some doubts concerning the origin and the content of this document. See Fani and Farina, *Le Vie Delle Lettere*, 51–52 and Gdoura, *Le Début De L'imprimerie Arabe*, 89–90.

36. Jones, 'The Medici Oriental Press', 92.

37. Ibid., 93. Although the monolingual editions, if used in conjunction with existing Latin translation of the texts, as well as the bilingual editions on their own, could offer 'a rich supply of vocabulary, both religious and scientific' for European Arabists.

38. Ibid., 98.

39. Ibid., 90.

40. See Roper, 'Arabic Printing in Malta', 51; Gdoura, *Le Début De L'imprimerie Arabe*, 38.

41. 'I have seen in Constantinople, in the shop of a bookseller, an Avicenna printed in Rome, which surpasses in beauty all the prints in Arabic which have since appeared, and which best imitates the writing of manuscripts, that this bookseller kept for a long time although he had offered it much cheaper than it is sold in Christendom, despite that he and the other booksellers sold the same manuscript very dearly', approximate translation by the author from Duverdier, 'Les Impressions Orientales', 249. See also Gdoura, *Le Début De L'imprimerie Arabe*, 96–97.

with those of unsold copied still available in the eighteenth century, traceable in some Medicean documents.⁴² For instance, of the original 3,000 copies printed of the *Euclid*, 1,967 were still unsold in 1772.⁴³ It should also be said that the Medicean print runs were overestimated: the *Evangelium* was printed in 5,000 copies – 1,500 of the Arabic and 3,500 of the Arabic-Latin version – an impressive number by Renaissance standards.⁴⁴ Furthermore, the famous events of the clandestine copies sold cheaply on the European market by the Medicean *proto*⁴⁵ Matteo Neroni compromised more profitable sales at the Frankfurt Fair of 1594.⁴⁶ Finally, it seems that many Medicean copies reached the Middle East as gifts, like the recorded donation of a case of books from Cardinal de Medici to the Lebanese Amīr Fakhr al-Dīn II in 1631 in exchange for a bale of silk.⁴⁷ A late note of Raimondi also records a donation of books to be brought to Persia, suggesting that in his last years he was ready to give some books away just to see them reach their intended readership.⁴⁸

Raimondi, the people in the Press and the types

Tinto described Giovanni Battista Raimondi as a scholar but not a technician of typography.⁴⁹ He was an Orientalist, passionate about philosophy, chemistry, astronomy and maths.⁵⁰ Besides Latin and Greek, he learned Oriental languages (Arabic, Persian, Turkish and Syriac) and sojourned briefly in the East: he reported of his travels from Hormuz – an island in the Persian Gulf – to Venice, between February and December 1575. As the scientific director of the Typographia Medicea, he was in charge to oversee both the scholarly programme and the practical works of the Press.⁵¹ He produced many important works, also leaving a wealth of manuscripts – mostly preparatory material for finished and unfinished works⁵² – but also records,

42. Extrapolated from the papers concerning the Neroni trial, see below.

43. A more complete table is given in Fani and Farina, *Le Vie Delle Lettere*, 75.

44. Neil Harris, 'Printing the Gospels in Arabic in Rome in 1590', in *A Concise Companion to The Study of Manuscripts, Printed Books, and the Production of Early Modern Texts*, ed. Edward Jones (Chichester, West Sussex: Wiley-Blackwell, 2015).

45. The person running the composition department of a printing house, see § 3.2.3, note 96.

46. A detailed account of this event and the trial to Matteo Neroni is in Antonio Bertolotti, *Le Tipografie Orientali E Gli Orientalisti A Roma Nei Secoli XVI E XVII* (Firenze: Tipografia della Gazzetta d'Italia, 1878), [Estratto dalla *Rivista Europea*].

47. Roper, 'Arabic Printing in Malta', 44.

48. Fani and Farina, *Le Vie Delle Lettere*, 53–54.

49. Or, for that matter, a prudent administrator of the Press. He proposed new systems to print books – including a more advantageous way to print Arabic – although their description is not clear from the sources. Tinto, *La Tipografia Medicea Orientale*, 58–61.

50. In Rome he was known as the 'father of geometry', Saltini, 'Della Stamperia Orientale Medicea', 264.

51. Angelo M. Piemontese, 'The Emergence of Persian Grammar and Lexicography in Rome', *Rivista Degli Studi Orientali*, Nuova Serie, 83, no. 1/4 (2010), 402.

52. In particular for a Persian grammar (entitled *Rudimenta Grammaticae Linguae Persicæ*), which many bibliographic sources erroneously reported as printed at the beginning of the seventeenth century. It appears that the work in question (i.e. Raimondi's Persian grammar to which scholars refer to) is in fact a manuscript and not a printed book: this is contained in the *Ianua Linguae Persicæ*, BAV [Vat.pers.24] (Appendix 12), a manuscript conserved in the Vatican library. A preparatory work for this grammar is the BNM [Or. LIII (27)] in (Appendix 13), that Raimondi copied as a layout for printing: although this work carries a note of an *imprimatur*, it was never printed. On the other hand, it appears that the manuscript BAV [Vat.pers.24] was not written by Raimondi as stated by Piemontese (his Arabic handwriting was of far superior quality), but copied by one of his students, perhaps Flaminio Clementino Amerino, as suggested by the scholar Ettore Rossi. Therefore, Amerino in 1614 reworked (and authographed) the Persian grammar (and Latin explanation) of Raimondi. See Ettore Rossi, *Elenco Dei Manoscritti Persiani Della Biblioteca Vaticana. Vaticani, Barberiniani*,

notes and proofs.⁵³ Besides interpreting and translating many of the manuscripts received from the East – and compiling drafts of lexicons and glossaries⁵⁴ – Raimondi realised one or more copies of the manuscripts texts that were to be printed so they could be more easily readable.⁵⁵ His meticulous practice included some more finalised copies intended as layouts prepared for printing, which reflected the arrangement planned for the printed texts.⁵⁶ These copies would serve not only to facilitate the work of the compositors but also as models for the types:⁵⁷

[...] abilissimo nella scrittura dei caratteri orientali, di sua mano preparava loro gli esemplari, ordinava e dava la forma ai punzoni di tutte quelle lingue, con una intelligenza e perizia più unica che rara.⁵⁸

It is also apparent that Raimondi had a certain interest in Arabic calligraphy: samples of different Arabic calligraphic styles are amongst his papers available in the Medicean Archives, possibly documents collected for study purposes.⁵⁹ The printing was then preceded by many proofs and corrections, some of which survive amongst the material of the Press (Appendix 9).

A document from the Medicean Archives⁶⁰ lists some of the people working in the printing Press: amongst them, the expert compositor of Oriental languages – especially Arabic – Giacomo Luna,⁶¹ the typefounder ('gittatore') Antonio di Chiari and, in addition to Robert Granjon, a 40-year old Flemish punch-cutter by the name of Alberto Cesari.⁶² Other documents mention the names of Gregorio, Battista Pavone and Antonello Facchetti as printers; the brothers Cesare and Pietro Eliano,

Borgiani, Rossiani, Studi e Testi 136 (Città del Vaticano: Biblioteca Apostolica Vaticana, 1948), 52–54, Piemontese, 'La «Grammatica Persiana»: 142 and Piemontese, *Catalogo Dei Manoscritti Persiani Conservati Nelle Biblioteche D'Italia, Indici e Cataloghi*, Nuova Serie, V (Roma: Istituto Poligrafico e Zecca dello Stato, 1989), 349.

53. Piemontese, 'The Emergence of Persian Grammar', 404. These documents and the manuscripts of the *Typographia Medicea* are mostly divided between the BML, BNCF and ASFI in Florence; the BNF in Paris, the BNM in Venice and the BNN in Naples.

54. See Appendix 11.

55. See Appendix 2, 11, 15.

56. See Appendix 13, and Figure 2.29. Some of these layout copies also carry notes with the corresponding page numbers of the printed editions, like the manuscript of the *Liber Tasriphi* Figure 2.33 and Figure 2.34.

57. See also § 2.2 and § 6.1.4.

58. '[...] very able in writing Oriental characters, he prepared the models in his own hand, ordering and giving shape to the punches of all those languages, with unique and rare intelligence and expertise', approximate translation by the author from Saltini, 'Della Stamperia Orientale Medicea', 269. See also Fani and Farina, *Le Vie Delle Lettere*, 54–55.

59. See Appendix 16. The Appendices 18–23 have also been written by Raimondi and are part of his accounts books: the Appendix 18 refers to the 'Arabica grande' [RG3] and the Appendix 18 to the 'Arabica piccolina' [RG5] by Granjon, whereas the Appendices 21–23 refer to other Arabic types allegedly cut by French punch-cutter Cavaillon (see § 6.1.6).

60. Written by Raimondi probably in 1585, entitled 'Breve raguaglio [...]'; Tinto, *La Tipografia Medicea Orientale*, 11–12. Amongst other important sources of information are Raimondi's accounts books, personal correspondence and other papers of the Medicean Press.

61. His real name was Yákub al-Hilâl, a Maronite from Baslukît, Lebanon. It is possible that he, like Cesari, worked for Basa before the Medicean Press. In 1595, he founded his own press called 'Typographia linguarum externarum'. See also Nasser Gemayel, 'Les Imprimeries Libanaises De Rome', in *Le Livre Et Le Liban Jusqu'à 1900: Exposition*, edited by Camille Aboussouan, 190–93 (Paris: Unesco, 1982).

62. There are still doubts about role of Alberto Cesari [de Keyser?] in the Press: originally a goldsmith, it is not clear if he was a punch-cutter or if he was a kind of servant to Granjon as a 'forgiatore' (i.e. someone who prepared the steel for the punches), as suspected by Vervliet in *Sixteenth Century Printing Types*, 33. See also Tinto, *La Tipografia Medicea Orientale*, 13–15.

also compositors;⁶³ the founder Clemente Stangaporta from Rome;⁶⁴ the proof-reader Tommaso da Terracina.⁶⁵ Finally, it is known that two additional punch-cutters worked at the Press: Jean Cavaillon⁶⁶ and Giovanni Battista Sottile.⁶⁷

The 'Breve raguaglio' also informs us that – besides contracting workers, paper and other materials for printing from Basa⁶⁸ – the *Typographia Medicea* also acquired⁶⁹ from the Papal Polyglot Press an Arabic type (RG1),⁷⁰ a Syriac⁷¹ type by Granjon and a Greek type;⁷² whereas there were plans for future acquisitions of an Armenian and a Cyrillic type.⁷³ Moreover, the document, lists a 'lettera Arabica Orientale grande' already cut to use for the Scriptures, a 'lettera Arabica Orientale piccolina' to print scientific books, plus a Persian and a Turkish type.⁷⁴ This source, together with Raimondi's personal accounts and payment books, also served to date the making of the Arabic types. However, there are some conflicts in the dates recorded in the sources for the punch-cutting, casting and payment of the types, which still need clarification. A hypothesis for some chronological discrepancies is that Granjon delivered batches of punches and matrices to the typefounder as he progressed with the work rather than finished sets.⁷⁵ Despite the uncertainties about the start and finish date for each type, it is clear that Granjon worked at the Arabic types for the Medicean Press between 1584⁷⁶ and the spring of 1590, when he died. During this time, he possibly worked at more types at the same time, which may have contributed to the longer timeframes recorded in the Medicean documents than what it would have normally required.⁷⁷

63. They are described as skilled in composing Arabic, Chaldean, Hebrew and Latin.

64. He took over from Antonio di Chiari from 1587.

65. See Tinto, *La Tipografia Medicea Orientale*, 11–19.

66. See § 6.1.7.

67. Sottile was a punch-cutter and typefounder who worked first at the Papal Polyglot Press and then for the Medicea from 1593. He later moved to de Propaganda Fide. It seems that Sottile made only a Chaldaic type and perhaps an Estrangelo type for the Medicean Press, for whom there are payments dated 1593. See Tinto, *La Tipografia Medicea Orientale*, 51–52

68. *Ibid.*, 19.

69. As already mentioned it was not an actual sale from Basa, because the types were a property of the Pope, see note 17.

70. Tinto, *La Tipografia Medicea Orientale*, 23. In the Medicean document, this type is just designated as 'letter Arabica Orientale', identified by Tinto as the first Arabic (RG1). On the other hand, it seems that RG2 was not acquired.

71. Made by Granjon in the years 1579–1580.

72. It is not sure if this type was from the Polyglot Press or Basa's personal printing press, Tinto, *La Tipografia Medicea Orientale*, 24.

73. *Ibid.*, 24–25. Also cut by Granjon for Basa: the first in 1579, the second finished in 1582. In Raimondi's document the Cyrillic is called 'letter schiavona' and 'letter dalmata'.

74. *Ibid.*, 25–27. Tinto also reports the most recent inventory of the types available in the *Typographia Medicea* was redacted probably in 1600: however, he warns that the document presents mistakes and discrepancies with Raimondi's accounts and the other Medicean papers.

75. For a more detailed account, see Tinto, *La Tipografia Medicea Orientale*.

76. At least officially, as this date corresponds with the foundation of the Medicean Press. The RG2 type appeared first in 1583, in a specimen addressed to the Pope Gregorio XIII, and later in a Medicean work. However, it is not clear from the sources if this type belonged to the Papal Polyglot Press before the *Typographia Medicea*.

77. Tinto stated that according to what can be deducted from the sources, the type-making of RG3 required three years. This is a rather long time compare to Vervliet's estimate of four to six months for the punch-cutting and casting of a new type in the sixteenth century. Tinto, *La Tipografia Medicea Orientale*, 27 and Vervliet, 'Cyrillic & Oriental Typography in Rome', 436, note 79.

There are also doubts regarding the identification of the Arabic types recorded in the Medicean sources. The 'Arabica grande' seems to be certainly identifiable with RG3. There are also two small Arabics: the '1º carattere arabo piccolo' identifiable with RG4 and the '2º carattere arabo piccolo', which took nearly four years, identifiable with RG5. However, according to Tinto, the 'Arabica mezana' – mentioned in a single payment for the punches and matrices in a Medicean paper dated 1587 (Appendix 20) – is still not identified.⁷⁸

78. The author hypothesises that this type could be RG2. Although the payment is dated 1587, it mentions only 6 punches and 12 matrices, perhaps a simple addition to the original type, which was made at an earlier date. RG2 appeared indeed for the first time in the specimen of 1583 signed by Granjon. It is possible that RG2 was acquired by the Medicean Press but never really used besides the last page of the *Alphabetum Arabicum* of 1592 (where the same text of the specimen is repeated). See also Tinto, *La Tipografia Medicea Orientale*, 28–29.

6.1.3 The second Arabic type

The second Arabic of Granjon (RG2)¹ is used in a single sheet Arabic specimen dated 1583,² which also carries his name (Figure 6.30), and on the last page of the *Alphabetum Arabicum* of the *Typographia Medicea*, 1592 (Figure 6.31).³ According to Vervliet, RG2 is on the same body of RG1 and therefore it could have been cast in the same mould, but with a larger x-height that could serve for titling.⁴

The analysis of this Arabic type has some limitations, due to the small sample of text provided by the two sources; nonetheless, they supply enough elements for some brief considerations. It should be noted that the two sources present the same text, but show differences in the setting/placement of the vowels and dots: the second observation is particularly relevant, as it seems to confirm that the dots are separate from the base-forms (except, again, for few letters like *nūn*) (Figure 6.32). Vervliet observes that in this Arabic the French punch-cutter 'freed himself of the dry scribal hand of the Jesuits' Arabic. An exuberant calligraphy, quite close to Granjon's italics, characterized these new types which I feel have never been equalled.⁵ Overall, the RG2 type maintains many features already discussed for RG1, from the gentle slant to the more cursive and dynamic letterforms. On the other hand, there are some significant differences. Firstly, the type shows letterforms that are stylistically inconsistent: some features seem to be of *tulut* inspiration rather than *nash*, like the introduction of a barb in the ascenders of *alif*, the crossed isolated *hā'*/*tā'* *marbūṭa*,⁶ and new forms for *wāw* and *rā'*. Likewise, for the flag of the letter *kāf* that shows the typical form of *tulut* (Figure 6.33).

In terms of structure (e.g. the method employed to indicate the medial toothed characters), RG2 follows the same approach introduced by Granjon with his first type RG1. Likewise, the two types use a separate flag added to the base-form of *lām*, when necessary, to indicate the letter *kāf* (Figure 6.34). Nevertheless, when *kāf* is designed as part of a ligature, it maintains the typical *nash* form, exposing RG2 even more as a hybrid design between *tulut* and *nash* styles. Furthermore, RG2 introduces another feature – observed particularly in the *tulut* style – interpreted in typographic form. Calligraphic composition allows characters that belong to different words to join 'across the visual space and irrespective of the orthographic status of that space'.⁷ This means that letters could appear to be visually connected although they are orthographically independent. The RG2 type seems to represent some of these calligraphic *visual ligatures* but adapting them to the typographic environment.⁸ In

1. Also known as *The Medium Arabic (on 2-line Great Primer: 200 mm)* in Vervliet, 1981; 'Arabic on Two-line English [Ar 200] or *Petit-canon* (1583)' in Vervliet, 2008.
2. 'Arabici Characteres. GREGORII XIII. PONT. OPT. MAX. IVSSV. *Nunc Primum Romae Incisi*. Rob. Granjon Parisien. Typographus & Characterum Incisor. Incidebat Romæ, 1583. *ÆTATIS SUÆ. LXX.* ASFI [Misc.Med.720 (6) n.10, f.13r]. Vervliet indicates the present specimen as [Misc.Med.Stamp. Or., 4 (5), f.10], according to the old marking system. He adds that there are six copies of this specimen in the Archivio di Stato, see 'Cyrillic & Oriental Typography in Rome', 452; the existence of a seventh damaged copy is indicated by Tinto in the BML [Ms.Orient. 457 c.533], see 'Per luna Storia', 299, note 64.
3. Vervliet, 'Cyrillic & Oriental Typography in Rome', 452.
4. Ibid.
5. Ibid.
6. In RG2 Granjon also adds a barb to the ascender of the *lām*, which is present both in *tulut* and *nash* styles, but which was missing in RG1.
7. Thomas Milo, e-mail message to author, 16 January 2017. He defines these cases as 'Arabic ligatures' vs. the 'typographic ligatures'.
8. A similar phenomenon is observed in the typeface of Ohannes Mühendisyan. In this case, it

the three examples provided by the short sample of text set in RG2, Granjon represents them either as typographic ligatures (by having two joined characters on the same sort) or by eliminating the space between individual characters in composition (adjusting the fitting or through kerning)⁹ (Figure 6.35).

RG2 also maintains the quality of the joins seen in RG1 and the full vocalisation, but the diacritic dots become more calligraphic with the traditional diamond shape (only some characters show smaller dots that appear rounder). RG2 also has more blind counters and presents still problems with the proportions of the letters: the final lām is still narrow; the initial/medial šīn seems oversized and has a revised design (i.e. the denticles point towards the same direction, Figure 6.36). Amongst the new letterforms are the medial open hā', wāw, tā'; initial ġīm and hā'; moreover, the specimen shows a first glimpse of the swash ligatures characteristic of Granjon's design, further explored in later Arabic types (here fā'-yā' and mīm-nūn) (Figure 6.37).

The author has identified a case of punches amongst the Medicean material kept at the Laurenziana library in Florence as that of the RG2 type¹⁰ (Appendix 10). The case consists of 108 punches; 58 of them were matched with the letterforms in Granjon's specimen of 1583¹¹ (Figure 6.38). The punches also confirm the existence of separate dots and vowels, which explains their changing positioning in print (except, as said, for few letters like nūn, which indeed carries the dot on the punch). Some punches are also stepped, revealing one of the methods for their addition. The punch for the separate flag of the kāf confirms earlier observations but it was not the only method used because at least in another case it is included on the same punch of the base-form. Finally, the punches confirm the method of 'peak' endings to indicate medial teeth characters; however, in the case there is also one punch for an independent tooth character in medial position (Figure 6.39), introducing a different approach used by Granjon in his later Arabic types. Besides bringing evidence to further the knowledge of Arabic type-making, the identification of this case of punches is an important confirmation of the methodology employed in this thesis through external verification. It indeed proves that the analysis of types through the observation of typeforms in the printed books – combined with knowledge on the technology of type-making – is conducive to valid hypotheses that, in this case, were confirmed by the observation of punches and their correspondence with the type in question. In other words, it confirms that the punches correspond correctly to an interpretation of how the printed material appeared that, in turn, is instrumental to build concrete foundations around the hypotheses presented in this study. The problem of guess-work to deconstruct early printing by looking at the evidence in the primary sources is a constant throughout history and the opportunity to have a solid verification of the methodology to confirm the hypotheses is infrequent. In this particular case, the identification of the case of punches as the match to a known type adds validation to the process because it was not affected by pre-existing knowledge but built through sound methodology and cross-referencing.

appears that the calligraphic behaviour of handwritten Arabic was not simply represented but adopted to serve a different typographic function, see Figure 9.20 and Figure 9.23.

9. This is also confirmed by the punches of the letters in questions available in the case in Figure 6.39.
 10. Although the punches are known to be from the *Typographia Medicea*, there is no extant specific identification of the typeface.
 11. In his unpublished work *Stamparia Medicea*, Charles Whitehouse indicates this case of Arabic punches as Arabe N.5. Moreover, he states that two out of the 108 punches carry a different number on the shank than all the others (12 instead of 21). Whitehouse identified another three punches carrying the number 21 on the shank in the case of the Arabe Persan N.1 and 2 more in the case of the Arabe N.9.

6.1.4 The third Arabic type

The third Arabic of Granjon¹ (RG3²) is perhaps his best known Arabic type because it is used in the famous New Testament of the *Typographia Medicea*, the *Evangelium Sanctum Domini Nostri Iesu Christi*.³ The work was first printed in Arabic in 1590 (Figure 6.40), followed by a bilingual edition with a Latin interlinear version in 1591⁴ (Figure 6.41); however, there is evidence that the two versions were printed simultaneously.⁵ It should be noted that RG3 made its first appearance (without vowels) a few years before the *Evangelium*, in the titles of the *Kitāb Al-Bustān* published in 1585. RG3 also appears as the main text type in two grammars issued by the Medicean Press in 1592, the *Kāfiya* (Figure 6.42) and the *Āğurru'miyya* (Figure 6.43). In the same year it is used in the *Alphabetum Arabicum* (Figure 6.44) and for the titles of the *Geographia* (see Figure 6.76). Later, for the chapter headings in the *Avicenna* of 1593 (see Figure 6.92) and the *Euclid* of 1594 (see Figure 2.27); in 1595 for few words on the title page of the *Professio Fidei*, and in 1610 in the third Medicean grammar entitled *Liber Tasriphi*⁶ (Figure 6.45). Finally, RG3 appears in a specimen of the Vatican Press (Stamperia Vaticana & Camerale) of 1628 (with several letters apparently mutilated or recut) (see Figure 7.32).⁷

RG3 has many traits in common with RG2 as if the same concept started with the second and was continued on a larger size, which eventually developed its own identity. The third Arabic of Granjon is also a hybrid design originating from different calligraphic styles, progressively moving towards more *ṭulūṭ* inspired forms (Figure 6.46). Moreover, the French punch-cutter repurposed many letterforms already seen in RG2 (e.g. alif, lām, kāf, nūn, wāw) with the addition of new significant shapes, cementing in this third Arabic what would become some of the trademark features of his design (e.g. the slanted nūn, the flag of the kāf, the alif, the lām) (Figure 6.47).

The analysis of RG3 highlights the difficulty of having a type's complete overview when it is used for different publications, even in a relatively short amount of time. By looking at the *Evangelium*, the first Medicean publication that makes an extensive use of the type, it seems that Granjon abandoned his innovative 'peak' method

1. The attribution to Granjon is well founded, thanks to some documents in the ASFI, see below.
2. Also known as *The Large Arabic (260 mm)* in Vervliet, 1981; Arabic on Two-line Great-Primer [Ar 260] or *Trismégiste* (1585) in Vervliet, 2008. This type is also named *Arabe des Quatre Évangiles* in the Archives of the Imprimerie Nationale, cdp. In Tinto, *La Tipografia Medicea Orientale*, is indicated as 'Arabica grande'.
3. Also known as *Gospels*. The Arabic version of the *Evangelium* also includes a different type used for the names of John, Matthew, Mark and Luke, the four canonical division of the Gospels, whereas the bilingual version sets them also in RG3. However, both editions use an additional type of much smaller size (RG5) to set the catchword at the foot of the printed page, which anticipates the first word of the following page.
4. The 1591 edition received a new title in 1619, and in 1774 César Malamina, director of the Medicean Press after the move to Florence, had printed a false title and a preface inserted in the copies remaining in store. See *Les Caractères De L'Imprimerie Nationale*, 204.
5. For this reason, the two versions should be considered two issues of the same edition rather than two separate editions. For a more in-depth analysis see Harris, 'Printing the Gospels', 136.
6. *Kitāb Al-Taṣrīf Ta 'Lif Al-Šayḥ Al-Imām/Liber Tasriphi, Compositio Est Senis Alemani*, Romae, 1610. The author is az-Zanġānī, the book is also known as *Taṣrīf az-Zanġānī* or *al-Izzi*. Smitskamp, *Philologia Orientalis* 1, 32b.
7. Although the type appears in different publications, the analysis is based mostly on the first two grammars and the *Evangelium*, which supply the longer samples of text.

to indicate the medial toothed characters (see Figure 6.6), resorting to that more conventional of designing individual sorts for the toothed letters in medial position. This practice is also confirmed by analysing a publication of the following year, the *Alphabetum Arabicum*, which also shows tables with the sorts in question (Figure 6.48). Even with the second 'standard' system, Granjon made an effort in maintaining round connections to have a visually cursive joining line; overall this is achieved, except for the recurrence of the straight kašida sort (Figure 6.49). On the other hand, when used in the two grammars also from 1592, RG3 seems to return to the original 'peak' system for the medial tooth characters. The observation of different sources, in this instance, is essential to avoid misjudgement: therefore, Granjon did not entirely replace his first method but implemented it with what was the more standard solution also used by previous Arabic types. Nonetheless, it is perhaps more important to understand the motivation for this change. It does not seem to be a matter of simplification: to accommodate the straight-ending strokes of the new medial teeth, all the other letters had to be designed accordingly to allow a successful joining; likewise, the letters that followed the original system of 'peaks'. This certainly translated into a larger character set for RG3 to enable the use of both methods (Figure 6.50).

Regarding the accuracy in the correct representation of the script – remarkable in RG1 – it seems that it tends to decrease in RG3, particularly when the standard method for the medial teeth forms is used: this can be noted in the teeth differentiation (Figure 6.51). The progressive deviation from calligraphic practice is also due to a specific design choice for the design of the sorts for the ġīm group in medial and final position, which simplified the composition – by allowing the alignment on the notional baseline of joins that should be raised – but compromised the rendering of the script. This feature has been partially discussed for the RG1 type, which introduced two sorts for the medial/final ġīm group with the same characteristic – only for the printing of the *Kitāb Al-Bustān* published in 1584–5⁸ (see Figure 6.22). In RG3, the sorts for medial/final ġīm group apply the same principle, but the design and method of use are revised: these characters are indeed always preceded by a separate leading stroke that serves either simply as a connector with previous characters or to indicate a tooth letter with the addition of dots. With this tweak, the sorts of medial/final ġīm group can be better aligned, instead of sitting below the notional baseline as seen in RG1 (Figure 6.52). The application of this method visually flattens the script reducing multilevel connections, which are otherwise represented by extensive use of ligatures (Figure 6.53).

Another element that influenced the size of RG3 character set is the number of variants that can be noted in the text, particularly in terms of different designs of the same letterforms in the same position (Figure 6.54). For some letters, the additional variants bring inconsistency in the type, either due to design, proportions, or both (Figure 6.55). The presence of differently sized letters – ligatures in particular – raises the question about their making: perhaps they were added at a different time or designed by a different hand⁹ (Figure 6.56).

In terms of design, RG3 presents the characteristic slant and cursivity of Granjon's Arabic types. The stroke contrast attempts to replicate the calligraphic modulation,

8. It is worth recalling that this book also used the RG3 type for the titles. It is not possible, at this stage, to establish with certainty if the two sorts added in RG1 were an experiment later fully developed in RG3, or if the making of the RG3 type – finished by 1585 – influenced the addition of the two sorts to the character set of RG1 for the setting of the *Kitāb Al-Bustān*, published in 1584–5.
9. The design and size issues of RG3 are particularly evident in the 'Syllabarium' section of the *Alphabetum Arabicum*, where the pairing of letters exposes the differences between the sorts.

which significantly contributes to the visual quality of the typeforms. Besides the stylistic inconsistencies and few obvious problematic characters,¹⁰ the shape of some individual letterforms could be improved and be overall more cohesive (Figure 6.57). RG3 also appears to confirm some observations detected in the previous Granjon's types about separate diacritic dots from the base-forms: the dots seem indeed to move around – with some exceptions – when the same individual letters or characters combinations occur in the text (Figure 6.58). Moreover, Granjon's third Arabic type shows more swash ligatures (Figure 6.59), another trademark of his design, which are also useful for technical considerations concerning type-making and composition (see Figure 3.55).

A document at the Archivio di Stato in Florence – which records the cost of the casting of RG3 – is also helpful in providing an idea of the character set of the type, at least between 1588 and 1590 (see Appendix 18).

About the model

As already mentioned, RG3 is the most iconic Arabic type of Granjon, also thanks to the size which allowed for a better definition of its characteristic features (aesthetic and structural). Many of these have been highlighted and discussed in the analysis. Nonetheless, a comparison with the sources of inspiration for the design (i.e. the manuscripts models) and the sources of information for the script knowledge (i.e. the advisors) would certainly provide additional information for the understanding of Granjon's practice.

It has been previously pointed out that the *Typographia Medicea* had access to a rich collection of manuscripts and to a variety of collaborators, some of whom contributed copying manuscripts (see Appendix 3). However, it seems that the manuscripts left by the Press' director Raimondi are the most significant in attempting to trace the origin of Granjon's Arabic design. Comparing some manuscripts written or copied by Raimondi with RG3, it appears that Granjon's Arabic letterforms show a close resemblance to Raimondi's handwriting, leaving no doubt that the Orientalist's works served as model/source of inspiration for the French punch-cutter (Figure 6.60, Figure 6.61, Figure 6.62, Figure 6.63).¹¹ The manuscripts reveal the origin of some of Granjon's design characteristic features – copied by many other European Arabic types in the years to come – like the oversized slanted nūn, the isolated alif and lām, the final dāl/dāl, the strong emphasis on the flag of kāf. Moreover, some of the variants seen in Granjon's design can also be traced in Raimondi's handwriting, showing a marked inclination towards a close reproduction of the model. From a script-structure point of view, RG3 also seems to replicate that used by the Orientalist yet adapted to facilitate typographic composition (e.g. the connecting stroke for the medial/final ǵim group reaches the notional baseline, forcing a linear alignment of previous letters). Although Raimondi's handwriting reflects knowledge of script's rules for word formation and legibility purposes (Figure 6.64), these are not always rigorously applied (Figure 6.65). Furthermore, additional inconsistencies highlighted in the analysis of the type are reflected in the manuscripts: for instance, Raimondi's handwritten Arabic shows a mixture of different calligraphic styles' features (e.g. isolated/final hā', isolated alif, lām, kāf).

In conclusion, it seems worth recalling that both in terms of style consistency and rigorous script structure, Granjon's first Arabic (RG1) appeared more accurate – es-

10. Some of these characters have already been mentioned: the ǵim group, isolated/final kāf, the oversized nūn, some variants of 'ayn, fā' and qāf.

11. See also Figure 2.31 comparing RG3 from the *Euclid* book, 1594, with the layout prepared for print handwritten by Raimondi.

pecially in the first specimen – than any of his later Arabic types. This could suggest that Granjon might have had access to different models or advisors for his first type, which possibly changed over time; that he experimented with different type-making techniques (perhaps to ease one of the stages of production or to adhere to the model); or that, at different times, he made decisions based on varying priorities, possibly to adjust to specific contextual factors (e.g. the use of full vocalisation only in the presentation specimens of his first two Arabic types, not needed for later Medicean editions).

Notes from the Archives of the Imprimerie Nationale

Some of Granjon's Arabics from the *Typographia Medicea*'s collection in Florence were amongst the material seized by Napoleon ahead of his invasion of Egypt in 1798. Some of these types were returned to Florence in 1815, whereas other remained in France, now in the Archives of the Imprimerie Nationale. The material available at the *Cabinet des Poinçons*¹² is indeed valuable to add significant information for the history of the Medicean Press and their Arabic type production.¹³ However, it should also be borne in mind that what is in the Archives does not necessarily portray a truthful picture of the original Medicean material. Firstly, there is not a clear inventory of what came from Florence: the catalogue with the imprints of the punches and matrices extant at the Imprimerie Royale,¹⁴ *Recueil Des Empreintes Des Poinçons Et Des Matrices Des Caractères Français Et Exotiques*,¹⁵ is a much later work, dated 1828. Secondly, it is known that a certain amount of work was done on the Arabic types since their acquisition, either out of necessity (e.g. to replace missing or damaged material) or as a deliberate revision (e.g. to change the design of particular letterforms, reject some characters, add characters, change method of joins, re-casting type): this kind of evidence is traceable in other documents in the Imprimerie's Archives, which record the punches and matrices to be reformed.¹⁶ Another work in two volumes, entitled *Typographie Orientale Des Médicis*,¹⁷ also contains imprints of various Medicean types – possibly from the originals – including Arabic, Turkish, Syriac, Estrangelo, Hebrew: it appears to be a collection of cast type, but it is not dated.¹⁸ Finally, additional archival material of the Imprimerie Nationale includes

12. Also designated in this thesis as the French Archives.

13. The Archives of the Imprimerie Nationale also houses material regarding the Arabic type production of Savary de Brevès and the Propaganda Fide Press, as discussed in the relevant sections.

14. Established in 1640 by Louis XIII, it was named by successive governments *Imprimerie de la République*, *Imprimerie Impériale* and finally *Imprimerie Nationale*.

15. *Recueil Des Empreintes Des Poinçons Et Des Matrices Des Caractères Français Et Exotiques, Classés Par Genres Et Par Points, Et Rangés Par Ordre Alphabétique; Et Des Signes Divers, Armes, Fleurons Et Vignettes, Existans a L'imprimerie Royale; Dressé Par Les Ordres Et Sous La Direction De M. Le Bon De Villebois, Administrateur De L'imprimerie Royale, Par Le Soins De M. Saint-Martin, Membre De L'académie Des Inscriptions Et Belles-Lettres, Pour La Partie Orientale; Et De M. Auguste Rousseau, Garde Du Cabinet Des Poinçons, Pour La Partie Française, En 1828*, CDP.

16. See *Caractères Etrangers. Cahiers D'empreintes Des Poinçons À Reformer*, CDP and *Caractères Etrangers. Cahiers D'empreintes Des Matrices À Reformer*, CDP. It should also be noted that the extension of the character set to other languages (like Persian and Turkish) to accommodate later publications is also a kind of revision done on the original Arabic types, which is also recorded in the documents in the French Archives.

17. *Typographie Orientale Des Médicis*, I and II, CDP.

18. The book in two volumes contains internal divisions with handwritten notes in French and Italian: these carry the names of the relative types and other notes like: 'Refusi e caratteri diversi trovati a fine lavoro.' Although the volumes were clearly bound at the Imprimerie (the name of the book is impressed in French), it is possible that they came from Italy, and therefore that they carry the imprints of the original Medicean material. For instance, the pages containing impressions of

various folders containing information about the types that has mostly been published¹⁹ and also some of the case-lays used by the French Press.²⁰ The case-lays show ultimately what had become of the originally imported types of the *Typographia Medicea* – but also of Savary de Brevès and the *Propaganda Fide* – at least by 1885.²¹

At the Imprimerie Nationale, RG3 is named *Arabe des Quatre Évangiles*, 30 points²² (Figure 6.66). The documents in the French Archives state that it was 'sent from Florence in 1811' and record 356 steel punches and 379 copper matrices.²³ It is not clear if these numbers refer to the original material received from Italy.²⁴ the undated document also reports that in 1873 the number of punches recorded in the inventory was 331 and 1307 for the matrices.²⁵ Today,²⁶ the Archives hold 1 case containing 367 punches²⁷ (Appendix 33) and 3 cases of matrices (Appendix 34). The discrepancies in the numbers contained in the documents raise questions and requires a

RG3 show the characteristic oversized slanted nūn of Granjon and a few swash characters seen in Medicean books but that do not appear in other material in the Archives of the Imprimerie. See Appendix 32.

19. For instance in *Liste Des Types Étrangers De L'Imprimerie Nationale*. Paris: Imprimerie Nationale, 1890 and *Le Début De L'Imprimerie Arabe*.
20. *Modèles De Casses Des Caractères Français Et Étrangers De L'Imprimerie Nationale*, 1885, CDP.
21. All this material is used for the investigation of the types and to draw some significant observations for the purpose of this study. However, the sources in the French Archive would require a more in-depth research to attempt a more complete reconstruction of the development of types since their acquisition. The study of the punches (e.g. their shape, identification number) and the matrices (e.g. their shape, the different strikes) could add significant information about the type-making process.
22. RG3 is described as 'Arabe Nesky, Corp 30 (10+10+10)'. From Imprimerie Nationale, *Folders*, 'Arabe Nesky, corps 30 (10+10+10) ou Arabe de l'Évangile. Fonds des Medici (1590). Expédié de Florence en 1811', CDP. See also *Liste Des Types Étrangers*. According to Nelly Gable, punch-cutter and Head of the Cabinet des Poinçons at the Imprimerie Nationale, this method describes the point size by indicating a numeric value for the base-character size and two others for the size allowed for the vowel positioning, above and below the base-character. This gives the total point size of the type. She adds that the methods differ, as some people would intend as *corp* (or type size) only the size of the base-character without counting spaces for the accents. From a personal conversation with the author, 25 November 2015, CDP. It is worth noting that the body size of early Arabic types in this study is reported as found in the sources; the Arabic types have not been remeasured, mainly because their point size is not critical for their identification (i.e. there are no doubts that the selected case studies are different typefaces) or for their assessment. However, the author endorses the idea that a system that would provide unambiguous units and universal measures to deal consistently with metal types of all historical periods (e.g. for comparative studies on body sizes of different type-makers) is desirable for the Latin types – as suggested by James Mosley by using the PostScript point (see 'Measuring type', personal notes, 2016) – as much as for the Arabic types. Moreover, the 20 lines system, widely used for the Roman foundry types, cannot be applied to the measurement of Arabic types without questioning issues that are related to this particular script and its type-making processes (e.g. the concept of baseline, the use of overhanging characters).
23. 'Expédié de Florence en 1811,' from 'Arabe Nesky, corps 30 (10+10+10)', *Folders*, CDP.
24. The number 356 for the punches is also reported in the 1990's publication *Les Caractères De L'Imprimerie Nationale*, 204, which is probably the most recent publication of the Imprimerie.
25. The document, in the same handwriting, mentions also a specimen from 1878, so it was clearly written after that date.
26. The material from the Archives of the Imprimerie Nationale, CDP, in the 'Appendices' was photographed on the 25–26th November 2015.
27. A paper note contained in the punches' case reports various numbers: '356 poinçons, 15 May 1863' (this date is then crossed in pencil stating 'dont 1 accent, 1903'). An additional note in a different handwriting states: '382 poinçons+ 1 acc., 1967'. The final note states: '2010, 283 poinçons'.

critical approach to the sources. Regardless of this issue, it is evident that the case of punches is incomplete, as many characters seen in the Medicean printed books are missing from the case in the Cabinet des Poinçons.

The punches show that only a few single characters – or combinations represented by ligatures – carry diacritic dots. It is not clear according to which criteria the dots are added to particular punches and a more in-depth study might be necessary for a better understanding, although some first observations to highlight critical issues can be made. For instance, there are two punches for isolated *hā'* with and without dots,²⁸ suggesting an approach that replicates punches for characters that share the same base-form, instead of producing dotless base-forms and adding dots at the matrix-making stage or in composition. However, for the characters 'ayn/ğayn that share the same base-form, there is only the undotted punch (representing 'ayn): this suggests a different approach that seems to reduce the work of the punch-cutter, leaving the addition of dots to a different stage. The second option is also supported by the existence of punches for separate dots – which would not be otherwise necessary – and by the observation of the printed books, that highlighted moving dots for the letter ğayn in particular (see Figure 6.58). It is possible that the punch of ğayn is simply missing from the case, so as many other dotted characters; it is likewise possible that the dotted punches were produced only for some letters. If this is the case, an explanation for this practice is yet to be found, because there is no apparent reason to use different methods for *hā'*/*tā'* *marbūṭa* and 'ayn/ğayn (Figure 6.67). Other important observations, in this case of punches, concern the number of ligatures produced by Granjon to represent contextual variants, and the punches for the connecting/elongating strokes sometimes used to indicate toothed characters by adding dots. It should also be noted that there is a mixture of letters ending with straight horizontal strokes and with the 'peaks' endings, proving that both methods were used (Figure 6.68).

The case of punches of RG3 also contains stepped punches for characters, marks and dots (at least one of each); the first was possibly used to add either diacritic dots or vowels, the second and third to add additional vowels or dots (Figure 6.69 and Figure 6.70). The punches of the diacritic dots show another interesting feature: besides the standard punch for the two individual dots, there is an additional one which shows a straight shave at the tip, slimming it and exposing the design (Figure 6.71). It is not sure why this technique was used. According to Nelly Gable, it can be hypothesised that a slimmer tip provided better visibility in striking the matrix.²⁹ Moreover, it is likely that a straight shaved punch brought less impact during the strike, limiting the deformation of the matrix: this was desirable if the matrix was struck a second time to add dots.

Another significant consideration comes from the observation of some matrices of another Arabic type in the Imprimerie Nationale's Archives, the *Arabe d'Alde* (ADA):³⁰ these show various digging tracks that reveal a brighter metal around the characters (or the dots). According to Nelly Gable, this digging served perhaps to facilitate a faster flow of the metal mixture to reach the depth of the matrix during casting: this would also create a solid 'table' around the cast type, thanks to a greater quantity of metal entering in the digging. Another advantage of the digging was to remove copper in order to have less movement of material during the strike, thus controlling and limiting the deformation of what was already on the matrix. Fur-

28. The letter *hā'* becomes *tā'* *marbūṭa* adding two dots above.

29. From a personal conversation with the author, 25 November 2015, CDP.

30. This type is discussed more in depth in § 6.1.7.

thermore, the digging would provide better visibility to strike the matrix a second time and possibly more precision in the positioning of the dots.³¹

Finally, the dots that were added later on the matrix³² seem to be on a different depth (i.e. shallower) than what was already on the matrix (i.e. the image of the punch): the reason for this is not certain, however, it is likely that it was harder to achieve the same depth with a second strike and that it was also necessary to strike less hard to reduce the risk of damaging what was on the matrix (Figure 6.72).³³ The observation of the case-lay of the RG3 type (see Appendix 32) highlights a few issues and raises many questions that only a more in-depth study can answer comprehensively. Firstly, the case-lay of the Imprimerie Nationale shows characters of RG3 not reflected in the case of punches in the same Archives – that, as already said it is obviously incomplete – and vice versa. More importantly, the case-lay shows only characters with the straight horizontal endings and none of the characters with the ‘peak’ endings to indicate tooth characters, the innovative method introduced by Granjon. Furthermore, it also seems to include characters either not seen in the Medicean books³⁴ or that look different (Figure 6.73). This can suggest either some redesign (quite possible, considering that the case-lays are dated 1885) or perhaps that some characters were borrowed from a different type.³⁵ The *Recueil Des Emprintes* dated 1828 adds significant information for the investigation of RG3 (Appendix 36)³⁶ but also highlights further discrepancies and questions (Figure 6.74). The same can be said for the sources of the Imprimerie *Poinçons À Reformer* (Appendix 37) and *Matrices À Reformer* (Appendix 38).

Another curiosity identified by the author is that RG3 shows the first typographic appearance of the dāl/dāl-hā’ ligature.³⁷ The earliest example in print was found in the *Euclid*, 1594. However, RG3 was cut at a much earlier date, therefore it may be possible to find an earlier example in the *Evangelium* editions. A punch carrying this ligature was also identified by the author in the case of RG3 kept at the CDP. It should be noted that this ligature seems to be an exception in Granjon’s Arabic, that usually has the letter combination unconnected. Similarly, the dāl/dāl-hā’ ligature (but also with letters wāw, rā’/zā’) does not normally appear in Raimondi’s handwriting,³⁸ except for one manuscript, the *Kitāb Al-Taṣrif Al-’Izzī* (see Appendix 2), which is a preparatory copy for the Medicean *Liber Tasriphi*. It seems that this manuscript was copied using other manuscripts present in the Medicean collection containing the same text: coincidentally, one of these manuscripts, copied by the Neophyte Muslim convert Domenico Sirleto, contains the ligatures in question (see Appendix 3).³⁹ However, it should be noted that both the manuscript copied by Raimondi as

31. From a personal conversation with the author, 25 November 2015, CDP.

32. It is possible to establish which dots were added later by looking at the corresponding punch and identify which ones are missing.

33. From a personal conversation with the author, 25 November 2015, CDP.

34. See also the volumes *Typographie Orientale Des Médicis*, I, 120–154, CDP; an extract in Appendix 35.

35. It is reported that some letters of the ADA type where used at the Imprimerie Nationale when composing with RG3 because it fitted its point size, see § 6.1.7.

36. In this document the *Arabe de l’Evangile* is recorded as being ‘sur seize points’ (i.e. 16pt), and lists imprints of 356 punches and 379 matrices. From *Recueil Des Emprintes*, XI, 228–258.

37. This type of ligature with hā’ can also be found with other characters, like wāw, rā’/zā’. According to Milo, besides being common in tulut style, these ligatures are common in Ottoman casual nash, but less so in nash calligraphy. Thomas Milo, e-mail to author, 8 February 2017. For some examples in nash calligraphy see Figure 6.75.

38. At least in Raimondi’s manuscripts consulted and presented in this study.

39. Sirleto’s manuscript seems to be dated later than Raimondi’s one. However, the occurrence of these

layout for print of the *Liber Tasriphi*⁴⁰ and the printed edition of 1610⁴¹ do not contain the ligatures, and they correspond in showing the combinations as separate characters (Figure 6.75).

Finally, a block of composed sorts of RG3 was found and identified by the author in the BML (see Figure 3.67). This finding enables appreciating the difficulties of composing Arabic types and also to have evidence of some techniques used for making the sorts, such as vertically and horizontally kerned sorts and the method used for the 'heavy' kerns in occurrence of Granjon's swash characters (see Figure 3.55).

ligatures in Sirleto's handwriting demonstrates that they were common in Arabic casual handwriting.

40. See Figure 2.33.
41. See Figure 2.32.

6.1.5 The fourth Arabic type

The fourth Arabic of Granjon (RG4¹) is used in the Medicean editions from the beginning of 1592, firstly as text type in the summary the *Geographia* of Šarīf al-Idrīsī² (Figure 6.76), then in the *Euclid*³ (Figure 6.77) in 1594. RG4 is also employed for the chapter headings of the Medicean *Avicenna* of 1593 (see Figure 6.92) and *Alphabetum Arabicum* of 1592⁴ (Figure 6.78). An undated single sheet specimen preserved in the Biblioteca Vallicelliana in Rome⁵ (Figure 6.79) shows this type ‘cast on 200 mm, that is to say, in the same mould’⁶ as RG2. According to Vervliet, RG4 was probably intended to accompany Granjon’s RG2: ‘although it is cast on a nearly identical body size, its x-height is much smaller’.⁷ In the Vallicelliana’s specimen, RG4 is also displayed using vowels.⁸

RG4 maintains many traits of Granjon’s design, which have already been discussed for the other types. There is still mixture of styles (Figure 6.80) and problems with the proportion of the letters to one another: some letters are more prominent on the page (e.g. initial ġīm group, final dāl/dāl, long kāf) while others are undersized (e.g. isolated/final yā’, isolated/final lām) or inconsistently proportioned (e.g. isolated bā’ and nūn are small compared to the forms for the final positions). From a design point of view, some letterforms look less confidently shaped: this could be due to the smaller size of RG4 compared to the previous types (Figure 6.81). However, the irregularities within RG4 (i.e. non-cohesive design of same letterforms) could also suggest the work of a different hand, as if the type was cut by more people.⁹

The ġīm letter group in medial/final position is shaped according to approaches already explored in previous types. The combination of an initial tooth with the medial ġīm letter group introduces a new design, which is very characteristic of RG4 (Figure 6.82). A medial tooth character connecting with the ġīm letter group in medial/final position is represented as a ligature by a stroke that reaches to the notional baseline: while in RG3 this leading stroke was added separately (see Figure 6.52), in RG4 is fused to the ġīm letter group (i.e. included on the same punch, see Figure 6.87). Moreover, as previously discussed for RG3, also in RG4 this element contributes to removing the multilevel connections, levelling them on the notional baseline and simplifying the composition (Figure 6.83). Vertical and horizontal joins above the notional baseline exist almost exclusively in the form of ligatures (Figure 6.84).

1. Also known as *The 2-line English Arabic* (180 mm) in Vervliet, 1981; ‘Arabic on Paragon [Ar 130] or *Petit-paragon* (1585) in Vervliet, 2008. This type is also named *Arabe d’Euclide* in the Archives of the Imprimerie Nationale, CDP.
2. *Kitāb Nuzhat Al-Mušṭāq Fī Dikr Al-Amṣār Wal-Aqṭār Walbudan Wal-Ğuzur Wal-Madā’iñ Wāl-Āfāq*, edited by the Maronite priests Gabriel Sionita and Johannes Hersonita is a compendium of a geographical work composed in 1154 at the court of King Roger II of Sicily, and hence also known as the *Book of Roger*. Smitskamp, *Philologia Orientalis* 1, 29c, 29d.
3. *Kitāb Tahīr uṣūl li Ūqlīdīs min tā’līf ḥuḡa Nāṣiraddīn at-Tusi*, a commentary on Euclides. Smitskamp, *Philologia Orientalis* 1, 31.
4. Vervliet, ‘Cyrillic & Oriental Typography in Rome’, 456.
5. Anonymous proof, n.d., bv [Ms. Val. K 17, f. 177]. Vervliet locates this item as [Ms. Val. K 17, f. 174] and dates it ‘probably around 1584’. Vervliet, ‘Cyrillic & Oriental Typography in Rome’, 456.
6. Vervliet, ‘Cyrillic & Oriental Typography in Rome’, 456.
7. Ibid.
8. The text (repeated twice with and without vowels) is an extract of the *Epistola Pauli ad Galatas*, also used by Spey in 1583 (see Figure 5.13 [B], first 4 lines). Vervliet suggests that the proof was perhaps pulled for a comparison with Spey’s work. Vervliet, ‘Cyrillic & Oriental Typography in Rome’, 456.
9. As mentioned, other punch-cutters working in the Medicean Press.

With RG4, Granjon seems to also definitely abandon the system of 'peaks' to indicate toothed characters in medial position – by exploiting the connection between adjacent characters – relying instead exclusively on independent medial sorts. Moreover, further simplification affects the structure of the script, neglecting the rule system underpinning calligraphic practice: besides the levelling of letter combinations that should be stacked, also the differentiation of teeth to help legibility seems to disappear (Figure 6.85). As previously said, RG4 bears significant common traits with RG3. Despite the revisions on the design of the letterforms, also RG4 can be associated with Raimondi's handwriting, as shown in the comparison of the *Euclid* book with the manuscript copied by Raimondi as a layout for the printed edition.¹⁰

The punches and matrices of Granjon's fourth Arabic were also amongst the material 'sent from Florence in 1811' to France.¹¹ In the Archives of the Imprimerie Nationale, RG4 is named *Arabe d'Euclide*, 22 points.¹² The documents in the French Archives record 283 steel punches, 5 accents¹³ and 767 matrices.¹⁴ It is not clear if these numbers refer to the original material received from Italy:¹⁵ the undated document also reports that in 1873 the number of punches recorded in the inventory was 330, and 1306 for the matrices.¹⁶ Today, the Archives hold 1 case containing 481 punches¹⁷ (Appendix 41) and 4 cases of matrices (Appendix 42). An additional case with the punches of the overlined Arabic characters of RG4 that also appeared in the Medicean *Euclid* was found and identified by the author amongst the material kept at the BML:¹⁸ the case consists of 73 punches¹⁹ (see Appendix 43).

As already mentioned for RG3, the observation and comparison of some of the material kept at the Imprimerie Nationale also for RG4 raise some questions that will require additional research to be addressed. The chronology of the evolution of the type's redesign and character set additions proves difficult to reconstruct. The folder dedicated to RG4 in the French Archives²⁰ contains a table of the alphabet (see Appendix 44) and one of the ligatures of RG4 (see Appendix 45), which are not

10. See § 2.2.

11. It is not clear why Vervliet suggests that the matrices of this type could be possessed by the Biblioteca Medicea Laurenziana in Florence although, by his own admission, 'attempts to locate them have been vain', see Vervliet, 'Cyrillic & Oriental Typography in Rome', 456. The author was not able to find any matrices during the visit to the Medicean collection.

12. 'Arabe Nesky, corps 22 (10+6+6) ou Arabe d'Euclide. Fonds des Medici. Expédié de Florence en 1811', *Folders*, CDP.

13. Ibid. These are listed separately, and they are presumably punches (but it is not specified).

14. An additional note adds: 'Of which 23 punches and 4 accents engraved by M. Aubert, in December 1867 (Persian and Turkish forms) for the *Dictionnaire Turk-Oriental* of M. Pavet de Courteille published in 1870; in 8°. in 1887 the special letters for writing of the Afghans were engraved in the same style to print the *Chants populaires des Afghans* by M. James Darmesteter in 8° in 1888–1890', approximate translation by the author. From 'Arabe Nesky, corps 22 (10+6+6) ou Arabe d'Euclide', *Folders*, CDP. See also *Liste Des Types Étrangers De L'Imprimerie Nationale*.

15. The number 283 for the punches is also reported in the 1990's publication *Les Caractères De L'Imprimerie Nationale*, 200.

16. The document, in the same handwriting, mentions also a specimen from 1878, so it was clearly written after that date.

17. A paper note contained in the punches' case appears to state 'Arabe sur 10–22 points dit d'Euclide. 150 poinçons hors d'usage sous le n. 148 de l'inventaire 1861'.

18. Although the punches are known to be from the *Typographia Medicea*, there is no extant previous identification of the typeface.

19. In his work, Charles Whitehouse indicates this case of Arabic punches as Arabe N.10. Whitehouse, *Stamperia Medicea*.

20. 'Arabe Nesky, corps 22 (10+6+6) ou Arabe d'Euclide. Fonds des Medici. Expédié de Florence en 1811', *Folders*, CDP.

dated. The first document shows medial forms for the ġīm letter group that do not appear in the second (the initial form is used instead) or in the case-lay (the ġīm letter group in medial position is always in a ligature). The case of punches contains only some of the corresponding forms (Figure 6.86, Figure 6.87), and many more that are not represented either in these documents or the case-lay²¹ (Appendix 40).

The main problem with the case of punches seems to be that it contains forms that either do not belong to RG4 or that did belong to it but that were not used in the printed books. The *Geographia* and the *Euclid* seem indeed to use only characters and ligatures that have straight horizontal stroke endings and not 'peak' endings. This is also confirmed by the Medicean volumes in the Archives of the Imprimerie Nationale²² (Appendix 46). On the other hand, the case of punches of RG4 seems to have, for many characters, only the designs with the 'peak' stroke endings that do not correspond with what was used in the printed material (Figure 6.88). It is possible that the forms for both methods were included in RG4 (as it was for RG3), but that the case of punches is incomplete. However, this does not explain the reason for producing so many punches for characters that were not used. Curiously, many of these non-corresponding punches with the 'peak' endings letterforms in RG4 seem to replicate in a smaller size the forms from RG3 (Figure 6.89). Moreover, their design replicates the characters sketched by Raimondi in the list of punches and matrices of the 'Arabica piccolina'²³ (Appendix 19).

It has already been said that some of the revisions on the original Medicean types are accounted for in the documents of the Imprimerie Nationale, like the 23 punches added to RG4 in the nineteenth century for language extension (Figure 6.90).²⁴ However, the account is not exhaustive: for instance, RG4's characteristic letter yā' in isolated and final position (as seen in the Medicean publications) does not correspond to the punches in the case. It is possible that these punches were missing and that new ones had to be made in France: this might also explain why they are not listed amongst the punches to reform, as they were newly added (Appendix 48). The new designs also show in the Imprimerie's case-lay. Other punches with ligatures that include the final yā' character correspond to the original design of RG4 (Figure 6.91). It is evident that a more in-depth investigation to cross-reference the material in the Archives – including the *Recueil Des Empreintes*²⁵ (Appendix 47) and the cases of matrices (Appendix 42) – is necessary to find more definite answers. It seems that a good starting point would be to check the identification number on the shank of each punch, to verify that they correspond to the same set²⁶ (see Figure 6.70).

21. Three of the four parts of the case contain ligatures, most of with involving the ġīm letter group.

22. *Typographie Orientale Des Médicis*, I, 57–119, CDP.

23. The 'Arabica piccolina' should indicate RG5, see the following § 6.1.6.

24. RG4 was also used by Réverend Jules Ferrette to develop a simplified method to print vocalised Arabic, presented in 1859. See § 3.3.3 and Appendix 4. It is worth highlighting that amongst the new additions in RG4, there are two punches for the ġīm letter group in medial and final position using the 'linear method' of joining with preceding characters appeared in Mühendisyan's 24pt type (OM1) as early as 1288/1871 (see § 9.1.2). Further research is necessary to establish the connections between these two designs.

25. In this document the Arabe de l'Euclide is recorded as being 'sur doze points' (i.e. 12pt). From *Recueil Des Empreintes*, XI, 171–226, CDP.

26. Besides the number, the shape of the punch itself can add significant information: each punch-cutter 'had his own way of finishing off his punches, seen in the length of the shanks, in square-cut, pointed, or rounded ends, so that the sets are quite easily distinguishable'. From Leon Voet, *The Golden Compasses. The History of the House of Plantin-Moretus* (Amsterdam: Vangendt & Co/Routledge & Kegan Paul, London / Abner Schram, New York, 1969–1972), vol. 2, *10.

6.1.6 The fifth Arabic type

The fifth Arabic of Granjon (RG5¹) appeared for the first time in the catchwords and pagination of the Medicean *Evangelium*,² 1590–1. Most famously, it is used as main text, in the *Avicenna*³ of 1593 (Figure 6.92). According to Vervliet, RG5 also appears in the *Professio Fidei*⁴ of 1595 (Figure 6.93); however, it seems that the text type used in this volume is RG4, not RG5 (Figure 6.94). At the Imprimerie Nationale, RG5 is named *Arabe d'Avicenne*, 17 points.⁵ The documents in the French Archives state that it was ‘sent from Florence in 1811’ and record 353 steel punches and 1106 copper matrices.⁶ It is not clear if these numbers refer to the original material received from Italy;⁷ the undated document also reports that in 1873 the number of punches inventoried was 328, and 1304 for the matrices.⁸ Today, the Archives hold 1 case containing 691 punches (Appendix 52) and 1 case of matrices⁹ (Appendix 53).

RG5 was in vogue at the Imprimerie for a long time:¹⁰ ligatures and letters for the composition of the Afghan, Berber, Hindustani, Malaysian, Persian and Turkish languages were also added, although there is no reference to a date (Appendix 54 and Appendix 55).¹¹ In 1863 it was used by as a model for A.P. Pihan, *proto*¹² of the ‘Oriental typography’, when he undertook the task of simplifying the composition of Arabic;¹³ the new type was on the same body of RG5, 17pt, but differently cast.¹⁴ In 1875, all the letters of RG3 were photographed to obtain punches and then electrotype matrices, required to add a 12pt size Arabic type, necessary for footnotes.¹⁵ This type

1. Also known as *The small Arabic* (on English body: 100 mm) in Vervliet, 1981; ‘English-Sized Arabic [Ar 98] or *Saint-augustin*’ (1586) in Vervliet, 2008. This type is also named *Arabe d'Avicenne* in the Archives of the Imprimerie Nationale, CDP.
2. Vervliet, ‘Cyrillic & Oriental Typography in Rome’, 455.
3. *Al-Qānūn Fī Al-Ṭibb/Libri Quinque Canonis Medicinæ Abu Ali Principis Filii Sinæ Alias Corrupte Avicennæ. Quibus Additi Sunt In Fine Eiusdem Libri Logicae, Physicæ Et Metaphysicæ. Arabice Nunc Primum Impressi* (or *Avicenna*, often indicated simply as *Canon*), by Abu ‘Ali Ibn Sinā.
4. Ibid. Vervliet indicates this volume also as *Confessio Fidei*. The full title of the edition is: *Brevis Orthodoxæ Fidei Professio, Quæ Ex Præscripto Sanctæ Sedis Apostolicae Ab Orientalibus Ad Sacrosanctæ Romanae Ecclesiae Unitatem Venientibus Facienda Proponitur. Iussu Sanctissimi Domini Nostri D. Clementis Papæ VIII. Excussum Romæ in Typographia Medicea Anno Á Natiuitate Domini M.D.X.CV.* The copy in the Vatican Library has shelf number R.G.Or.IV.447 (3), and not R.G.Or.II 123, IV 447 as indicated in Vervliet, ‘Cyrillic & Oriental Typography in Rome’, 454, note 197. There is also a second copy in the Vatican marked R.G.Or.IV.584 (7).
5. ‘Arabe Neskhy, corps 17 (7+5+5) ou Arabe d'Avicenne’, *Folders*, CDP.
6. Ibid.
7. A total of 353 punches is also reported in the 1990’s publication *Les Caractères De L’Imprimerie Nationale*, 196.
8. The document, in the same handwriting, mentions also a specimen from 1878, so it was clearly written after that date.
9. The note on the paper in the matrix case appears to state ‘248 matrices frappées, 2 galvano’; however the case shows 282 matrices, each manually numbered.
10. *Les Caractères De L’Imprimerie Nationale*, 196.
11. See *Liste Des Types Étrangers De L’Imprimerie Nationale*, 4.
12. The person running the composition department of a printing house, see § 3.2.3, note 99.
13. *Les Caractères De L’Imprimerie Nationale*, 196 and *Liste Des Types Étrangers De L’Imprimerie Nationale*, 20–21. See also § 3.3.3 and for more about this type and Pihan’s simplification using this type.
14. That is (9+4+4), instead of (7+5+5), meaning that the base-form (or consonants) are cast on 9pt instead of 7pt. As mentioned in § 3.3.3, in the documents of the Imprimerie, RG5 is also indicated as the Arabic on 7pt and Pihan’s type as the Arabic on 9pt.
15. *Les Caractères De L’Imprimerie Nationale*, 196. The type size of the 12pt Arabic was also indicated as (6+3+3), according to the Imprimerie’s system. The punches were cut by Mourant and Froyer; the

also contained ligatures and letters for the composition of Berber, Hindustani, Malaysian, Persian and Turkish.¹⁶ These three types (i.e. the original RG5, the version of 1863 and that of 1875) are therefore related to each other, and it might prove difficult to clearly separate them by looking at the documents in the Imprimerie's Archives. For instance, the case-lays of the three types are separated but apparently not independent from each other: the 'original' RG5 had a case of four parts (Appendix 49); a different two-parts case covered both the 12 and 17 points Arabic (Appendix 50); and another two cases were available for the 'additional sorts' of the 17 pt Arabic (both for the 7pt and 9pt base-forms, Appendix 51).

The case of punches shows a clear difference in their shape with many presenting a much more square and regular finish than others: that is the case for the language extension characters and the punctuation, apparently added at a later date at the Imprimerie Nationale.¹⁷ Nonetheless, even some basic characters of the Arabic alphabet are cut on square punches, some of which with very clear steps: it is possible that these were remade to replace the originals, either damaged or missing.¹⁸

Important documents regarding this type are amongst Raimondi's papers, where he refers it to as 'Arabica piccolina'.¹⁹ The first, dated 1587, records payments to Granjon for the punches and casting of this and other types (Appendix 20);²⁰ the second records punches and matrices of the small Arabic started on the 6th September 1586 and 'received in more batches', between October 1586 and November 1591 (Appendix 19).²¹ This document, in particular, is significant for various reasons. Firstly, because it shows a breakdown of Arabic letters and ligatures written by Raimondi, virtually removing any residual doubt about his handwriting being the model of reference for the design of Granjon's Arabics.²² Secondarily, it shows a rare example of Granjon's signature²³ – looking rather shaky – dating few months before his death.²⁴ Thirdly, the recorded list of letterforms provides insight on what the original character set of the type (RG5) might have looked like, at least right before the print of the *Avicenna* in 1593. Finally, the account of punches and matrices provides an insight into the planning of the type and evidence on some technical aspects of Arabic type-making.²⁵ In his diary, Raimondi recorded separately a sketch of the punches received and a sketch of the corresponding matrices obtained from each punch (Figure 6.95). The document records a total of 351 punches²⁶ and 456 matrices: therefore, the additional 105 matrices – which are not the exact image of the punch – were obtained by adding dots, which also had separate punches. What cannot be estab-

new 12pt Arabic type was used in 1876 by Barbier de Meynard for the publication of Zamakhchari's *Colliers d'or*.

16. *Liste Des Types Étrangers De L'Imprimerie Nationale*, 4.

17. Possibly, also the punches with the vowel marks.

18. See Figure 6.97.

19. As suggested by Vervliet, 'Cyrillic & Oriental Typography in Rome', 454–55.

20. 'A 4 di Decembre 1587; asfi [Misc.Med.719 (12), ff. 1–2].

21. 'Ponsoni et madre dell'Arabica pic | colina incominciata à 6 di Settembre | 1586 et recevuti in piu partite, come | à 15 di Ottobre 1586; 1586–1591, asfi [Misc.Med.718 (2), ff. 1–11].

22. At least from RG2 onwards. As previously discussed, the first type might have originated from different models. See also § 2.2 for a manuscript of the *Avicenna*, perhaps a model followed for the printing of the book, rather than a model for the typeface.

23. Already published in Vervliet, *Cyrillic & Oriental Typography*, 1981.

24. Under the signature there is the date 12 July 1589; Granjon died on the 14th March 1590. See Tinto, *La Tipografia Medicea Orientale*, 31.

25. This is important information if the punches or matrices are not available.

26. Plus one but for the 'Arabica mezana', last page.

lished from the document is if the said matrices were struck once by the punch and dot/s tied together (as a stepped punch), or if it was repeatedly struck by the dotless punch and then the separate dot/s. However, observing other characters in Raimondi's document might suggest a possible hypothesis. The letters that share the same base-forms are not all generated from the same dotless punch, which should be the method to use if the dots are added independently with a second strike of the matrix. Instead, the characters that share the base-forms are obtained from two punches, one to obtain matrices of characters with dot/s above, and another for the characters with dot/s below. It seems that this decision could be motivated by the use of stepped punches, one with the step above, and one below (Figure 6.96). The punches of RG5 at the Imprimerie's Archives seems to show evidence in this regard (Figure 6.97).

A few other observations can be made from Raimondi's document. For instance, from his sketches, it appears that the same dotless punch is used to obtain matrices for the letters *fā'* and *qāf*, even if the two letters should be differentiated from each other. The typeforms of RG5 confirm this design/simplification choice (Figure 6.98). Similarly, the typeforms confirm the exclusive use of vertical dots below the tooth of *yā'* in initial/medial position (aligned on the left side of the letter), as in the sketch of the punch (Figure 6.99). Finally, RG5 seems to use only characters with straight-ending horizontal strokes, at least in the *Avicenna* edition, 1593. On the other hand, Raimondi's notebook also shows characters designed with 'peak' ending strokes. It is not surprising that the two methods could have been both included in RG5, as this was the case for previous Granjon's Arabic types. Even less so, if taking into consideration that RG5 seems to be just a smaller version of RG4, which presented both systems. The use of the two methods appears to be confirmed by the case of punches in the Imprimerie's Archives (Figure 6.100) and partly also the *Typographie Orientale Des Médicis*²⁷ (Appendix 56) and *Recueil Des Empreintes*²⁸ (Appendix 57).

Also in terms of structure, RG5 replicated RG4, following the same use of joins for the *ğim* letter group and undifferentiated sequences of teeth. Despite the small size, the letterforms are handled with confidence: RG5 maintains all the characteristic features of Granjon's design, perhaps showing more coherence in the overall design than the previous type (i.e. there are fewer doubts about the revision work of different hands in the design).²⁹ However, the proportions of the characters one to another remain imbalanced and unresolved, as well as the style consistency (Figure 6.101).

Some conclusions

The analysis of Granjon's five Arabic types was instrumental to highlight his contribution to the advancement of Arabic typography, and to rightfully credit the French punch-cutter with the introduction of features that set new typographic standards followed by several subsequent Arabic types in Europe and the Middle East. Granjon's work proved that the convergence of different factors (e.g. fundings, skilled craftsmanship, availability of manuscripts and advisors) enabled an improved typographic representation of the script and his approach demonstrates that technical

27. *Typographie Orientale Des Médicis*, I, 1–56, CDP.

28. In this document the *Arabe d'Avicenne* is recorded as being 'sur dix points' (i.e. 10pt). From *Recueil Des Empreintes*, XI, 116–170, CDP.

29. Nonetheless, the revision work of different hands for the making of the punches cannot be excluded: Raimondi's accounts books mention payments to Cesari, amongst other things, for punches for the 'Arabica piccolina' in 1586, on behalf of Granjon's. See Tinto, *La Tipografia Medicea Orientale*, 13–14.

difficulties could be surmounted with the appropriate sensitivity to preserving the script's requirements despite the limitations. On the other hand, the shortcomings highlighted in Granjon's Arabic types reveal that punch-cutting mastery could not alone compensate for the lack of script-related knowledge; secondarily, the differing nature of the shortcomings reveals that the typographic image of the Arabic script can be understood only by identifying the manifold conditions of type-making.

6.1.7 The apprentice of Granjon: Jean Cavaillon

Nothing is known about the French punch-cutter Jean Cavaillon, except that he replaced Granjon at the Typographia Medicea when he died, working for the Press since 1590.¹ Amongst the papers kept in the Medicean Archives, there are payment receipts to Cavaillon for different types, although there is not enough documentation about their casting. Moreover, the vague terminology used in the documents does not provide support for the identification of the types and the editions in which they were eventually used.²

According to Tinto, the 1591 and 1592's payments to Cavaillon refer to two different 'carattere arabo grande' (i.e. large Arabic type) – in this study indicated as JC1 and JC2³ (Appendix 21) – although there is printed evidence for only one of them, in the form of a specimen. The anonymous and undated single sheet proof (Figure 6.102), found by Vervliet in the Medicean Archives, shows a large vocalised Arabic, described by the historian as of equal size to RG3 but less well executed.⁴ Vervliet, who suggested a possible attribution of this type to Cavaillon, also identified its use in one page of the *Alphabetum Arabicum*, 1592 (Figure 6.103). Between 1591 and 1592 there are more payments for a first 'carattere arabico mezano'⁵ (i.e. medium Arabic type, JC3) (Appendix 22), and for a second 'carattere arabico mezano' in 1593⁶ (JC4) to accompany a the 'persiano mezano' (i.e. medium Persian type). There are also two 'carattere arabo piccolo' (i.e. small Arabic type, JC5 and JC6),⁷ and a 'carattere arabo commune' (i.e. Common or ordinary Arabic type, JC7⁸) (Appendix 23).

According to Tinto, Cavaillon also made another nine types for the Press between 1591 and 1600: a 'lettera africana',⁹ two Syriac types, three Persian types (large, medium, small), and three 'egiziano' (large, medium and small¹⁰). Some of Cavaillon's types could possibly be identified with the printing proofs found by the author in the Medicean Archives (Appendix 24). Regardless of the significant investments, it seems that Cavaillon's types were never used in Medicean editions besides the page in the *Alphabetum*; perhaps they were prepared for the unfinished project of the Polyglot Bible and its related publications, like Raimondi's long-planned Persian Grammar.¹¹

1. Tinto, *La Tipografia Medicea Orientale*, 46 and Saltini, 'Della Stamperia Orientale Medicea', 269.

2. Ibid.

3. Ibid., 46–47. In Raimondi's account books the first payments to Cavaillon are to buy the steel for the punches of a large Arabic (JC1): the document records 13 entries between 10 June 1591–6 March 1592. Another document records payments for what is considered a second large Arabic (JC2) started on the 20th March 1591: the 142 entries are dated 22 March 1591–22 August 1592. There is also a third document that records payments to Cavaillon to buy the copper for the matrices, dated 21 March–5 December 1591.

4. Vervliet, 'Cyrillic & Oriental Typography in Rome', 454, note 195.

5. Started on 16 September 1591, the payments are dated 18 September 1591–22 December 1592. Tinto, *La Tipografia Medicea Orientale*, 47.

6. Ibid. Payments for 254 punches and 254 matrices.

7. Ibid., 47–48. JC5 was started on 14 April 1592 and paid between 14–28 April 1592. Payments for the matrices of JC6 are dated 15 July–5 December 1591.

8. Ibid., 48. JC7 was started on 3 October 1592, paid between 3 October 1592–28 May 1596.

9. Ibid. According to the Medicean documents, Cavaillon acquired the copper for the matrices of this type on the 2nd February 1591. A type named *Arabe d'Afrique* 'sur seize points' (i.e. 16pt) appears in the *Recueil Des Emprintes*, CDP, 259. It is yet to be established if these two types relate. The term 'africana' indicates a Maghribi style of Arabic.

10. Ibid., 48–51.

11. Mentioned in § 6.1.2, note 52.

Furthermore, it is likely that some of the boxes of unidentified Arabic punches at the Laurenziana Library in Florence may belong to Cavaillon: however, none of the cases available corresponds to the large Arabic used in the undated specimen.¹² On the other hand, at least one of the two cases of Persian-labelled punches seems to correspond with the types used in one of the proofs found in the State Archive.¹³ Nonetheless, this may be the previously mentioned medium size Arabic type in the *nash* style made to accompany the medium Persian, because the punches do not show the *nasta*'liq inspired characters used in some of the printing proofs.¹⁴

A large *nasta*'liq type appears notably on the title page of the *Liber Tasrifhi*, the last work published by the Typographia Medicea in 1610 (Figure 6.104).¹⁵ More evidence can be found in the volume II of *Typographie Orientale Des Médicis* in the Archives of the Imprimerie Nationale, which amongst an unsorted assortment of characters, shows at least two sizes of *nasta*'liq types (Appendix 30) that seem to match the proofs found in the State Archive in Florence.¹⁶ From the volume I of the same book it is possible to identify the larger size Persian with the type named *Persan d'Alde* (PDA1), that has a dedicated section¹⁷ (Appendix 31).

The Medicean Persian types should be compared to Raimondi's *nasta*'liq handwriting which may have also supplied the models for the types: some examples are found in his preparatory manuscripts (Appendix 13 and Appendix 25) and in other records in the Medicean Archives (Appendix 26).

The Arabe d'Alde

It is appropriate to discuss here another type that belonged to the Typographia Medicea, which until today lacked evidence of attribution to Jean Cavaillon. The type in question is named *Arabe d'Alde* (ADA) in the documents of the Imprimerie Nationale.¹⁸ The French Archives hold 1 case containing 391 punches (Appendix 58) and 3 cases of matrices (Appendix 59).

The ADA type appears in some of the sources of the Imprimerie like the *Matrices À Réformer* and the *Poinçons À Réformer*, but not in the *Recueil Des Empreintes*, the *Folders*, the *Liste Des Types Étrangers*¹⁹ or in the *Modèles De Cassettes*. According to

12. Although at least one of the two cases of large unidentified Arabics (see Appendix 27 and Appendix 28) could be one of Cavaillon's two large Arabic types. The other was identified by the author in the CDP, see below.
13. The two cases of punches in the BML are labelled as 'Arabe-Persan N.1' and 'Arabe-Persan N.2'. The second one (see Appendix 29) appears to show some characters used in the proof n.17 in Appendix 24.
14. See also Appendix 24. It should be noted that the author has not photographed the case of 'Arabe-Persan N.1' in the BML, which contains 356 punches. Nonetheless, from what can be gathered from Whitehouse's work, it seems that also this case does not contain punches of *nasta*'liq characters.
15. One of the specimens found in the Medicean Archives is a printing proof of this *nasta*'liq title (Appendix 24, n.4).
16. See Appendix 24, proofs n.17 and n.22–24 for the smaller size and proofs n.4 and n.16 for the larger size. It should be noted that the Imprimerie Nationale holds only the punches of a 30pt 'Farsi Persian' belonged to Savary de Brèves and completed in the French Press in 1885 by Marcellin Legrand, under the direction of Pihan. See *Les Caractères De L'Imprimerie Nationale*, 216 and Duverdier, 'Les Impressions Orientales', 228.
17. These first cross-references on the Persian types suggests a cautious attribution of the to Jean Cavaillon. This is also due to the name of the larger sized Persian, that clearly shows some relation to the *Arabe d'Alde* attributed by the author to Cavaillon, see below. These Persian types are possibly the earliest Persian *nasta*'liq types made in Europe.
18. It was briefly mentioned in § 6.1.4.
19. Consequently the type does not appear in the publication *Les Caractères De L'Imprimerie Nationale*,

Nelly Gable, the *Arabe d'Alde* was never employed in a printed book. The Imprimerie Nationale occasionally employed some characters (it seems mostly ligatures) when composing with the *Arabe des Quatre Évangiles* (RG3), because it fitted the latter point size. Thanks to this use, it was possible to detect a mistake in the size of ADA, which is corp 32 or 34 and not 14 as recorded in the documents of the Imprimerie.²⁰

It is not known why this type is named *Arabe d'Alde*, but it appears that it received the attribution at the Imprimerie Nationale.²¹ By comparing the case of punches with Raimondi's account books, the author was able to identify ADA with the Medicean 'Carattere Arabico grande' started on the 20th March 1591 by Jean Cavaillon, indicated in this study as JC2. The sketches of the letterforms written by Raimondi find perfect correspondence with the punches of the *Arabe d'Alde* (Figure 6.105), providing evidence – for the first time – for the identification and attribution of this type. From the observation of the sources, it seems that Raimondi's entries are incomplete because the case of punches at the Imprimerie shows more characters/ligatures than the ones appearing in the account books.²²

Although ADA shows some peculiar features (e.g. the rounded form of medial *hā'*, the long thin barb on the ascenders of *ṭā'*/*ẓā'*, in the *lām-alif* ligature), it also presents the general structure and many traits in common with Granjon's Arabic types (e.g. the flag of *kāf*, the form of *rā'*/*zā'* and *ğim* group). This is not surprising considering that Cavaillon was Granjon's apprentice. On the basis of this observation, it is safe to say that the ADA type was also based on the models of Raimondi's handwriting.

A final comparison was made between the punches of ADA and the anonymous and undated specimen in the Medicean Archives, attributed by Vervliet to Cavaillon. Although some characters that appear in the specimen do not appear in the case²³ of punches, many letterforms seem to match: these include at least one ligature that has the corresponding punch but does not appear in Raimondi's sketches (Figure 6.106) and one ligature that has not the corresponding punch but appears in Raimondi's sketches (Figure 6.107). However limited, this evidence seems to suggest that the three sources (punches, specimen and Raimondi's sketched) are not only related, but that they all refer to the same large Arabic of Cavaillon (*Arabe d'Alde* or JC2). It remains to be established if the 1591–1592 payments in the Medicean records are for two different large Arabics of Cavaillon as suggested by Tinto, or if they refer to the same type (JC2), possibly just delivered in different batches.

based mostly on the *Liste*.

20. See Nelly Gable's note in the case of the punches, Appendix 58.
21. Unless the name is a French translation from Italian, in which case the origin must be searched in the *Typographia Medicea*. It is possible that the name has a relation with the old Italian terminology used to indicate the types according to their point size: the 'Testo d'Aldo' was used to indicate the 16pt, and the 'Testino' was its half, thus 8pt. See Giuseppe Bellini, *Storia Della Tipografia Del Seminario Di Padova*, 1684–1938 (Padova: Gregoriana editrice, 1938), 26, note 3. The 'Testo d'Aldo' is possibly the equivalent of the French 'Gros Texte' (indicating Fournier's 16pt body size), rather than of the 'Gros Romain' (indicating Fournier's 18pt): see the table provided in James Mosley: 'Type Bodies Compared', accessed July 11, 2017, <http://typefoundry.blogspot.co.uk/2008/04/type-bodies-compared.html>.
22. Raimondi entries record 292 punches, about 100 less than the case in the CDP.
23. It should be borne in mind that the case could be incomplete, considering the various displacements of the Medicean material between Italy and France.

6.2 A 17th-century noteworthy improvement: the types of Savary de Brèves

After the demise of the *Typographia Medicea* following the death of Raimondi in 1614, Oriental printing in Rome was briefly in the hands of François Savary de Brèves, who served as ambassador of France in Constantinople between 1591 and 1604, although overall he spent a total of 22 years in the East.¹ Savary de Brèves returned to Marseille in 1606 and sojourned in Paris until 1608. Between 1608 and 1614 he was dispatched to Rome on a diplomatic mission where he found the ideal environment to pursue his project to establish a polyglot printing press, the *Typographia Savariana*, motivated by the plan of a crusade against the Turks.² Rome also supplied him with valuable collaborators: Victorius Scialac Accurensis (Naṣrallāh Šalaq al-‘Aqūrī) and Gabriel Sionita (Ǧibrāīl aş-Šahyūnī) from the Maronite College as editors and translators; the printer Stefano Paolini, later known in France as Étienne Paulin; and a Muslim Turkish assistant who became his protégé, Husayn of Buda (Oussin de Boudes).³

With its first publications – the *Doctrina Christiana* by Cardinal Bellarmino in 1613⁴ (Figure 6.108) and the *Liber Psalmorum Davidis Regis* in 1614⁵ (see Figure 2.20) – the *Typographia Savariana* introduced new Arabic types, whose unknown origins has been variously attributed to Constantinople, Rome or Paris. The historian Gerald Duverdier – who has discussed in detail all the different hypotheses regarding their provenance – has provided evidence that they were made in Rome,⁶ suggesting the name of Guillaume II Le Bé as the punch-cutter.⁷ Other scholars have advocated the notion of an Italian craftsman as the punch-cutter, in consideration of the fact that during the same period (1614–1621) a few of them had worked for an Oriental press established temporarily in the Maronite College. Due to these circumstances, Giambattista Sottile seems the most likely name: he was the only surviving craftsman from the *Typographia Medicea*, and was also closely linked to the Savariana's printer Paolini, who had previously worked for Raimondi.⁸

In 1614 Savary de Brèves was recalled to Paris, where he relocated the entire Press, including the types, the precious collection of manuscripts collected in the East and all his collaborators with the exception of Scialac, who was replaced by the Maronite

1. Duverdier, 'Les Impressions Orientales', 159.
2. In order to unify the Eastern Churches against the same enemy, he intended to print and distribute Christian texts in Syriac and especially in Arabic, the spoken language of the people, to keep them in the Christian faith. See Gerald Duverdier, 'Les Caractères De Savary De Brèves, Les Débuts De La Typographie Orientale Et La Présence Française Au Levant Au XVIIe Siècle', in *L'Art Du Livre À L'Imprimerie Nationale Des Origines À Nos Jours* (Paris: Imprimerie Nationale, 1973), 72–73.
3. Duverdier, 'Les Impressions Orientales', 159, 163.
4. Also known as the *Catechism*. The first edition was published only in Arabic, not vocalised, destined for the Christians of the East. In 1619 it was followed by a bilingual edition with vocalised Arabic and Latin translation. The print run was 500–600 copies. Duverdier, 'Les Impressions Orientales', 195.
5. Ibid., 199–200. This book was also printed in two editions, the first in Arabic alone for the Eastern market and the second with a facing page Latin translation, for Europe. It was printed in 3,000 copies (against the originally planned 6,000 copies).
6. Duverdier, 'Les Impressions Orientales', 160. In his letters to Jacques-Auguste de Thou, de Brèves mentioned type for three languages, Turkish, Arabic and the third language variously indicated as Persian or as Chaldean (Syriac).
7. Duverdier, 'Les Caractères De Savary De Brèves', 73–74.
8. See Vaccari, 'I Caratteri Arabi Della Typographia Savariana'.

Jean Hersonita (Yuhanna al-Hasrūnī⁹). In Paris the *Typographia Savariana* became the press of the *Collège Royal*, where Sionita also obtained the chair of Arabic: 'ce n'est plus une imprimerie de propagande, c'est une imprimerie savante qui sert la propagande du catholicisme zélé'.¹⁰ Therefore, Savary de Brèves focused on publications that could support the progress of knowledge in Oriental languages, and be used for the study of the Scriptures. Nonetheless, he was forced to abandon the project of a Polyglot Bible that would be bigger than Plantin's Bible due to the lack of funds. The choice to publish bilingual editions and to vocalise the Arabic text also reflected Savary's interest in encouraging sales in the European market.¹¹ However, the *Typographia Savariana* had a short life and published its last work in 1616, the *Grammatica Arabica Maronitarum* by Gabriel Sionita, under the new printer Jérôme Blageart.¹² After Savary's death at the end of 1627, his types appeared in many other works in France, like Jean-Baptiste Duval's *Dictionarium Latino-Arabicum Davidis Regis* printed in 1632 (Figure 6.109). More notably, the types were used for the Paris Polyglot Bible,¹³ which was eventually printed in 10 volumes between 1628 and 1645 by Antoine Vitré, financed by the wealthy Parisian lawyer Guy Michel Le Jay.¹⁴ Yet, the work did not generate satisfactory sales and was soon overshadowed by Brian Walton's London Polyglot Bible printed by Thomas Roycroft between 1653–57,¹⁵ which employed a faithful – but much less accomplished – copy of Savary's types (Figure 6.110).¹⁶

The eventful story of the sale of Savary de Brèves' types (and manuscripts) has been widely documented.¹⁷ It will suffice to report that they were first purchased from his heirs by Vitré in 1632, under the commission of Cardinal Richelieu; they were later kept in a deposit at the *Bibliothèque du Roi* between 1674 and 1692, when they were handed to the *Imprimerie Royale*. The existence of the punches was in doubt until their discovery and identification by the French Orientalist Joseph de Guignes, who compiled an inventory in 1787¹⁸ (Appendices 60, 61 and 62).

9. At the end of 1615 or beginning of 1516, the printer Paolini returned to Rome and was employed first at the press of the Maronite College and later at that of the Propaganda Fide, Duverdier, 'Les Impressions Orientales' 169.
10. 'It is no longer a propaganda printing press; it is a learned printing press which serves the propaganda of zealous Catholicism', approximate translation by the author from Duverdier, 'Les Caractères De Savary De Brèves', 79.
11. Duverdier, 'Les Impressions Orientales', 166.
12. This was the second Arabic grammar published in France, after Postel's one in 1543. Only one of the five announced books was published. Duverdier, 'Les Impressions Orientales', 203.
13. *Biblia. 1. Hebraica, 2. Samaritana, 3. Chaldaica, 4. Græca, 5. Syriaca, 6. Latina, 7. Arabica*, Paris, 1645.
14. It appears that the Arabic for this Bible was cast from the matrices of Savary's types given from Sionita to Vitré. On the other hand, Jacques de Sanlecque only completed the Arabic by cutting a certain number of punches and striking the corresponding matrices. Duverdier, 'Les Caractères De Savary De Brèves', 83.
15. Ibid., 35.
16. The Arabic type used by Thomas Roycroft (TR1) was a relatively large size: according to Roper, a 'Great Primer', name that refers to the 18pt (i.e. cast on a 18pt body), see Roper, 'Arabic Printing and Publishing in England Before 1820', 21.
17. See Joseph de Guignes, *Essai Historique Sur La Typographie Orientale Et Grecque De L'Imprimerie Royale*, Paris 1787; Duverdier, 'Les Impressions Orientales' and from the same author 'Les Caractères De Savary De Brèves'.
18. Joseph de Guignes, *Inventaire De La Typographie Orientale De L'Imprimerie Royale Et Y Éxistante Au Premier Janvier 1787*, BNF [RES G-Q-180 (1); RES G-Q-180 (2)]. It contains imprints of characters for Arabic (Gros, Moyen and Petit), Persian and Turkish ('Taalik'), Syrian, Armenian and Hebrew. While sorting the punches, De Guignes also compiled a document to record his observations regarding the type-making and composition methods that he could infer from their examination and

In the eighteenth century, Savary's Arabic types were notably used in 1795 for the *Addresse de la Convention Nationale au Peuple Français*,¹⁹ and later by Napoleon Bonaparte during his campaign (1798–1801) that brought Arabic typography to Egypt.²⁰ The new press, named Imprimerie Orientale et Française, was entrusted to the printer Marc Aurel and the Orientalist Jean-Joseph Marcel, later also director of the *Imprimerie Impériale* in Paris.²¹ The first work published in Alexandria 1798 was the *Alphabet Arabe, Turk Et Persan* followed, by a reading manual and a grammar,²² so that the typographers could become acquainted with the Oriental characters and learn the Arabic language.²³ After the move to Cairo in 1799, the Press operated under the name *Imprimerie Nationale de Caire* and printed the first two periodicals of the Arab world, the *Courier de l'Egypt* and *La Décade Egyptienne*.²⁴

About the types

Savary de Brèves used two sizes of Arabic types while in Rome, a 64pt (SDB1) and a 30pt (SDB2); whereas a 7pt size (SDB3) appeared in the publications after the move to France²⁵ (Figure 6.111). His types – mainly referring to the 30pt size – have been variously praised for their 'outstanding elegance and beauty';²⁶ for their charm, perfection and remarkable vocalisation, which makes them the only ones comparable to those of the Medici Press,²⁷ if not more elegant;²⁸ and for 'the sheer beauty of design' that 'has never been excelled'.²⁹ Moreover, the significance of Savary's types lies in their longevity as 'the mainstay' of Arabic typography in France until the late 19th century, but also in their influence on other seventeenth century Arabic types in Europe, like those used by Thomas Roycroft in England (TR1) and by the Press

comparison of different point sizes, providing important information about Savary's Arabic types, see De Guignes, *Principes De Composition Typographique*.

19. The National Convention was the third government of the French Revolution.
20. See Fawzi M. Tadrus, 'Printing in the Arab World with Emphasis on the Būlāq Press in Egypt', *Bulletin of the Faculty of Humanities and Social Sciences* no. 5 (1982): 62–63; George N. Atiyeh, 'The Book in the Modern Arab World: The Cases of Lebanon and Egypt', in *The Book in the Islamic World: The Written Word and Communication in the Middle East*, edited by George N. Atiyeh (Albany: State University of New York Press, 1995), 244; J. Heyworth-Dunne, 'Printing and Translations under Muḥammad 'Ali of Egypt: The Foundation of Modern Arabic', *Journal of the Royal Asiatic Society* (1940): 326–27; and Clifford Edmund Bosworth, *Encyclopédie De L'Islam. Nouvelle Edition*. Fascicle 11 (Leiden: E. J. Brill, 1992), 787.
21. For a history of this press see Raymond Blanchot, 'Histoire De L'Imprimerie D'État', in *L'Art Du Livre À L'Imprimerie Nationale Des Origines À Nos Jours* (Paris: Imprimerie Nationale, 1973), 1–31.
22. Entitled, respectively, *Exercises De Lecture D'arabe Littéral, À L'usage De Ceux Qui Commencent L'étude De Cette Langue* and *Grammaire Arabe*.
23. Duverdier, 'Les Impressions Orientales', 234.
24. Geoffrey Roper and Dagmar Glass, 'The Printing of Arabic books in the Arab World'. In *Middle Eastern Languages and the Print Revolution: A Cross-Cultural Encounter: A Catalogue and Companion to the Exhibition* (Westhofen: WVA-Verlag Skulima, 2002), 182 and Dagmar Glass, 'Arabic Newspaper and Periodicals in the Arab World (1828–1928)', in *Middle Eastern Languages and the Print Revolution: A Cross-Cultural Encounter: A Catalogue and Companion to the Exhibition* (Westhofen: WVA-Verlag Skulima, 2002), 207.
25. Duverdier, 'Les Impressions Orientales', 160. SDB2 is recorded as being of 29pt in the Archives of the Imprimerie Nationale, see below. An additional Arabic type of 16pt of Savary de Brèves (SDB4) is mentioned by Smitskamp, and discussed briefly in § 7.2.2.
26. Roper, 'Early Arabic Printing in Europe', 144.
27. Balagna, *L'Imprimerie Arabe En Occident*, 56.
28. De Guignes, *Essai Historique*, 6.
29. Arthur John Arberry, *Arabic Printing Types: A Report Made to the Monotype Corporation Limited* (Great Britain, 1950), 18.

of the Sacra Congregatio de Propaganda Fide in Rome.³⁰ According to the scholar A. J. Arberry, they also influenced the types of the monastic presses of 18th century Romania, Syria and Lebanon and the types used in Spain in the mid 18th century.³¹ Today, the Archives of the Imprimerie Nationale hold the punches of the two bigger sizes of Savary's Arabic types.³² SDB1 is named *Gros Arabe* on 64 points³³ (Appendix 67): the documents – not dated – record an initial number of 254 steel punches and 359 copper matrices;³⁴ whereas the number of the punches inventoried in 1873 was 333 and 1309 for the matrices.³⁵ Today,³⁶ there are 2 cases containing 329 punches³⁷ (Appendix 64) and 4 cases of matrices (Appendix 65). This type was used for the first time for the titles of the *Liber Psalmorum*, the second publication of the *Ty-*
ographia Savariana (Figure 6.112). From the six-parts case-lay used at the Imprimerie Nationale dated 1885 (Appendix 63), it can be observed that SDB1 had a large character set. This was not only to provide contextual variants and ligatures but also to cover two different methods of letter-joining, with straight and 'peak' ending horizontal strokes, as introduced by Granjon (Figure 6.113). The letterforms adhere almost consistently to the tulut style, which is traditionally particularly suited for use at large sizes (Figure 6.114).

SDB2 is the most representative of Savary's types: being used for longer text composition, it is also more interesting for this study, and therefore the basis of a more in-depth analysis. However, it is worth remarking that the two types appear to be made by the same craftsman and share common features. Furthermore, having two Arabic calligraphic styles applied almost consistently to two different sized types that seem to have originated from the same concept, also shows an awareness of the type-maker of the script's requirements, or at least, access to the right models or advisors.

There is limited information regarding the models used for Savary's Arabic types. Referring to SDB2, Roper describes the type as 'evidently based directly on Arab or Turkish specimens of calligraphy acquired by Savary while serving in the Ottoman Empire'.³⁸ The most significant evidence for this hypothesis is supplied by Father Alberto Vaccari, following the discovery of a manuscript in the Vatican library,

30. See § 7.1.3.

31. Arberry, *Arabic Printing Types*, 18–19. Roper adds that Zāḥir's Arabic types were modelled on the Romanian Arabic types, which were in turn influenced by de Brèves, 'Arabic Printing in Malta 1825–1845', 19 note 70. For more in-depth discussion of the first Arabic printed types of Syria and Lebanon See sections § 8.2.1 and 8.2.2.

32. Plus the Persian, as already mentioned.

33. SDB1 is described as 'Arabe Nesky, Corp 64 (20+4 fois 11)', that is four times 11. From Imprimerie Nationale, Folders, 'Arabe Nesky, corps 64 (20+4 fois 11) ou Gros Arabe. Gravé par le soins et aux frais de Savary de Brèves, ambassadeur à Constantinople de 1591 à 1605, et à Rome, de 1608 à 1614', [CDP]. See also *Liste Des Types Étrangers*, 6. In the *Recueil Des Empreintes*, SDB1 is recorded as being 'sur vingt points' (i.e. 20pt), because it only indicates the size of the base-character, without counting spaces for the accents. See *Recueil Des Empreintes*, XI, 44–79. In a Specimen from 1819 SDB1 is indicated as 53pt (see Appendix 66).

34. The original number of punches is also reported in the 1990's publication *Les Caractères De L'Imprimerie Nationale*, 207.

35. The document, in the same handwriting, mentions also a specimen from 1878, so it was clearly written after that date.

36. The material from the Archives of the Imprimerie Nationale, CDP, in the 'Appendices' was photographed on the 25–26th November 2015.

37. As also stated in the most recent paper note contained in the punches' case, see 'Appendices'.

38. Roper, 'Early Arabic Printing in Europe', 144. According to Arberry, they were supplied by an oriental calligrapher, 'for so high and true a standard of perfection could hardly be attained by the most gifted European artist', Arberry, *Arabic Printing Types*, 18.

considered not only the model for the text of the *Liber Psalmorum*, but also for the design of the Arabic types.³⁹ The manuscript – which appears to come from Lebanon – shows a handwriting that bears close resemblance to Savary's Arabic; however, the differences found in comparison to the typeforms seem to suggest that the manuscript supplied a source of inspiration rather than a model to copy faithfully.⁴⁰

At the Imprimerie Nationale SDB2 is named *Moyen Arabe*, 29 points⁴¹ (Appendix 71 and Appendix 72). The documents in the French Archives record an initial number of 487 steel punches and 497 copper matrices, whereas in 1873 the number of the punches inventoried was 329 and 1305 for the matrices.⁴² Today, there are 2 cases containing 587 punches⁴³ (Appendix 69) and 3 cases of matrices (Appendix 70). Like SDB1, also SDB2 has a six-part case-lay (Appendix 68), containing a large number of ligatures and same characters adapted for the two joining methods previously mentioned.⁴⁴ This type was used fully vocalised in the bilingual versions of the *Doctrina Christiana* and the *Liber Psalmorum*.

According to Arberry, 'the most noteworthy characteristic of the Savary fount is its remarkable fidelity to the principles of the best *naskh* calligraphy' that it successfully reproduces 'but one – and that its most vital and vitalising feature, impossible of reproduction in print – its subtle variations of tone and texture'.⁴⁵ The analysis of letterforms of the SDB2 type confirms that these conform more to the *nash* calligraphic style, although it highlights some exceptions (e.g. isolated alif, medial kāf) that show *tulut* features, perhaps deriving from the larger sized SDB1⁴⁶ (Figure 6.115).

SDB2 is fairly upright, abandoning the gentle slant of Granjon's Arabic. From a structural point of view Savary's types seem to replicate Granjon's approach without introducing any significant innovation; however, they accomplish a distinctive aesthetic quality with some noteworthy improvements. One of the main features of SDB2 is the sharp and delicate design with a marked stroke contrast. Although this reveals a more conscious effort to replicate calligraphic models, the handling of the weight distribution is flawed. Furthermore, the difference between thin and thick strokes could be better balanced to avoid the hairline strokes that occur in many characters (Figure 6.116). The design of letterforms also shows intention to incorporate features belonging to calligraphic practice. However, their execution and use is far

39. Vaccari, 'I Caratteri Arabi Della Typographia Savariana'.

40. For the comparison of the Vatican manuscript with SDB2 typeforms see § 2.2.

41. SDB2 is described as 'Arabe Nesky, corps 29 (9+10+10) ou Arabe Moyen. Gravé par le soins et aux frais de Savary de Brèves, ambassadeur à Constantinople (1591–1605) et à Rome (1608 – 1614). Acheté pour ordre de Louis XIII en 1632', [CDP]. See also *Liste Des Types Étrangers*, 5–6. In the *Recueil Des Empreintes*, SDB2 is recorded as being 'sur huit points' (i.e. 8pt), because it only indicates the size of the base-character, without counting spaces for the accents. See *Recueil Des Empreintes*, XI, 4–43. Likewise, the volume *Poinçons À Reformer* records an 'Arabe sur 8 points' of Savary de Brèves, (Appendix 73), see *Poinçons À Reformer*, 2–10, CDP.

42. The document, in the same handwriting, mentions also a specimen from 1878, so it was clearly written after that date.

43. As also stated in the most recent paper note contained in the punches' case, see 'Appendices'.

44. A single printed sheet of SDB2 is also available at the Bibliothèque Nationale: Joseph De Guignes, 'Alphabet Arabe', *Gallica*, accessed 22 February, 2018. <http://gallica.bnf.fr/ark:/12148/bpt6k6423461q>.

45. Arberry, *Arabic Printing Types*, 19.

46. There is no record of which type was designed first. It is however known that the *Liber Psalmorum*, which used both types, was supposed to be the first publication of the Press. The *Doctrina* was perhaps prioritised due to the missionary nature of the publication for Arabic-speaking Christians in the East, whereas the psalter was 'a Christian manual of Arabic' for Europeans. See Duverdier, 'Les Impressions Orientales', 160–61.

from faultless: for instance, the closed variant for the initial ǵim group is not always used correctly; the spur on the initial/medial lām is in the correct position but the design is poor; the high teeth variants to aid legibility are used only occasionally (Figure 6.117). Besides some characters being more accomplished than others, SDB2 shows inconsistencies between letterforms that should relate harmoniously to each other to achieve an overall more cohesive design (Figure 6.118). Regarding the proportions of characters, SDB2 shows improvement compared to Granjon's types, although there are some unresolved issues (Figure 6.119). As already mentioned, the structure of the script and in particular the methods of letter-joining is clearly modelled on Granjon's experimentations with 'peak' ending strokes and curved extensions.⁴⁷ Nonetheless, the standard method is also used, where the letters' straight-ending horizontal strokes are elongated, when necessary, with flat kašida sorts (Figure 6.120). A more common solution to adjust the fitting is, however, to use swash character variants (Figure 6.121).

Multilevel connections in SDB2 are variously rendered: the simpler vertical joins between characters are obtained through ligatures, as well as a limited number of complex stacking of characters (up to six, Figure 6.122). More often, these cascading connections are levelled to the notional baseline by means of various expedients (Figure 6.123). This practice served not only to simplify the composition, but mainly to create systematic methods to avoid the unfeasible task of creating ligatures for each cascading combination. The ǵim letter group in medial and final position uses a connecting stroke that reaches for the notional baseline, as seen in Granjon's first Arabic: by adding dots the stroke also serves to indicate a tooth character (see Figure 6.23). This solution appeared in the first version of SDB2 used in the earliest Roman publications of the *Typographia Savariana* in 1613–14 and it was also copied for TR1, the type used in the London Polyglot Bible. New sorts for the ǵim letter group of SDB2 appeared in the alphabet tables included in two works printed with Savary's type in Paris in 1616 and 1632. However, these were probably an experiment or a temporary solution: the first approach was indeed never abandoned and appeared regularly in later works, including the Paris Polyglot Bible and the eighteenth-century publications of the Imprimerie Orientale et Française that used SDB2 (Figure 6.124). The alphabet tables also provide an overview of the basic character set of SDB2 that remained almost unchanged in the space of nearly 200 years.

Regarding the design of characters of SDB2, there are two more elements worth mentioning. Firstly, the second typographic appearance of the dāl/dāl-hā' ligature – after Granjon's use (see Figure 6.75) – plus the rā'/zā'-hā' ligatures (Figure 6.125). Secondarily, a more cursive variant for the bā' letter group in final position is added to the more upright version; this cursive form, characteristic of Granjon, is perhaps also inspired by the latter's Arabic types (Figure 6.126).

Another significant feature of SDB2 is the support for full vocalisation, previously only seen in Granjon's Arabic types, although the *Typographia Savariana* – and later also Vitré using the same types – made a more systematic use of vocalised texts in their publications compared to the Medicean Press. The vocalisation achieved in the bilingual versions of Savary's first two works printed in Rome – the catechism and the psalter – is quite convincing: it is proficient in replicating manuscript practice and appears to be fairly accurate in the relative positioning to the characters, thus improving legibility. This observation takes into consideration not only the standards of what had been previously put on the market but also the difficulty in the typesetting. On the other hand, issues related to the position of diacritic dots – often

47. For Granjon's examples, see Figure 6.51.

too far from the base-forms – also affect the vowels that have to sit above or below them (Figure 6.127). Moreover, the size and weight of the vowel marks are slightly overwhelming on the page, and their setting becomes at times claustrophobic, also due to the fitting of the type. In later publications that used SDB2, the typesetting of vowels is handled differently. For instance, in Duval's dictionary of 1632 and in the Paris Polyglot Bible, all the marks are aligned as much as possible to the same height, revealing the characters with the diacritic dots cast on the same sort of the base-forms (and therefore positioned closer to them). This practice both simplified and sped up the work of the composer, although it produced a more rigid-looking composition, possessing less affinity to manuscript practice (see Figure 6.109).

The cases of punches and matrices of SBD2 at the Imprimerie Nationale show that most of them are dotless, confirming that the diacritic marks were added separately in composition.⁴⁸ Furthermore, besides the punches for individual dots, the case contains numerous other punches for single or double vowels, and for single and double vowels combined with dots. More importantly, the matrices also show that dots and vowels were also cast at different heights to provide for a more accurate positioning above or below the base-forms (Figure 6.128).

Finally, it is worth mentioning that the smallest size of Savary's Arabic types, SDB3, is named *Petit Arabe* at the Imprimerie Nationale. As far as is known, the oldest evidence of this type in France – besides the above mentioned printed edition of 1616 (Figure 6.129) – is in de Guignes' inventory from 1787 (Appendix 62). On the other hand, the French Archives do not hold any punches or matrix cases for this type, nor case-layouts as are held for the two larger sizes of Savary's types. It appears that the material regarding this type did not reach the Imprimerie Nationale, which does not hold any record of it.⁴⁹ To date, no additional evidence had surfaced regarding this type.

It has already been mentioned that Savary's types have been historically appreciated as the highest peak of Arabic typography, equalling, if not surpassing those of Granjon's:

If the art of Arabic typography be to reproduce in print a faithful image of a scholarly manuscript hand, then the Savary types have never been surpassed.⁵⁰

The analysis has established that although this might be true from an aesthetic point of view (e.g. shaping and proportioning of letterforms), Savary's types structurally replicate Granjon's approach, while remarkably improving on the vocalisation. It is evident that, by the early seventeenth century, these two key figures represented, for different reasons, the high point in the competence, execution and refinement of the Arabic typography, which was to have a long-lasting influence on later types. The next chapter gives an overview of the notable successors that in Europe followed in their footsteps, before looking at the developments of Arabic typography in the Middle East.

48. This hypothesis was verified by looking at the significant distance between the base-forms and diacritics showing in the printed books.

49. The type is also missing in the publication *Les Caractères De L'Imprimerie Nationale*.

50. Arberry, *Arabic Printing Types*, 19.

7.1 New 16th–17th centuries Arabic types of some notable successors

The influence of Granjon on the production of Arabic types in Europe did not take long to manifest itself: firstly in the Netherlands by the end of the sixteenth century, and soon followed by France and Germany. Granjon's large Arabic (RG3) was the type most copied, encouraged by the Medicean Gospels' benchmark publication in 1590. The first printer to produce a new Arabic type on this model was the Orientalist Franciscus Raphelengius in 1595, who significantly contributed to shifting the centre of Arabic printing in the seventeenth century from Rome to Leiden.¹ New Arabic type appeared also in Paris in a specimen printed in 1599 by Guillaume II Le Bé² (Figure 7.1): the type (GLB) was a faithful copy of Granjon's RG3 and the specimen's style replicated the one published by Granjon in Rome in 1583 (see Figure 6.30). The GLB type was used only occasionally in Paris until the end of the eighteenth century,³ perhaps due to the introduction of the superior Arabic types of Savary de Brèves.⁴

Like France, Germany had produced only Arabic woodcuts by the end of the sixteenth century, with the personal initiatives of Rutger Spey and Jakob Christmann.⁵ The first to publish Arabic editions with movable metal type was Peter Kirsten, who started a printing press in Breslau in 1607. The new Arabic type (PK) was cut at Kirsten's expense by Petrus von Seelau after the large Medicean type,⁶ of which he also reproduced some of the ligatures.⁷ On the other hand, the PK type shows some mağribi influence (i.e. in dāl/đāl dal, hā') perhaps derived from Raphelengius' Arabic types or other models (Figure 7.2).⁸ Although Kirsten's Arabic type was 'far superior to any that existed in Germany before his time',⁹ it was of lower quality in comparison to its models. It was later used by Hieronymus Magister for printing a Turkish

1. Raphelengius inaugurated modern Arabic studies together with the scholars Joseph Justus Scaliger, Thomas Erpenius and Jacob Golius, all working in the Netherlands, see Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, ix. The Arabic types of Raphelengius and Erpenius are discussed below.
2. Although there is a conflicting of evidence on whether Le Bé cut the punches himself, see Hendrik D.L. Vervliet and Harry Carter, *Type Specimen Facsimiles II*, (London: The Bodley Head, 1972), 15. An inventory of Le Bé foundry in 1685 lists Arabic punches (no number was given) and 84 partly justified matrices for 'Gros Paragon' Arabic in a box labelled 'Arabic LB'.
3. Ibid. The types appear in one instance also in Amsterdam, see Smitskamp, *Philologia Orientalis* 3, 287b and 345d.
4. See § 6.2.
5. See § 5.1.
6. Rijk Smitskamp, *Philologia Orientalis 2: Seventeenth Century: A Description of Books Illustrating the Study and Printing of Oriental Languages in Europe* (Leiden: E.J. Brill, 1983), 110d.
7. This table of characters also appears in the publication of 1608, *Grammatices Arabicæ, Liber I: sive Orthographia et prosodia Arabica*, without the table of ligatures. See also Appendix 75 for vocalised text set with this type.
8. See below. The letter 'ayn presents a variant form for the initial and final position which is very peculiar to this font. See Krek, *Typographia Arabica*, 22.
9. Ibid.

grammar in 1612¹⁰ and, after Kirsten's move to Sweden, in a publication in Upsala in 1706.¹¹

7.1.1 Franciscus Raphelengius

The origin of Arabic typography in the Netherlands is marked by the move from Antwerp to Leiden in 1585 of the French Orientalist Franciscus Raphelengius, although his first work with Arabic types was only published ten years later. Raphelengius was a scholar and a self-taught Arabist, besides knowing Latin, Greek, Hebrew, Aramaic, Syrian and Persian.¹² After becoming a proof-reader for Plantin's Polyglot Bible – and marrying Christophe Plantin's eldest daughter – Raphelengius bought the printing office that Plantin had established in Leiden (the *Officina Plantiniana*) where he was also appointed professor of Hebrew in 1587.¹³ His interest for Arabic developed as early as 1572,¹⁴ but it was not until much later in life that he could pursue it more intensely. This was associated in particular with the arrival in Leiden of the eminent French scholar Joseph Justus Scaliger in 1593¹⁵ and with the printing of the latter's work *Opus De Emendatione Temporum*, for which Raphelengius offered to produce the Arabic types¹⁶ (see Appendix 76).

As previously mentioned, the first work published with Raphelengius' new Arabic types was a specimen in 1595:¹⁷ in the Latin introduction he stated that his Arabic type was cut according to the style of the Medicean types 'of such elegance that I dare affirm that nothing could be done to improve them'.¹⁸ Raphelengius refers to his large nash-like type (FR1). The specimen also contains a second Arabic type of mağribi influence (FR2) that appears in the alphabet table (Figure 7.3) and at the back of the proof (Figure 7.4). Nonetheless, Raphelengius does not mention the mağribi type in the introduction to the specimen, a decision explained by the fact that this type – made first – was considered inferior to the nash but still significant enough to be included. The nash type was used as the primary text type for all the printed books, whereas the mağribi was used only in another publication in 1613.¹⁹ Lane suggests the

10. Ibid.

11. Smitskamp, *Philologia Orientalis* 3, 113d.

12. H.F. Wijnman, 'The Origin of Arabic Typography in Leiden', in *Books on the Orient*, (Leiden: E. J. Brill, 1957), vii–xv.

13. The Leiden branch of Plantin served as the printer to the University, a title that Raphelengius took over. See Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, ix–x.

14. According to other sources by 1570, see Ernst Braches, 'Raphelengius's Naschi and Maghribi. Some Reflections on the Origin of Arabic Typography in the Low Countries', *Quaerendo* 5, no. 3 (1975): 235.

15. Wijnman, 'The Origin of Arabic Typography in Leiden', ix–xi. Scaliger reportedly encouraged him and put at his disposal the precious collection of Arabic manuscripts that he had brought to Leiden.

16. Braches, 'Raphelengius's Naschi and Maghribi', 241 and Vervliet, *Sixteenth Century Printing Type*, 315. Scaliger's work was printed only in 1598, a year after the death of Raphelengius by the latter's sons.

17. The specimen and an 'open letter' from 1595 conserved at Plantin-Moretus (see Appendix 75) are the only known works printed in Arabic before Raphelengius' death. His sons, who took over the management of the printing office although they had neither knowledge or interest in Oriental languages, continued working until 1619, see Wijnman, 'The Origin of Arabic Typography in Leiden', xiii. For a description of the specimen see Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, xxii–xxii.

18. Vervliet, *Sixteenth Century Printing Type*, 315.

19. The second known use of FR2 is a four-word running head in the *Passio Domini Nostri Iesu Christi, Secundum Matthæum*, published by Raphelengius' Press: see Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, xxxvi. Historian Ernest Braches hypothesised that FR2 was made in or about

possibility that the two types could have been planned from the beginning, highlighting the similarity of Postel's table showing maǵribi characters after the nash (see Figure 5.10), with Raphelengius' use in the specimen.²⁰

The punch-cutting of FR1 is attributed to Jodocus Hondius, who had just moved to Amsterdam in 1593. He was seemingly the only (recorded) punch-cutter in the Northern part of the Low-Countries²¹ and had established connections with the House of Plantin in Leiden.²² However, this remains a hypothesis in addition to that advanced by other historians about the punch-cutter possibly being Guillaume Le Bé, with whom Raphelengius had close contact in connection with the Hebrew type he had cut for Plantin's Polyglot Bible.²³ Regarding the typefounder of Raphelengius' types, it has been claimed that it was most certainly Thomas de Vechter, who was working for him in 1593 and whose foundry shared the same premises.²⁴

In 1612 English Arabist William Bedwell bought Raphelengius' Arabic type²⁵ (i.e. the cast type) with the help of Erpenius²⁶ as he intended printing his own Arabic dictionary, which he had been compiling since the 1580s.²⁷ However, the fount was sent to him only towards the end of 1613, after Raphelengius' sons completed the typesetting of their father's *Lexicon Arabicum* (Appendix 77) and Erpenius' *Grammatica Arabica* (Appendix 78) with the original fount cast in 1595.²⁸ Ahead of selling

1591. Arriving in Leiden two years later, Scaliger showed Raphelengius a copy of the Medicean's *Alphabetum Arabicum*, which then served as a model for the nash-like type. See Braches, 'Raphelengius's Naschi and Maghribi', 241. According to Smitskamp, Raphelengius perhaps decided to experiment with a maǵribi type first due to the style being better suited to typography and needing a smaller number of ligatures, Smitskamp, *Philologia Orientalis* 1, 28a. It is also been claimed that the maǵribi type was a more natural development based on his own handwriting, markedly maǵribi, see below.

20. Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, xiv.
21. 'Later Netherland as opposed to Belgium', see Wijnman, 'The Origin of Arabic Typography in Leiden', xi.
22. If the maǵribi type was made in 1591, it could not have been Hondius' work but perhaps a punch-cutter from the Low Countries that worked on Raphelengius' instructions. Because of the smoke-proofs of this type appearing in a manuscript owned by Raphelengius (in Appendix 80 and discussed at the end of this section), it has been inferred that it must have been someone close enough to him to have access to it for this purpose, see Braches, 'Raphelengius's Naschi and Maghribi', 241. The hypothesis of an independent goldsmith has also been suggested: someone who possibly cut some or all four of Raphelengius' non-Latin types under the direction of the typefounder Thomas de Verchter. See also Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, xix–xx.
23. Braches, 'Raphelengius's Naschi and Maghribi', 243. Although, as observed by Lane, Le Bé's types documented later show a higher degree of finish, see Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, xx.
24. Wijnman, 'The Origin of Arabic Typography in Leiden', xi.
25. Always designated as FR1, unless otherwise stated.
26. There is no mention about the punches or the matrices, although it seems certain that they did not end up in Erpenius' possession, who considered Raphelengius' nash inelegant and had new types cut. Braches, 'Raphelengius's Naschi and Maghribi', 244. The Plantin-Moretus holds Raphelengius' punches for the Samaritan and Ethiopic; the Arabic types seem to be lost, Vervliet, *Sixteenth Century Printing Type*, 315. On the other hand, Hamilton considered the possibility that the punches and matrices remained in the hands of the Raphelengius brothers. See also Alastair Hamilton, 'The Victims of Progress: The Raphelengius Arabic Type and Bedwell's Arabic Lexicon', in *Liber Amicorum Leon Voet*, (Antwerpen: Nederlandsche Boekhandel, 1985), 97–108.
27. Hamilton, 'Arabic Studies in the Netherlands', XCIX. See also Hamilton, 'The Victims of Progress'.
28. Although, as mentioned earlier, the type had by then few additions (e.g. new character designs) and modifications (e.g. larger diacritic dots). The publication of Raphelengius' *Lexicon*, completed with the help of Erpenius, inhibited Bedwell's hope to accomplish the first printed Arabic-Latin

the type, the Dutch press had a second fount cast from the matrices for their own use, employed only in one book, Erpenius' *Proverbiorum Arabicorum*, 1614²⁹ (Appendix 79). Raphelengius' son sold this second cast to his cousin Balthasar Moretus, who by that time inherited Plantin's Antwerp office.³⁰ Both Bedwell and Moretus never used the type, which was 'too tedious to set and too large for economical book production'.³¹

The Arabic type of Raphelengius remained in use at the Press for less than 20 years 'but it served as the foundation stone for a revolution in Arabic scholarship'.³² FR1 indeed represented the first initiative to cut new Arabic movable metal types outside Italy in the sixteenth century; furthermore, its Protestant origins have greater significance in the context of Arabic printing in Europe, which until then was dominated by the Roman Catholic presses.³³

As already mentioned, FR1 was modelled on Granjon's RG3; therefore, it replicated many of the design and structural traits already discussed in the analysis of the Medicean type (e.g. style inconsistency, proportion issues). The table of characters in Erpenius' *Grammatica Arabica* printed 1613 presented a better overview of Raphelengius' nash type (Figure 7.5), including characters that were omitted from the somewhat incoherent table in the *Specimen* of 1595,³⁴ and also new additions and modifications. Moreover, it shows a close resemblance to the table of RG3 in the Medicean's *Alphabetum Arabicum* (see Figure 6.48), which was indicated as the reference source for the making of FR1. Perhaps this explains why Raphelengius used in his type only the conventional solution for the medial teeth characters, instead of also replicating Granjon's innovative solution of the 'peak' connections.³⁵ Appar-

dictionary. His work remained in manuscript form, today at the Cambridge University Library, see Hamilton, 'Arabic Studies in the Netherlands', C–CI.

29. This was the last work published by the Officinal Plantiniana, perhaps also due to the death in the same year of their Arabic compositor, Hamilton, 'Arabic Studies in the Netherlands', CI. On this work, see also Arnoud Vrolijk, 'The Prince of Arabists and His Many Errors: Thomas Erpenius's Image of Joseph Scalinger and the Edition of the "Proverbia Arabica" (1614)', *Journal of the Warburg and Courtauld Institutes* 73 (2010): 297–325.
30. A description of the fount cast in 1613 for Moretus (e.g. weight, cost, body) is reported in Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, xviii.
31. Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, xvii. It seems that at his death Bedwell bequeathed the type to the University of Cambridge, where they disappeared, Hamilton, 'The Victims of Progress', 106.
32. Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, ix.
33. As discussed in § 1.3.3, the initial drive for printing Arabic books came mainly from the Roman Catholic Church whereas the Protestant initiative was slower to come to fruition. Religion was also an important factor in the context of the trade of Arabic types, as both Catholics and Protestant saw them as the instrument to spread their own message in the Oriental countries. For this reason, they were mindful about the types remaining in the same religious circle if these were to be borrowed or sold. See also § 6.1.
34. The table shows additional variants for some nash forms, like the elongated final alif and the curly wāw, but omits some basic forms that are however visible in the text of the *Specimen*, like the medial ġim group, final bā' and medial yā'. The table is carelessly assembled: the order of the character's forms is unsystematic; there is a superfluous mīm next to the lām-alif ligature; the letter zā' shows only the magribi form. It should also be noted that the 'open letter' of 1595 in Appendix 75 also shows the characteristic slanted nūn of Granjon that was omitted from the *Specimen*.
35. As discussed in § 6.1.4, RG3 accommodated both methods. The 'peak' solution was temporarily abandoned for the *Evangelium* and the *Alphabetum Arabicum* printed in 1592, whereas it appeared in the two Medicean grammars from the same year.

ently, this also applied to the overall method for FR1's letter-joining, which provided only characters with straight-ending horizontal strokes (Figure 7.6).

On the other hand, the *Specimen* gives some evidence on the technical aspects of type-making by showing typeforms that appear to have been obtained by filing off parts of the strokes to reuse the same character in more than one position (Figure 7.7).³⁶ With regard to the typeforms of the medial ڭim group, these used a connecting stroke – leading from the notional baseline to the top of the character – to join with preceding letters remaining aligned on the notional baseline. This solution, introduced by Granjon (see Figure 6.52), used the undotted strokes as simple connectors, or as teeth characters in medial position by adding separate diacritic dots (Figure 7.8). Only in a few instances – to maintain the joins on the baseline without using the connecting stroke – was the initial form of the ڭim group used in medial position and the isolated in final position. On the other hand, occasionally, the letters preceding the medial and final ڭim group were raised above the notional baseline to create multilevel connections (Figure 7.9). The experimentations with the setting of the ڭim group in FR1 continued in later publications where different approaches can be observed. In Raphelengius' *Lexicon* – printed posthumously in 1613 by his sons with the assistance of Thomas Erpenius – there is a significant use of multilevel connections, even on three lines (Figure 7.10). The reason for this approach to replicate the characteristic stacking of letters in Arabic might also lie in the lack of ligatures of FR1, which in previous types (especially Granjon's) provided many letter combinations on the same sort: in FR1, besides the lām-alif, there are few if any at all (Figure 7.11). Finally, a rather unusual and inventive approach is used in Erpenius' *Proverbiorum Arabicorum* published in 1614 with the second cast of FR1. In this work, the forms of the ڭim group in medial and final positions are often tilted, enabling the top stroke of the letter to reach the notional baseline and join directly with the preceding letters, with considerably detrimental consequences for the joins and the overall appearance of the composition (Figure 7.12).³⁷

In conclusion, with regard to the mağribi type of Raphelengius, it is worth mentioning that historian Ernst Braches has identified a model for the making of the type in a manuscript that belonged to Raphelengius, held today in the Leiden University Library³⁸ (Appendix 80). More importantly, this manuscript contains in the margin and the flyleaves the smoke-proofs impressions of Raphelengius' mağribi type, or rather smoke-proofs showing the typeface in progress, as they differ considerably from the typeforms.³⁹ The influence on Raphelengius' choice to design a mağribi type is also attributed to the fact that his collection featured predominantly mağribi manuscripts (Appendix 81), as well as books set with mağribi influenced Arabic types (e.g. Giustiniani's *Psalter*, Postels's grammar).⁴⁰ Furthermore, it appears that

36. See also Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, note 15.

37. It seems more likely that these letterforms were recast in the tilted position on the sort, allowing the sorts to lock normally with each other in composition, rather than turning the sort itself. Smithkamp, also of this opinion, suggests that this makeshift of a 'right-hand drop' was later copied by Schickard, for an Arabic type engraved as copper matrices in 1628, see *Philologia Orientalis* 3, 279c.

38. Braches, 'Raphelengius's Naschi and Maghribi', 240.

39. As observed by Lane, at the most fourteen or fewer characters match (see also the synopsis tables of the mağribi typeforms and smoke proofs) in Lane, Breugelmans, and Witkam, *The Arabic Type Specimen*, xliv–xlvii.

40. Ibid., xiv and xxvii, note 10.

his Arabic handwriting was also ‘strongly maḡribi in character’,⁴¹ as was the manuscript-dictionary source for his *Lexicon* (Appendix 82).⁴²

7.1.2 Thomas Erpenius

The teaching of Arabic at Leiden University suffered a blow following Raphelengius’ death: the post remained more or less vacant until Erpenius was appointed professor in 1613.⁴³ Initially interested in Hebrew studies, Erpenius took up Arabic after encouragement from Scaliger, who supplied him with a letter of recommendation to present to leading European Arabists. After graduating from Leiden’s University in 1608, Erpenius set off to England and France to study with the likes of Bedwell, Casaubon and Hubert.⁴⁴ He later visited some of the major collections of Arabic manuscripts in Europe, borrowing some manuscripts from the Palatine Library in Heidelberg. During this time he also extended his knowledge to Persian, Turkish and Ethiopic, and started working on his Arabic grammar.⁴⁵ After failing to embark on a trip to the Ottoman Empire from Venice, he returned to Leiden in 1612. Here he created ‘the greatest school of Arabic in Europe’ in the footsteps of his mentor Scaliger, and attracted to Leiden students from all over the Protestant world, training also the man who succeeded him after his death in 1624, Jacob Golius.⁴⁶

Erpenius was very critical of other European Arabists, including his teachers. However, his knowledge of classical Arabic was not free from flaws, and his works show errors that he never corrected during his lifetime.⁴⁷ His most significant contribution to Arabic studies was the *Grammatica Arabica*, which was not the first of its kind, but ‘infinitely superior to any of its predecessors’.⁴⁸ The success of this work consisted in following the structure of Latin grammars, the most familiar model for students and scholars.⁴⁹ It also established a standard for the study of the language, influencing the nineteenth-century fundamental Arabic grammars of the French scholar Antoine-Isaac Silvestre de Sacy (*Grammaire Arabe*, 1810),⁵⁰ and of the German Carl Paul Caspari (*Grammatica Arabica*, 1844–48), known today as William Wright’s English translation (*A Grammar of the Arabic Language*, 1859).⁵¹

As already mentioned, Raphelengius’ sons printed Erpenius’ earliest works, using the FR1 type that he reportedly disliked due to its inelegance and large size.⁵² The size also seemed to be the reason for his discontent with the Arabic type of Le Bé, who was initially his printer of choice.⁵³ When the Officina Plantiniana in Leiden

41. In contrast to Scalinger’s *nash* handwriting, Braches, ‘Raphelengius’s Naschi and Maghribi’, 241.

42. Ibid.

43. The post was briefly assigned to Philippus Ferninandus in 1601 and then to Jan Theunisz in 1602.

44. But also from other people like the Egyptian Copt Yūsuf ibn Abū Daqan (Abudacnus) and the learned Moroccan merchant Alḥmad ibn Qāsim, see Jones, ‘Learning Arabic in Renaissance Europe’, 98–120, 187–212.

45. Hamilton, ‘Arabic Studies in the Netherlands’, C.

46. Ibid. See also Vrolijk and van Leeuwen, *Arabic Studies in the Netherlands*.

47. Vrolijk, ‘The Prince of Arabists and His Many Errors’, 319.

48. Hamilton, ‘Arabic Studies in the Netherlands’, CI. The Grammar was edited and reissued several times by different people: for an overview, see Smithkamp, *Philologia Orientalis* 1, entries 68–78.

49. Arnoud Vrolijk, ‘Arabic Typography in the Netherlands: A Brief Introduction’, in *TXT: Exploring the Boundaries of the Book* (The Hague: Boom Uitgevers, 2014), 150.

50. See Appendix 91.

51. See Jones, ‘Learning Arabic in Renaissance Europe’, 212.

52. Smithkamp, *Philologia Orientalis* 1, 84d.

53. Ibid. Le Bé allegedly refused to publish the work of ‘heretics’ (i.e. Protestants), see Vrolijk, ‘The

closed, Erpenius decided to found there a press of his own and have a new Arabic type cut, seemingly a compromise between Granjon's 'confusingly small' type used in the *Avicenna* (RG5) and the uneconomical large type of the *Evangelium* (RG3).⁵⁴

The first publication of the 'Typographia Erpeniana Linguarum Orientalium' using the new smaller Arabic type (TE1) was the bilingual edition *Locmani Sapientis Fabulæ* printed in 1615.⁵⁵ Other works printed using the same type include in 1616 the first complete edition of the New Testament in Arabic, the *Novum D.N. Jesu Christi Testamentum Arabice* (Figure 7.13); in 1617 the *Historia Josephi Patriarchæ* and the *Grammatica Arabica Dicta Gjarumia*, a new bilingual edition of the *Ajurrūmīa* grammar first printed by the Typographia Medicea; in 1620 a revised edition of his own grammar, *Rudimenta Linguae Arabicae*.⁵⁶ Erpenius died of the plague at forty years old in 1624, before he could accomplish many of his planned editions. Nonetheless, his legacy continued as did the use of his type, thanks also to his successor Jacob Golius. The latter completed Erpenius' *Historia Saracenica* published in 1625, edited Erpenius' grammar published with the new title *Arabicæ Linguae Tyrocinium* in 1656 and used TE1 for his own most important work, the *Lexicon Arabico-Latinum* printed in 1653 by the firm of the Elzeviers.

About the types

After Erpenius' death, his collection of Oriental manuscripts was sold to the Duke of Buckingham, whose widow donated them to the University of Cambridge, where they are still kept. The printing material (including the Arabic characters, matrices and punches) was sold in 1624 to the Academy printer Isaac Elzevier and in the eighteenth century to his successors Pieter van der Aa and Samuel Luchtmans: both undertook the role of printer to the University in 1715 and 1730 respectively.⁵⁷ Erpenius' Arabic type was obtained by Johannes Enschedé about 1772,⁵⁸ who 'added [it] to his typographical collection rather than using it for commercial purposes': it appeared in the Enschedé type specimen of 1773 with the name 'Type n. 15'⁵⁹ and was also included in the specimen of Oriental types in 1907, together with all the other Arabic types.⁶⁰ According to Enschedé, Erpenius acquired two more sets of Arabic types both on 'Great Primer' body: one light-faced used in the *Pentateuchus Mosis*

Prince of Arabists and His Many Errors', 322.

54. Braches, 'Raphelengius's Naschi and Maghribi', 244. See also Smithkamp, *Philologia Orientalis* 1, 84e.

55. According to Erpenius' preface, the *Fabulæ* were printed as a specimen of the new type; the text was printed without vowels because they were not yet ready. See Enschedé, *Typefoundries in the Netherlands*, 69, note 2.

56. Hamilton, 'Arabic Studies in the Netherlands', CII.

57. Vrolijk, 'Arabic Typography in the Netherlands', 151–53. In 1625 the material was bought by Bonaventura and Abraham Elzevier: Van der Aa bought Arabic matrices from their sale in 1713, see Enschedé, *Typefoundries in the Netherlands*, 68–73. See also Gdoura, 'L'Edition Arabe en Europe aux XVI et XVII Siecles', 42.

58. Seemingly from the heirs of Pieter van der Aa (in the form of matrices). See Enschedé, *Typefoundries in the Netherlands*, 73.

59. The type is designated by Enschedé as the 'Two-line [large] English bodied Arabic no.15, see Enschedé, *Typefoundries in the Netherlands*, 69 (vocalised reproduction); 75 (fount synopsis). In a publication from 1908, Enschedé called this type 'deux points St Augustin' (i.e. 24 point), see Smithkamp, *Philologia Orientalis* 1, 84g.

60. Vrolijk, 'Arabic Typography in the Netherlands', 154. The specimen is: *Letterproof Van Oostersche Schriften Uit De Lettergieterij Van Joh. Enschedé And Zonen Te Haarlem* (Haarlem: Joh. Enschedé & Zonen, 1907).

Arabice in 1622 and one bold, employed in the *Historia Saracenica* 1625.⁶¹ On the other hand, Smithkamp suggests that these types are in fact ‘one and the same’ (TE2).⁶² After being purchased by the House of Enschedé, only the two-line English body was completed (TE1), whereas the two sets of Great Primers were not refurbished.⁶³ In this regard, Enschedé argued that, besides being without vowels, these two Arabic types were considered old-fashioned because the ġīm letter group required multilevel setting (or double alignment), instead of the ‘modern’ makeshift to allow alignment on the same line (for which new punches would have been necessary). Nevertheless, the double alignment was also the method required for setting TE1, not only for the smaller sized Arabic; moreover, TE1 was initially cast without vowels, which were added independently at a later date. As highlighted by Harry Carter, Enschedé statements seem debatable and would require further investigation.⁶⁴

The TE1 type (24 pt) was cut especially for Erpenius at his expense, but the punch-cutter is unknown: different hypotheses have attributed it to Arend Cornelisz. van Hoogenacker,⁶⁵ Nicolas Briot⁶⁶ or possibly to the same punch-cutter of Raphelengius’ Arabic, merely by their similarity.⁶⁷ Punches and matrices of Erpenius’ Arabic survive in the collection of Museum Enschedé, Haarlem, but are currently inaccessible.⁶⁸ Historians unanimously described Erpenius’ type as more elegant, economical and practicable than Raphelengius’ Arabic:⁶⁹ besides the aesthetic improvements, the smaller size contributed significantly to its success amongst printers – especially in the academic world – and to its longevity into the eighteenth century (Figure 7.14).⁷⁰ A first glance at the alphabet table of TE1 (Figure 7.15, Figure 7.16) shows a typeface overall more balanced compared to FR1. Improvement in the design and sizing of letterforms (e.g. final dāl/dāl, initial ġīm group, isolated/final kāf), their joins and alignment on the notional baseline can be observed. Nonetheless, the type maintains problematic letters, individually (e.g. oversized isolated lām, undersized isolated/final nūn)⁷¹ and in relation to others (e.g. final lām, isolated and final šād/đād, final ‘ayn). Moreover, TE1 has more variants and ligatures than

61. Enschedé, *Typefoundries in the Netherlands*, 70.

62. In a publication from 1908, Enschedé called these types ‘gros romain maitre’ and ‘gros romain gras’ (i.e. 16 pt), see Smithkamp, *Philologia Orientalis* 1, 84h. In this study, the 16pt Arabic of Erpenius is indicatively referred to as TE2: further research is required to establish if the ‘two sets of Great Primers’ mentioned by Enschedé were indeed two different typefaces or the same as suggested by Smithkamp.

63. Enschedé reported that the two sets of Great Primers Arabic matrices disappeared and that only the Arabic on two-line English body remains, Enschedé, *Typefoundries in the Netherlands*, 73.

64. Enschedé also complained about the method of filing off dots to obtain various characters sharing the same base-form, considering it as a defect of the type, slowing the typesetting work. On the other hand, he failed to observe that the method was a standard practice of the time for Arabic type-making and that it had other significant advantages. Enschedé, *Typefoundries in the Netherlands*, 74–75.

65. It is possible that he was also the typefounder, see Enschedé, *Typefoundries in the Netherlands*, 66–67. Some of Van Hoogenacker’s foundry stock was sold to the University of Oxford, see § 7.2.2.

66. Smithkamp, *Philologia Orientalis* 3, 280i.

67. Enschedé, *Typefoundries in the Netherlands*, 69, note 2.

68. The Museum is now closed; an image of the punches and matrices is shown in Vrolijk and van Leeuwen, *Arabic Studies in the Netherlands*, 40.

69. Vrolijk, ‘Arabic Typography in the Netherlands’, 151; Hamilton, ‘The Victims of Progress’, 103.

70. Vrolijk, ‘Arabic Typography In The Netherlands’, 153.

71. This refers to the most used nūn variant, also inserted in the alphabet tables. TE1 has indeed also the large slanted final nūn design characteristic of Granjon’s Arabic, used in the new Testament’s publication of 1616 (see Figure 7.13).

Raphelengius' Arabic although it does not overcome its predecessor's inconsistency in reproducing a particular Arabic calligraphic style.⁷²

The TE2 type (Figure 7.17) is very similar to TE1, although the smaller point size of the former (16pt) has some differences in the design (Figure 7.18, Figure 7.19).⁷³ Overall, the significance of Erpenius' types lies mainly in their widespread use rather than in their contribution to significant developments for Arabic typography. However, they use a makeshift worthy of note for the multilevel connections with the ǵim group in medial and final position. As well as offering solutions already seen in previous Arabic types (Figure 7.20), both TE1 and TE2 types indeed use a new method to solve the triple and double alignments, either to reduce or eliminate them (Figure 7.21). The TE1 type allows also for four level alignments with the ǵim group in medial/final position (Figure 7.22).

7.1.3 Sacra Congregatio de Propaganda Fide

After the Dutch wave of new Arabic type production, Italy reclaimed temporarily the monopoly of Arabic printing in Rome from 1626 onwards with a new Polyglot Press annexed to the recently founded *Sacra Congregatio De Propaganda Fide*.⁷⁴ The printing office (and foundry) was established to supply books in various languages to serve the students' education in the College of the Congregation and to support their missionaries' work of evangelisation around the world.⁷⁵ The establishment of the Propaganda Fide Press in Rome inhibited the initiative of the Capuchin priest Père Joseph to found a polyglot printing office in Lebanon to supply books in Greek, Arabic, Persian, Turkish and Syriac. He was banned by the Congregation in 1628, as the will of the Papacy was to maintain the monopoly of Oriental printing in Rome and export its books to the Christians of the East.⁷⁶

According to a report by Cardinal Bentivoglio dated 1627, in the occasion of his visit to the Propaganda Fide a year after its foundation, the Press already owned 14 types in different languages:

6 came from the Emperor⁷⁷ and are in Illyrian and Serbian; 3 are from the Vatican: one Arabic, one Serbian, one Armenian; 5 have been bought by the Congregation: one Greek, one Hebrew, one Chaldean, and two Latin. Cardinal Bentivoglio mentions also the further need of letters in Greek, Arabic,

72. According to Milo, Erpenius was convinced that his types are 'faithful' nash style, see 'Thomas Milo: Bodoni's Arabic, Some Observations'. A synopsis of the fount is shown in Enschedé, *Typefoundries in the Netherlands*, 75.

73. It is worth noting that also TE1 shows design interventions across the years and the various publications. A further investigation would be necessary to trace all the developments of this typeface, which is outside the scope of this study.

74. The Cardinals of the Sacred Congregation, established in 1622, proposed the opening of the polyglot press to the Pope Urbano VIII, see Melchiorre Galeotti, *Della Tipografia Poliglotta Di Propaganda* (Torino: Pietro di G. Marietti, 1866), 14, 65–67.

75. Ibid. The book production of the Propaganda Fide Press ranged from religious editions (e.g. Bible, calendars, liturgical books) to grammars and dictionaries for the study of foreign languages.

76. Duverdier, 'Les Impressions Orientales', 269–70.

77. Ferdinand II from Austria, who offered Illyrian letters as a gift for the print of new missals. See Willi Henkel, 'The Polyglot Printing-Office of the Congregation. The Press Apostolate as an Important Means of Communicating the Faith', in *Sacrae Congregationis De Propaganda Fide Memoria Rerum. 350 Anni A Servizio Delle Missioni 1622–1972* (Rom, Freiburg, Wien: Herder, 1971), 336.

Chaldean and Latin. According to him there are still many types in the Vatican, which are not used. They should be borrowed, in order to make copies.⁷⁸ Other Latin, Greek, Hebrew and Rabbinic types for the Propaganda Press were also acquired from the Salviati family,⁷⁹ and Arabic letters obtained from the Medici; some were cut for it by Stefano Paolini:⁸⁰ ‘e per la formazione di nuovi punzoni e madri ci di altre lingue si valse di Stefano Paolini, che n’era espertissimo intagliatore’.⁸¹ Paolini was also the appointed printer and technical director by the members of the Congregation, having already worked for the printing-office of the Medici, the Vatican and Savary de Brèves.⁸² Moreover, it employed two experienced type-makers’ assistants: languages:

One called “Tedesco” [German]; he worked before in the Vatican printing-office and the other one was Giambattista Sottile, who had also worked for the Vatican and the Medici. They made copies of Arabic and Glagolitic letters, which had been borrowed from Aleppo and other types.⁸³

There were three expert compositors assigned to the typesetting of various languages, amongst whom the Maronite Joseph David Luna composed in Arabic, Syrian, Chaldean, Georgian, Hebrew, and Indian languages.⁸⁴

At the beginning of 1633, the Polyglot Press printed books in ten languages, and ten years later in 23 languages.⁸⁵ After a steady progress for the first twenty years of activity, it entered a period of crisis due to a range of reasons (e.g. the lack of a competent director, a suitable location, financial difficulties). This led the Congregation to question the usefulness of the Polyglot Press,⁸⁶ against which Ingoli advocated. His strenuous efforts were critical to maintaining the activities of what was at the time the most conspicuous printing office in the world for the variety of its alphabets and the quality of its work,⁸⁷ admired and emulated even by Protestant printers around Europe.⁸⁸ The Polyglot Press underwent a new period of prosperity in the eighteenth century, reaching its highest peak under its directors Ruggieri and Amaduzzi.⁸⁹ During this time there was a growing acquisition of types, including Hebrew letters from Paris, and Latin, Armenian, Arabic Syriac and Arabic – which increased ‘from four scales to six’ – from the Vatican printing office, cut by Garamond and Le Bé but

78. Henkel, ‘The Polyglot Printing-Office of the Congregation’, 337.

79. Ibid. The Greek letters were made for Cardinal Giovanni Salviati, the son of Lorenzo de’ Medici’s eldest daughter.

80. Also previously mentioned as Étienne Paulin, see § 6.2.

81. ‘And for the making of new punches and matrices of other languages it used Stefano Paolini, who was an expert engraver’, approximate translation by the author. See Galeotti, *Della Tipografia Poliglotta Di Propaganda*, 15–16.

82. Prior to the official establishment of the Propaganda Fide Press, Paolini had offered to print at his own expense the works of the Congregation in exchange for a privilege for printing books in Oriental languages in Rome, Henkel, ‘The Polyglot Printing-Office of the Congregation’, 335–36.

83. Ibid., 337. In this regard, Galeotti mentions that ‘si fecero venire al Paolini dall’Oriente i necessari alfabeti’, in *Della Tipografia Poliglotta Di Propaganda*, 16.

84. Henkel, ‘The Polyglot Printing-Office of the Congregation’, 338.

85. Ibid., 347. Mentioned by Francesco Ingoli, the first Secretary of the Congregation.

86. Ibid., 342. The initial policy of the Congregation allowed the free distribution of liturgical editions in the East, banning any kind of commerce: ‘100 copies of each to be sold without profit, so that the books might become known’. Moreover, those to be sold should be ‘for the price of production’.

87. ‘Books serve to spread the truth. Therefore they must be without errors’, Henkel, ‘The Polyglot Printing-Office of the Congregation’, 344.

88. Ibid., 349; see also Galeotti, *Della Tipografia Poliglotta Di Propaganda*, 17–18.

89. Willi Henkel, ‘The Polyglot Printing-Office During the 18th and 19th Century, in *Sacrae Congregationis De Propaganda Fide Memoria Rerum. 350 Anni A Servizio Delle Missioni 1622–1972* (Rom, Freiburg, Wien: Herder, 1973), 299.

no longer used.⁹⁰ The number of alphabets possessed by the Propaganda Fide rose to twenty-seven different writing systems, becoming the largest and most diverse collection of its time.⁹¹ Under the direction of Ruggieri, the Polyglot Press employed and trained a young Giovanni Battista Bodoni. He entered the printing-office in 1758 at 18 years old, with the task 'of cleaning the rusty letters which had not been used for a while', and later as the compositor in the section of foreign languages, learning eventually the art of printing, cutting and casting letters. Bodoni left in 1766 and two years later was appointed director of the 'Reale Stamperia' in Parma.⁹²

The Propaganda Fide Press faced a new critical period following the French occupation, when a large part of its typographic material was plundered:⁹³

39 boxes of Arabic, Armenian, Brahmanic, Chaldaic, Coptic, Hebrew, Georgian, Greek, Irish, Illyrian, Indian, Malabar, Persian, Ruthenian, Syriac, German, and Tibetan letters and three printing presses were transported to the French Academy in 1799. Some other boxes of Arabic, Greek, Syriac, and Latin letters, and some presses, were also sent to Civitavecchia and Ancona and on to Corfu and Egypt.⁹⁴

The difficulties continued in the new century: the printing office was closed twice and in 1812, following a new order, more Oriental types were sent to Paris,⁹⁵ only partially recovered in 1815 after a difficult – and not clearly documented – restitution process.⁹⁶ The Propaganda Fide Press remained active in the nineteenth century, relocating to new sites and being equipped with new types and the most modern printing machines. However, due to the continued financial difficulties and the re-organisation of the Curia Romana, in 1909 it was eventually merged with the Vatican Press founded by Sistus V in 1587: the new *Tipografia Poliglotta Vaticana* published a catalogue of the joint collections in 1911.⁹⁷

About the types

There are two Arabic types of the Propaganda Fide Press worthy of mention. The first typeface (SCPF1) appears in four specimens from 1633 (Figure 7.23), 1776 (Figure 7.24, Appendix 83), 1784 (Figure 7.25) and 1843 (that shows two different sizes, see Appendix 84): the first is a single sheet containing Arabic only; the second is a single

90. Ibid., 301–02.

91. Ibid., 302. Although it seems that Ruggieri was still not satisfied, recommending the Pope to acquire those alphabets still missing in the printing-office.

92. Ibid., 303–04. In 1807, as a token of gratitude, Bodoni donated to the Propaganda Fide Press four of his Latin types in different point sizes (Silvio, Lettura, Testino, and Garamoncino).

93. For a more detailed account of the events, see Galeotti, *Della Tipografia Poliglotta Di Propaganda* and Henkel, 'The Polyglot Printing-Office During the 18th and 19th Century'. See also Duprat, *Histoire De L'Imprimerie Impériale De France* and from the same author, *Précis Historique Sur L'Imprimerie Nationale Et Ses Types* (Paris: Librairie Orientale de Benjamin Duprat, 1848).

94. Henkel, 'The Polyglot Printing-Office During the 18th and 19th Century', 306. For a complete list of the seized punches and typographic material see Galeotti, *Della Tipografia Poliglotta Di Propaganda*, 24–26.

95. Galeotti, *Della Tipografia Poliglotta Di Propaganda*, 27–28. Few items were saved and hidden, see Henkel, 'The Polyglot Printing-Office During the 18th and 19th Century', 307.

96. Prior to the restitution 'des frappes de cuivre' of the Italian punches (both of the Propaganda Fide and of the Medicean Press) were taken, so that the Imprimerie Impériale effectively maintained the totality of the plundered material forming, together with the Oriental punches of Savary de Brèves, the most rich and complete collection available in the world the time. See Duprat, *Histoire De L'Imprimerie Impériale De France*, 260–61 and Galeotti, *Della Tipografia Poliglotta Di Propaganda*, 28–30.

97. Henkel, 'The Polyglot Printing-Office During the 18th and 19th Century', 314. See also § 7.2.1.

sheet containing twenty-one languages,⁹⁸ whereas the last two are more complete volumes, printed respectively in forty-four and fifty-five languages.⁹⁹ SCPF1 is a new typeface, although it displays the evident influence of both Granjon's and Savary de Brèves' Arabic types – not surprising considering the background of Paolini, who was possibly the designer. Nonetheless, the SCPF1 typeface failed to match the qualities of these notable predecessors with its less confidently shaped letterforms (Figure 7.26) or to introduce any significant innovation for Arabic typography as yet unexplored. However, it is an important typeface due to its widespread use in the Propaganda Fide's editions, particularly the *Biblia Arabica* (Figure 7.27), the first printed edition of the complete Bible in Arabic (with parallel text in Latin Vulgate).¹⁰⁰ According to Smitskamp, the type is an 18pt,¹⁰¹ possibly 'designed or acquired for the purpose', whereas in the 1843 specimen is designated as a 14½pt. The SCPF1 typeface was also long-lived thanks to the publications of the Imprimerie Impériale, like the important nineteenth-century grammar of Antoine-Isaac Silvestre de Sacy (Appendix 91).

In the Archives of the Imprimerie Nationale, the SCPF1 type is recorded as a 13pt,¹⁰² named *Arabe de la Propagande*: the documents state that it was 'sent from Rome to Paris in 1798'¹⁰³ and record 256¹⁰⁴ steel punches and 644 copper matrices. It is not clear if these numbers refer to the original material brought from Italy: the undated document also reports that in 1873 the number of the punches' inventory was 327 and 1303 for the matrices.¹⁰⁵ Today,¹⁰⁶ the Archives hold 1 case containing 276 punches (Appendix 86) and 3 cases of matrices (Appendix 87).¹⁰⁷

98. There is another five-column specimen sheet similar to the first sheet in the Enschedé Museum in Haarlem entitled *Specimen Characterum Exoticorum Typographice Sac. Congreg. de Propaganda Fide*, see James Mosley, 'Sources for Italian Typefounding', *La Bibliofilia* 102, no. 1 (2000): 47–102, with an appendix: 'Italian Type Specimens to 1860', 56–97.

99. The languages are listed in Galeotti, *Della Tipografia Poliglotta Di Propaganda*, 94–96. The 1784 specimen was produced for the visit of the King Gustave III of Sweden in Rome; the 1843 specimen was produced on occasion of the visit of Pope Gregory's to the Press in 1842. Galeotti mentions another specimen in twenty-nine languages, produced for the visit of the Pope Pius IX in 1866, whereas according to Henkel the languages are 250 (possibly a mistake, meaning instead twenty-five), see Henkel, 'The Polyglot Printing-Office During the 18th and 19th Century', 311.

100. The project took years of extensive review and corrections, with the contributions of many different people as translators and editors. The Old Testament was completed in 1647 and the New Testament in 1650; it was finally published in three large volumes in 1671.

101. Smitskamp, *Philologia Orientalis* 2, 225.

102. SCPF1 is described as 'Arabe Nesky, Corps 13 (6+3½+3½)' from Imprimerie Nationale, 'Arabe Nesky, Corps 13 (6+3½+3½) ou Arabe de la Propagande', *Folders*, CDP. See also *Liste Des Types Étrangers*, 4, and two single sheet specimens from 1819 (Appendix 89) and 1878 (Appendix 90). In the *Recueil Des Empreintes*, SCPF1 is recorded as being 'sur six points', because it only indicates the size of the base-character, without counting spaces for the accents, see *Recueil Des Empreintes*, XI, 87–115. Likewise, the volume *Poinçons À Reforme* records an 'Arabe sur 6 points' (Appendix 88), *Poinçons À Reforme*, 19–21, CDP.

103. Approximate translation by the author from the original 'expédié de Rome à Paris en 1798' in 'Arabe Nesky, Corps 13 (6+3½+3½)', *Folders*, CDP.

104. The number 256 for the punches is also reported in the 1990's publication *Les Caractères De L'Imprimerie Nationale*, 198.

105. The document, in the same handwriting, mentions also a Specimen from 1878, so it was clearly written after that date.

106. The material from the Archives of the Imprimerie Nationale, CDP, in the 'Appendices' was photographed on the 25–26th November 2015.

107. A paper note contained in the punches' case also reports this number and its dated '1978'. An additional printing proof sheet from 1878 in the Imprimerie's Archives show yet another different enumeration of punches and matrices, see Appendix 86.

The discrepancies in the numbers included in the documents suggest that at the Imprimerie the typeface was revised, perhaps at different stages: it is known, for instance, that the special characters and ligatures required for the composition of Berber, Hindustani, Malay, Persian and Turkish were added, although there is no mention of a date.¹⁰⁸ Inconsistencies between the case-lay (see Appendix 85)¹⁰⁹ and the punches included in the case raise questions regarding the sources that need to be critically evaluated (Figure 7.28). Moreover, a comparison between some of the Propaganda Fide's printed material and the case of punches shows missing characters in the second, which is therefore incomplete (Figure 7.29). This suggests that further research is necessary to document and have a better understanding of the typefaces' developments following their arrival at the Imprimerie Nationale.¹¹⁰

A second important typeface of the Propaganda Fide Press is SCPF2, a 24pt type named *Arabe de la Collection Orientale* in the Archives of the Imprimerie Nationale.¹¹¹ The documents state that it was 'sent in 1798'¹¹² and record 343¹¹³ steel punches and 780 copper matrices. Again, it is not clear whether these numbers refer to the original material brought from Italy: the document – not dated – also reports that in 1873 the number of the punches' inventory was 332 and 1308 for the matrices.¹¹⁴ Today,¹¹⁵ the Archives hold 1 case containing 464 punches (Appendix 93) and 5 cases of matrices (Appendix 94).¹¹⁶

The SCPF2 type was occasionally used by the Propaganda Fide, for instance in the *Grammatica Arabica Agrumia Appellata*, 1631 (Figure 7.30). As suggested by Vervliet and in Smitskamp's words, 'these attractive 24pt types are identical with Granjon's *arabe du Kitāb al Bustān*, used by Basa in 1585 and afterwards rarely used'.¹¹⁷ The type – previously discussed in this thesis with the name RG1¹¹⁸ – appears very different when used by the Propaganda Fide, due to some letterforms being replaced (seemingly borrowed from SCPF1 or other types of similar size), and to the typesetting approach (Figure 7.31). Furthermore, in 1832 the SCPF2 type was retouched by the punch-cutter Delafond – under the direction of Sylvester de Sacy and Maccagni,

108. *Liste Des Types Étrangers*, 4.

109. It should be borne in mind that the case-lays of the Imprimerie are dated 1885.

110. This thesis focuses on the assessment of the original design for each Arabic typeface to evaluate the first approach of each type-maker. However, later developments are important to track evolutions in the design or different technical solutions because they give insight to which elements might have been considered as problematic or improvable from the type-makers' perspective.

111. SCPF2 is described as 'Arabe Nesky, Corps 24 (12+6+6)' from Imprimerie Nationale, 'Arabe Nesky, Corps 24 (12+6+6) ou Arabe de la Collection Orientale', *Folders* CDP. The folder also contains two single sheet specimens: one from 1819 indicates the type as a 21pt (Appendix 95); the other from 1878 as a 24pt (Appendix 96). In France the SCPF2 typeface was also named *Arabe de l'Institut*, see *Liste Des Types Étrangers*, 5.

112. Approximate translation by the author from the original 'expédié en 1798' in 'Arabe Nesky, Corps 24 (12+6+6) ou Arabe de la Collection Orientale', *Folders*, CDP.

113. The number 343 for the punches is also reported in the 1990's publication *Les Caractères De L'Imprimerie Nationale*, 202.

114. The document, in the same handwriting, mentions also a Specimen from 1878, so it was clearly written after that date.

115. The material from the Archives of the Imprimerie Nationale, CDP, in the 'Appendices' was photographed on the 25–26th November 2015.

116. A paper note contained in the punches' case reports various numbers: '464 poinçons, 7 accents, 1978'. An additional note in a different handwriting states: '247 poinçons ancien + 213 poinçons + 7 accents', not dated, see Appendix 93.

117. Vervliet, 'Cyrillic & Oriental Typography in Rome', 450 and Smitskamp, *Philologia Orientalis* 2, 222d.

118. See § 6.1.1.

the prote¹¹⁹ of the Oriental printing office¹²⁰ – and used in some publications of the Imprimerie Royale.¹²¹ The extent of Delafond's work it is not known, however, it seems that it was quite extensive considering the type's appearance in the Imprimerie's sources¹²² and a note in the punches' case that enumerates the *ancien* (i.e. old) punches against those that were possibly added afterwards.¹²³ The resulting typeface possesses little affinity with Granjon's original design, losing the characteristic qualities of RG1 highlighted in the analysis in the previous chapter.¹²⁴

In conclusion, it is known from the French Archives' documents that, before being retouched by Delafond, the SCPF2 Arabic type was sent to Algier, to serve the new Government printing-house created in the colony, directed by M. Roland de Bussy.¹²⁵

119. The person running the composition department of a printing house, see § 3.2.3, note 99.

120. He had also been compositor at the Propaganda Fide and in 1798 he was in charge of bringing their types to France, *Les Caractères De L'Imprimerie Nationale*, 202.

121. Ibid.

122. Besides the punches and specimens previously mentioned, see also the case-lay in Appendix 92.

123. This refers to the white note in Appendix 93.

124. See § 6.1.1.

125. *Liste Des Types Étrangers*, 5.

7.2 Other significant new Arabic types in Europe

7.2.1 Typographic ventures in Italy

The Roman developments

After the *Tipografia poliglotta universale* or «pontificia» established in 1578 by Gregorio XIII, and the *Typographia Medicea* founded in 1584,¹ Rome was the centre of many other typographic ventures in the sixteenth and the first half of the seventeenth century.² The events surrounding these institutional presses still await clarification, due to a lack of scholarship on the subject, although it seems clear that their history is somewhat intertwined. Nonetheless, in the context of Arabic printing, only a few events are worth mentioning, mainly about the *Stamperia Vaticana*, the Polyglot Press of the *Sacra Congregatio de Propaganda Fide* and, in the twentieth century, the *Tipografia Poliglotta Vaticana*.

The *Stamperia Vaticana* (also known as *Typographia Apostolica Vaticana*, *Tipografia Vaticana* or in English with the more generic *Vatican Press*) was founded by the Franciscan Pope Sixtus V in 1587;³ the technical direction was entrusted to the Venetian printer Domenico Basa.⁴ In 1609, the Vatican Press was merged with the *Stamperia Camerale*.⁵ This fusion explains the composite nature of the famous Vatican type Specimen of 1628 entitled *Indici De Caratteri Con L'inventori & Nomi Di Essi, Essistenti Nella Stampa Vaticana & Camerale*, which includes types originating both from the 'Stampa Camerale' and the 'Stampa Vaticana'.⁶ This specimen contains only one Arabic type (RG3,⁷ Figure 7.32), and other Oriental types cut by Granjon, like Syriac and Armenian, used in some Vatican Press's publications in the late sixteenth century.⁸

As already mentioned in the previous section, in 1911 the Vatican Press and the Propaganda Fide Press were merged to form the *Tipografia Poliglotta Vaticana*.⁹ A printed inventory of the combined material is the *Catalogo Dei Punzoni E Delle Matrici Orientali E Latini Esistenti Nella Tipografia Poliglotta Vaticana*,¹⁰ dated 1911. The

1. Both have been already discussed in Chapter 6.
2. During this time the *Stamperia del Popolo Romano* was founded by Pope Pio IV in 1561; the *Typographia Congregations Oratorii* was also Basa's initiative in 1593, see Tinto, *La Tipografia Medicea Orientale*, 20.
3. The Press was directed by Andreas Brogiotti from 1623. See Hendrik D. L. Vervliet, *The Type Specimen of the Vatican Press, 1628: A Facsimile with Introduction and Notes*, 1st ed. (Amsterdam: Menno Hertzberger & Co., 1967). See also Armando Lodolini, 'La Stamperia Vaticana E I Suoi Primi Libri', *Accademie E Biblioteche D'Italia* (1933): 154–161. Note that the press founded in 1561 by Pio IV and entrusted to Paolo Manuzio was the *Stamperia del Popolo Romano*, a name that Lodolini fails to mention, causing confusion.
4. He had already been involved in the Papal Polyglot Press founded by Gregorio XIII in 1578, see § 6.1.1.
5. Vervliet, *The Type Specimen of the Vatican Press*, 16.
6. Ibid., 17.
7. Ibid., 21–22. The type was identified by Vervliet.
8. See Tinto, *La Tipografia Medicea Orientale*, 24–25.
9. See Mosley, 'The Materials of Typefounding'.
10. The original copy of this inventory should be still found in the administrative offices of the *Tipografia Poliglotta Vaticana* in Rome, where James Mosley saw it in the 1980s. Containing smoke proofs of the punches, it is possible that the catalogue exists only as this one copy. Mosley obtained a photocopy during that visit, which is now at St Bride Library in London. James Mosley, e-mail message to author, 27 May 2016. The *Tipografia Poliglotta Vaticana* published a new specimen in 1980, *Campionario di Caratteri*, that does not contain any Arabic types, and another in 1967, *Campionario*

document lists 6,270 punches and 31,187 matrices, showing smoke proofs of punches and manuscript annotations.¹¹ It contains one Arabic type from the Propaganda Fide (Appendix 97), and two sizes of Arabic types from the Biblioteca Vaticana (see Appendix 98).¹² The latter are Medicean Arabics, the larger size appearing to be RG3.¹³ According to Mosley, the typefounding material consisting of punches and matrices is ‘contained in a hypothèque of oak supplied by Foucher, Paris, and also a box of moulds (for type and furniture) and dressing planes. These are currently in storage in Trastevere. There was at one time an intention to display them in a small museum within the Vatican printing office’.¹⁴

An update on the Vatican material comes from historian Dermot McGuinne, who examined it in July 1996¹⁵ during his research for the ‘Rome/Irish’ punches, republished in 2010.¹⁶ McGuinne described the material as kept in a ‘typographic cabinet labelled “*Typothecca*” located in the basement of the Tipografia Vaticana annex building at San Callisto [a Vatican property] in Trastevere’.¹⁷

Ambrosiani Collegii Typographia, Milan

In the seventeenth and eighteenth century, more Arabic types appeared in Italy, notably those in Milan, Padua and Parma, although they were not particularly influential for the development of Arabic typography.

The first of these Arabic types (AG) appeared in Antonio Giggei’s (or Giggeius) *Thesaurus Linguæ Arabicæ*, the first large Arabic dictionary printed in Europe, published in 1632 in four folio volumes (Figure 7.33).¹⁸ This significant work in the field of Arabic studies was realised through the efforts of Cardinal Federico Borromeo. In 1607, he founded the Collegio Ambrosiano – annex to the famous Biblioteca Ambrosiana in Milan – and equipped it with an Oriental printing office for Greek, Hebrew, Arabic, Syriac, Persian and Armenian languages. The AG Arabic type is a new design, yet nothing is known about its maker or provenance. According to Smitskamp, it is ‘a neat 16pt [...] unlike those of Granjon, of Savary or other types in use at that time in

Generale Tipografia Poliglotta Vaticana, that contains Arabic types of 10pt, 14pt, two 16pt and one 24pt.

11. Mosley, ‘The Materials of Typefounding’.
12. It is possible that amongst the unidentified cases of punches kept at the Laurenziana Library in Florence, there are punches belonging to these types from the Propaganda Fide Press and the Vatican Press. A cataloguing work, and comparison, of these punches and those in the Vatican (see below), is long overdue for further clarifications.
13. Being these smoke proofs, the Tipografia Poliglotta must have owned either original Medicean punches (possibly amongst the material returned from France) or copies of the original, as also suggested by Vervliet, ‘Cyrillic & Oriental Typography in Rome’, 454, note 198.
14. It appears that this project never took off.
15. It seems that McGuinne was the last person to see the material in Trastevere. Dermot McGuinne, e-mail message to author, 30 May 2016. James Mosley also visited the Vatican material at this address in the 1980s; he describes it as a ‘warehouse’ where publications and other materials of the Tipografia Vaticana were being kept. Mosley saw only punches there and no matrices. James Mosley, e-mail message to author, 27 May 2016.
16. Dermot McGuinne, *Irish Type Design*, 2nd ed. (Dublin: National Print Museum, 2010). The book was first published in 1992.
17. Ibid., 51. The author has attempted to trace and access the Vatican material in Trastevere, mainly to verify their location and to catalogue/identify the Arabic punches. Nonetheless, any attempted contact with the current Director of the Tipografia Vaticana Sergio Pellini was unfruitful (the previous visits of Mosley and McGuinne were both authorised by former directors of the Press).
18. Smitskamp, *Philologia Orientalis* 2, 226. It is also the first, and seemingly the only, Arabic book printed in Milan in the seventeenth century.

Rome',¹⁹ whereas Krek highlights how it 'strongly resembles that of Metoscita's grammar [...] except that it is larger'.²⁰ The work of the Maronite Petrus Metoscita (Petrus al-Maṭūšī) was printed in 1624 by Stefano Paolino²¹ 'with the 16pt Arabic types of Savary de Brèves'²² (SDB4) (Figure 7.34 and Appendix 99), which were also seemingly used by the same printer for Victorius Scialac's²³ *Alphabetum Arabicum* (Appendix 100). This type presents a new makeshift for the medial ġīm group, with a top stroke that reaches for the notional baseline to keep the preceding letters aligned on it instead of raising to a second level (Figure 7.35). It seems to be an improved evolution of the same approach applied in Raphelengius' FR1 type (i.e. the tilted medial/final ġīm group) as seen in Erpenius' *Proverbiorum Arabicorum*.²⁴

Typographia Seminarii, Padua

The last important typographic venture for Arabic printing in seventeenth-century Italy was the printing office and foundry founded in 1684 by Cardinal Gregorio Barbarigo in the Padua Seminary. Established mainly for educational purposes, it aimed to supply books that were either not available or too expensive to obtain, particularly for the learning of Oriental languages.²⁵ When opened, the Typographia Seminarii counted amongst its Oriental types 'five in Arabic, one Arabic-Turkish and one Arabic-Persian',²⁶ which according to an inventory from 1695 were the following: 'Arabico antico; Arabico Silvio; Arabico garamoncin; Arabico filosofia; Arabico testin; Arabico e turco filosofia [...]; Persian antico'.²⁷ Besides these types that were fit for composition, others existed only in the form of matrices, amongst which were also five in Arabic and one in Arabic-Turkish.²⁸

The printed specimen from 1808 entitled *Saggio Di Caratteri E Fregi Della Stamperia Del Seminario Di Padova Nell'anno 1808* lists, amongst the other Oriental scripts, two Arabic types and one Turkish (Figure 7.36).²⁹ According to Bellini, in 1939 there were 138 cases of matrices and 45 of punches still available in the Archive of the Tipografia del Seminario, although the different types had been mixed up and many were not complete. It is not clear how many of these survive today, and how many remain of Arabic.³⁰

19. Ibid., 226g.

20. Krek, *Typographia Arabica*, 12.

21. The work was printed under his name for the Sacra Congregatio de Propaganda Fide.

22. Smistkamp, *Philologia Orientalis* 2, 190e. The type is different from the previously discussed Arabic types of Savary de Brèves, but it is similar to SDB3, see § 6.2.

23. Victorius Scialac Accurensis (Naṣrallāh Ṣalaq al-‘Aqūrī), another alumnus of the Maronite College, see § 6.2.

24. See Figure 7.12, [A].

25. Bellini, *Storia Della Tipografia Del Seminario Di Padova*, 16.

26. Vercellin, *Venezia E l'Origine Della Stampa*, 46.

27. Bellini, *Storia Della Tipografia Del Seminario Di Padova*, 26–30. In the old Italian terminology used to indicate the types according to their point size: the 'Antico' was used to indicate the 12pt, 'Silvio' for the 14pt; 'Garmoncino' for the 9pt; 'Filosofia' for the 1pt and 'Testino' for the 8pt.

28. Ibid., 32. It is not clear if these refer to the same founts already mentioned or not.

29. Ibid. Besides this specimen, Mosley also lists another two printed in 1869, see 'Sources for Italian Typefounding'.

30. According to current director of the 'Biblioteca Antica del Seminario Vescovile di Padova' the material of the Tipografia del Seminario is still available there (i.e. punches, matrices and cast types), although it is in poor conditions. He also added that it is difficult to establish how much of it is datable to the seventeenth-eighteenth centuries; he has not confirmed if there is anything available of Arabic. There are current plans to transfer this material to the *Tipoteca Italiana*, a typographic museum in Cornuda (TV), Italy. Don Riccardo Battocchio, e-mail message to author, 11 July 2017.

According to the sources, Barbarigo's main investment went into the foundry: he planned to strike matrices from the punches of various Oriental types available in Italy – obtained through the benevolence of his friendships and his religious leverage – to then make new castings in his own foundry.³¹ However, things worked out even more in his favour, as he received donations of punches and matrices, which went to form a well-furnished collection. In 1683 the Duke Cardinal Federico Borromeo of the Biblioteca Ambrosiana in Milan donated matrices and punches of Arabic and Hebrew that were no longer in use. In the same year, he received from Cardinal Girolamo Casanate a donation of the Propaganda Fide Press' Greek matrices.³² However, the largest contribution also of matrices and punches came in 1684 from the Typographia Medicea, loaned by the Granduca of Tuscany Cosimo III: it is reported that eleven cases of matrices containing about 3,000 matrices of Oriental types were sent.³³

The most important publication of the Typographia Seminarii was Ludovico Marracci's *Alcorani Textus Universus* printed in two volumes in 1698.³⁴ This work was the third extant complete Qur'an printed in Arabic³⁵ and used a new Arabic type (TSP), albeit showing close resemblance with the SCPF1 and SDB4 types. Krek describes the characters of TSP as lacking 'the elegance of the Medicean and De Brèves presses but are clear and closely set'.³⁶ One interesting aspect of this typeface is the handling of the full vocalisation: the marks, which are cast independently from the characters, are aligned to the same height above and below them, clearly simplifying the typesetting (Figure 7.37).³⁷ On the other hand, this approach failed to give a flexible alignment of the floating marks in relation to the letters, complying with the rigid modular system of the metal sorts cast on the same body. However, rather than exclusively representing the limitation of the medium for composing fully vocalised Arabic text, this example shows how the type-maker's approach can affect the appearance of the script in the typographic environment, when favouring a simplified adaptation over its more truthful representation; this contributes to a more marked discontinuity with calligraphic practice (Figure 7.38).³⁸

Giambattista Bodoni

It has already been mentioned that Giambattista Bodoni received his first training in the art of printing and type-making at the Propaganda Fide Press. Here, he familiarised himself with various Oriental types including Arabic and, advised by the superintendent Ruggieri, he studied the rudiments of Oriental languages at the University

31. Ibid., 33. It was entrusted to the expert type-founder Gian Antonio Bresaola from Trento, who ran it for 14 years. He cast many Oriental types.

32. Bellini, *Storia Della Tipografia Del Seminario Di Padova*, 34–35.

33. Ibid., 35–36; see the list of all the material received in the same source, Appendix: Nota di Madri e Punzoni.

34. It contains the Arabic text prepared by Marracci, a Latin translation, commentary and refutation. The second volume is entitled *Refutatio Alcorani*.

35. The first being Paganini's edition printed in 1537–8 in Venice and the second being that of Abraham Hinckelmann, *Al-Coranus Sive Lex Islamatica Muhammadi*, published in Hamburg in 1694, also entirely in Arabic. Hinckelmann's Qur'an uses vocalised Arabic types of unknown origin that, according to Balagna, were without doubt fashioned on the Leiden model, Balagna, *L'Imprimerie Arabe En Occident*, 90.

36. Krek, *Typographia Arabica*, 12.

37. This approach also appears in later publications, like Walton's London Polyglot Bible (see Figure 6.111) and in the Cairo edition of the Qur'an (Figure 9.33).

38. Despite the problems, Granjon's first Arabic showed how a different approach towards type-making achieved a more successful representation of fully vocalised texts, see Figure 6.1.

'La Sapienza'. After eight years at the Polyglot Press, in 1768 Bodoni undertook the challenge of directing the new Royal Press requested by Duke Ferdinand of Parma. In 1774 he published a type specimen book³⁹ – for the occasion of the baptism of the Prince of Parma – containing his printing types for twenty non-Latin writing systems, including Arabic (Appendix 101). The following year he added nine additional Oriental types, which he displayed in the prestigious volume *Epithalamia Exoticis Linguis Reddita* (Appendix 102).

In his masterwork *Manuale Tipografico* – published posthumously by his widow in 1818 – the Arabic script is used to cover the Persian, Ottoman Turkish, and Tatar Turkic languages. The Arabic types available are 'Arabo 1' (GBA1)⁴⁰ and 'Arabo 2' (GBA2)⁴¹ (Figure 7.39), plus two other types 'Persiano 1' (GBP1)⁴² and a 'Persiano 2' (GBP2)⁴³ (Figure 7.40). However, Bodoni failed to apply the mastery and refinement that characterised his craft to the Arabic specimens; as a consequence, these resulted 'juvenile and inexperienced'.⁴⁴ Moreover, he failed to bring any innovation to the development of Arabic printing, with designs that followed the existing European models⁴⁵ and exposed his shortcoming in the knowledge of the Arabic script and the related languages. The larger of his Persian types also suggests his 'uninformed impression of Persian *nastaliq* style':

Summarising one can say that the fact that Bodoni's typefaces reflect the common uninformed European hybridisations of Arabic script, in contrast with the accurate details in his Preface make it very likely that Bodoni was quoting sophisticated information whose implication escapes him: after all, he writes: «the naskh and some of these other styles of writing are used also in learned books. So the intricate thuluth letter is employed in frontispieces and beginnings». If Bodoni had fully understood this description, he would not have continued the tradition of mixing thuluth and naskh elements. It is clear that he directly or indirectly copied Granjon's types and he was aware of Carsten Niebuhr's report on Arabic script styles.⁴⁶

39. *Pel Solenne Battesimo Di S. A. R. Ludovico Principe Primogenito Di Parma [...] Iscrizioni Esotiche, A Caratteri Novellamente Incisi E Fusi*, Parma, 1774.

40. Also used for the Turkish named 'Turco'. The point size is 'Silvio', name that refers to the 14pt (i.e. cast on a 14pt body), see Bellini, *Storia Della Tipografia Del Seminario Di Padova*, 28. It is the equivalent of the French Saint-Augustin. For a table with the names of the corresponding printing types body sizes in the foundries of different nations see Daniel Berkeley Updike, *Printing Types. Their History, Forms, and Use*, 2nd ed. (Cambridge, Mass.: Harvard University Press, 1937), 27.

41. Also used for the Tartar named 'Tartaro' (there is also a 'Tartaro Mantchou' type, but it uses a different script). The point size is 'Testo', equivalent either of the French 'Gros Texte' (indicating Fournier's 16pt body size) or of the 'Gros Romain' (indicating Fournier's 18pt), according to the table provided by James Mosley in 'Type Bodies Compared', accessed 11 July, 2017, <http://typefoundry.blogspot.co.uk/2008/04/type-bodies-compared.html>. In Updike's table, the size 'Testo' is given as only correspondent to the French 'Gros Romain' (18pt).

42. This type is also of the point size 'Silvio' and shares similarities with GBA1, suggesting that it is the same typeface. However, the five lines of text in 'Persiano 1' in the *Manuale Tipografico* show also different designs for the same letterforms compared to GBA1 (e.g. initial lām, isolated yā', isolated kāf), possibly some variations added for the setting of Persian.

43. This type is also of the point size 'Soprasilvio'. This type size is not mentioned in Bellini's source. In Updike, the 'Soprasilvio' is referred to as the equivalent of the French 'Gros Texte': it is shown in the same group as the 14pt, although it indicates Fournier's 16pt, see Updike, *Printing Types*, 27 and Mosley, 'Type Bodies Compared'.

44. Thomas Milo, 'Thomas Milo: Bodoni's Arabic, Some Observations', 2013, accessed 6 March 2017, <http://www.compulsivebodoni.com/?portfolio=thomas-milo-bodonis-arabic-some-observations>.

45. Particularly those of the Propaganda Fide Press and of the Medicean Press.

46. Ibid. In this source Milo also gives a detailed analysis of Bodoni's Arabic types, comparing 'isograph

The eighteenth-century publication *Rerum Arabicarum* of the Reale Stamperia (i.e. Regio Typographeo) in Palermo uses the smaller Arabic of Bodoni (Figure 7.41). This printing office was founded in 1779 by the will of Ferdinando IV, on the model of that established in Naples in 1750. It is not clear how the Sicilian printing house obtained Bodoni's Arabic, although it seems that they purchased types in Rome owing to the Orientalist Giovanni Cristofano Amaduzzi⁴⁷ (superintendent of the Propaganda Fide Press in Rome) with whom Bodoni always remained in contact after his departure from the Polyglot Press in 1766.

7.2.2 Typographic ventures in England and Germany

England

Although the first Arabic metal types appeared in England in the first half of the seventeenth century, it was not before the early 1800s that a strikingly new Arabic typeface appeared in the market, requested by the East India Company. The punch-cutting was entrusted to William Martin, the first English craftsman to describe himself as an 'Oriental type founder', using the models prepared by Charles Wilkins, the renowned Orientalist and pioneer of Arabic/Persian typography in India.⁴⁸ The new Wilkins-Martin type was cut in two sizes (WM1, the larger; WM2, the smaller),⁴⁹ firstly used in Sir William Jones' *A Grammar of the Persian Language*, London, 1804 (Figure 7.42).⁵⁰ These types represented a substantial improvement compared to their predecessors in England, which reflect Wilkins' statement about his work:

The punches were gratuitously designed by myself, and executed, under my superintendence, by that ingenious mechanic, Mr. William Martin [...]. They will, I trust, be found not only legible, but if compared with any that have been before made in this country, not inelegant. I chose the best specimens of Arabic writing for my copy, and I preferred the form which is called نش [nash], because, from its superior regularity and plainness over all other hands, it is, in my humble opinion, the only form which should be used for printing, whose object is not only to multiply and disseminate with superior expedition, but to facilitate study by plainness and uniformity of character.⁵¹

At close inspection, the praise for the typeface's 'fidelity to authentic Arabic *naskhī* hands', is too generous.⁵² It is not clear what happened to the punches and matrices of the Wilkins-Martin types. One of the hypothesis is that they found their way to Richard Watts, English cutter and founder of Oriental types, whose Arabic typeface

tables' with other European Arabic types.

47. Rosario Lentini: 'La Stamperia Reale', accessed 12 July, 2017, <https://www.lidentitadiclio.com/la-stamperia-reale>.
48. Roper, 'Arabic Printing and Publishing in England Before 1820', *British Journal of Middle Eastern Studies* 12, no. 1 (1985): 22. Wilkins was also the pioneer of Bengali foundry types in India, as extensively documented by Fiona Ross in *The Printed Bengali Character*.
49. According to Roper, a Double Pica (22pt) and an English (14pt), Roper, 'Arabic Printing and Publishing in England Before 1820': 31, note 93.
50. In the 'Advertisement' of the edition, Jones states: 'an elegant new type, cut after the best examples of writing in the Niskhi [sic] character, and of which no specimen has before been published', see William Jones, *A Grammar of the Persian Language*, 6th ed. (London: Lackington, Allen & Co., 1804), xxi.
51. In the 'Advertisement' by Charles Wilkins in John Richardson, *A Dictionary, Persian, Arabic, and English* (London, 1806), XCV.
52. Roper, 'Arabic Printing and Publishing in England Before 1820': 23. See § 8.4.1 for an analysis of the typeface.

used at the CMS Press in Malta, was 'with some minor modifications, the same as Martin's, and may well have been cast from his matrices'.⁵³

The Wilkins-Martin Arabic typeface was not the only new one produced in England: a series of Arabic types had appeared since 1635 when the first English publication using Arabic metal type – John Selden's treatise *Mare Clausum* – was printed by the Londoner William Stansby (Figure 7.43).⁵⁴ However, for the next two centuries, the Arabic type production in England followed mainly the style of the early seventeenth-century's Dutch types of Raphelengius and Erpenius, which in turn derived from the fifteenth-century types of Robert Granjon.⁵⁵ The Arabic type used by John Selden (JS), although of unknown provenance, was indeed either copied or imported from the Netherlands.⁵⁶

The Wilkins-Martin Arabic came as a replacement for another type used in England that was also designed following the Dutch fashion: the 'Jackson's Arabic' (JJ). Until supplanted, this type had been the favoured typeface for the publications under the patronage of the East India Company (Figure 7.44), although it had been originally cut by Caslon's apprentice Joseph Jackson in the late 1770s for John Richardson's *A Dictionary, Persian, Arabic, and English*. Richardson's foundry supplied the type to the Oxford University Press to produce the first edition of this work in 1777 (Appendix 103).⁵⁷ The JJ Arabic type adapts the same structure of Raphelengius and Erpenius' types, which allowed for three and even four levels of alignment to represent the multilevel structure of the script (Figure 7.45). In Jackson's Arabic, the top stroke of the final ڭim group is slanted as in Raphelengius' type (see Figure 7.10) rather than straight as in Erpenius (see Figure 7.22).

In his *Grammar*, Richardson describes the cascading nature of the Arabic script – especially that occurring with the repetition of the ڭim letter group – as a feature that gives a 'very whimsical appearance', using as an example the word *mukhajkhijon* ('contracting' or 'shrinking with fear'), on a five-level alignment (Figure 7.46).⁵⁸ The JJ type included additional characters to set Persian and Turkish languages, some of which show in Richardson's *Dictionary* from 1777⁵⁹ and in the Oxford University Press documents, where the type is named 'Arabic DTo' (Appendix 104). Arabic cast type belonging to a 'Long-bodied English' Arabic type owned by Richardson (possibly JJ) appears to survive at the St Bride Library, amongst the OUP material they rescued (Appendix 105). However, the document lists also a 'Jackson's Low 2-nick English': further research is necessary to verify which of the two types can be identified with JJ.

Another Arabic type regularly used in England was also a striking imitation of Erpenius's TE1 type. It was purchased through the Archbishop of Canterbury William Laud, whose interest in Arabic studies moved him to lay the basis for the Oxford University Press, and thus acquire the necessary material for printing. In 1637 he

53. Ibid., 24.

54. However, the first Arabic book to be printed in England can be considered Selden's *Eutychii Aegyptii...*, 1642, which makes a more substantial Arabic content, see Roper, 'Arabic Printing and Publishing in England Before 1820': 13.

55. Ibid., 18.

56. Ibid., 13.

57. Ibid., 21. The Oxford University Press purchases fount of this type in 1782. According to Roper, the punches and matrices of the JJ type were probably destroyed in the fire that affected Jackson's foundry in 1790.

58. See John Richardson, *A Grammar of the Arabic Language*, 1776. Menston: Scolar Press, 1969.

59. See Appendix 103.

sent to Leiden – on behalf of the University – the London bookseller Samuel Brown to negotiate ‘a sale of type, matrices, and punches from the stock of a typefounder, Arend Cornelisz. van Hoogenacker, lately deceased’.⁶⁰ Amongst other Oriental types, the collection included two sorts of Arabic.⁶¹ At the Oxford University Press, the bigger type was named ‘Canon Arabic’⁶² (imperfect), No. 10’ (OUP1) and had previously appeared in Erpenius’ edition *Locmani Sapientis Fabulæ* printed in 1636, but there is no mention of it being used in England (Figure 7.47).⁶³ The other was named ‘English Arabic No.11’ (OUP2) and it was included in the University’s *Specimen* of 1693 (Figure 7.48, Appendix 106).⁶⁴ It should be noted that before the smaller Arabic type (OUP2) was used regularly by the Oxford University Press established in the 1660s, it was lent to various English printers, who gradually added lost or missing sorts and amended defective letters⁶⁵ (in particular, John Greaves, Edward Pococke, Nicholas Nicholls and De Walpergen).⁶⁶ The OUP2 type was the only in use at Oxford until 1768, when the Press bought a fount of the JJ Arabic type from the foundry Caslon&Co.⁶⁷

Some Arabic metal types cast at the Oxford University Press survive in the holdings of the Jericho Press, the University of Reading and the St Bride Library in London. The OUP types that were available to scholars at St Bride Library are recorded, although access to the material is no longer accessible due to logistic problems.⁶⁸ The University of Reading holds a ‘Berthold 14 point’ (OUPB) and a ‘3-line nonpareil

60. Harry Carter, *A History of the Oxford University Press* (Oxford: Clarendon Press, 1975), 33.

61. Stanley Morison and Harry Carter, *John Fell, the University Press and the Fell Types: The Punches and Matrices Designed for Printing in the Greek, Latin, English, and Oriental Languages Bequeathed in 1686 to the University of Oxford by John Fell*, D.D. (Oxford: Clarendon Press, 1967), 22, 233.

62. According to Smitskamp, a 30pt, see *Philologia Orientalis* 3, 280g.

63. The Oxford University Press had ‘46 old punches for elements of the Arabic script to fit on Canon body. There are no corresponding matrices’, see Morison and Carter, *John Fell, the University Press and the Fell Types*, 233, 240.

64. Harry Carter mentions that it included ‘matrices enough for casting Arabic type of a convenient size’, see Carter, *A History of the Oxford University Press*, 34. According to Morison, the English size (14pt) was a misnomer, as the smallest body that could accommodate the type’s requirement for double alignment is a Great Primer (about 16½ pt): see Morison and Carter, *John Fell, the University Press and the Fell Types*, 240–41. A note to the University Press’ *Specimen* of 1768 reports that no punches or matrices exist for the English Arabic and that the example is reproduced with existing types, see Hart, *Notes on a Century of Typography at the University Press*, 102.

65. This included the making of new punches, matrices and new cast type for the Arabic and additional letters required for Turkish, Persian and Malay, see Roper, ‘Arabic Printing and Publishing in England Before 1820’: 15–18; Morison and Carter, *John Fell, the University Press and the Fell Types*, 241–42.

66. Ibid., 233, 240–41. According to Morison, the set of punches sold in 1637 must have been an incomplete set. In 1967 he reports that the Oxford University Press kept 110 punches, some of which broken and damaged by rust: ‘all but 17 appear to belong to the original set [...]. Of the additions, 5 are recognizable as the work of Nicholas Nicholls the London typefounder, 8 have the characteristic shape of De Walpergen’s work and 3 [...] are probably attributable to a London typefounder working for John Greaves in 1648 [...]. Apart from these additions, and extra to the total 110, there are 41 punches by De Walpergen for sorts matching the type needed for the Persian, Turkish, and Malay languages’. Morison also documents aspects of the type-making of OUP2 (e.g. punches not cut sharply or deeply enough; dots to be filed off by the compositor).

67. Ibid., 242.

68. See Appendix 105. In 1986 St Bride’s Nigel Roche and Dr. J.F. Coakley acquired the types disposed by the Oxford Printing-House (i.e. the Oxford University Press type-store) in order to salvage them. Most of the material was from stock (i.e. pages of sorts from the caster, usually one or more lines of each), or diss (i.e. a page of set-up type). Dr. J.F. Coakley, e-mail message to author, 29 August 2016.

(interchangeable with 18pt)' (OUP3).⁶⁹ According to the Oxford specimen-book,⁷⁰ the 14pt is indirectly from Berthold typefoundry based in Berlin. The Oxford University Press bought the fount in 1934 and had their own matrices made to cast the type to Oxford height (Figure 7.49, Appendix 107).⁷¹ The 18pt type derives from a fount of type procured from Cairo in 1909 and cast at Oxford in 1928⁷² (Figure 7.50, Appendix 108). The Jericho Press currently still holds one OUP Arabic type.

Besides Oxford – the first important centre of Arabic printing in England – and London, also in Cambridge were printed Arabic publications with types seemingly imported from the Netherlands. The *Genethliacōn* printed by John Hayes in 1688, was the first book to employ an Arabic type: it was different from that of Oxford, but similarly resembled the Dutch models (Figure 7.51).⁷³

The Cambridge University Press acquired its own Arabic type in the 1730s: it was a fount of William Caslon's Arabic (WC) commissioned in 1721–22 by the Society for Promoting Christian Knowledge (SPCK) for an edition of the Psalms (Figure 7.52).⁷⁴ Despite not departing from Granjon's models of the sixteenth century, the WC type 'aroused great admiration' and was supplied to both Oxford and Cambridge University Presses and other London printers (Appendix 109).⁷⁵ It was cut on an 'English' size, to be more economical of the Arabic type used for the London Polyglot Bible (TR), which was originally suggested for the project but discarded for its large size (Great Primer).⁷⁶ In their *Specimen* of 1933, the Cambridge University Press displays five Arabic types (Appendix 110).

Finally, there were a few more Arabic types used in eighteenth-century England: four differently sized owned by the founder John James, and two cut by Dr Edmund Fry under the guidance of Charles Wilkins (Figure 7.53).⁷⁷

69. Acquired by the Department of Typography and Graphic Communication in 2016 from J. F. Coakley, owner of the Jericho Press, based in Ely, near Cambridge, UK. Both names derive from Coakley's private sale notice. Both founts are Oxford height-to-paper, 23.93 mm.

70. *List of Ancient and Modern Greek and Oriental Founts at the University Press, Oxford*. 'Printed by Charles Beatty ... 1 December 1957'. A second issue, 'Printed by Vivian Ridler ... 1 October 1959', is identical.

71. *Ibid.*, 17. 'Arabic 14-pt. 2-nk. A small fount purchased from H. Berthold, Berlin, S.W. 61, through John Meerloo & Co., Ltd., London, September 1934. 218 matrices were produced by the Williams Engineering Co., Ltd, in 1934. No points were supplied with the fount but have been cast from the Long Primer matrices on 6-pt. and 2-pt. bodies. First used for Exam. Papers August 1935. Weight of fount December 1956: 250 lb.'

72. *Ibid.*, 16. 'Arabic 3-line Nonp. 1-nk. A small fount of type (27 lb.) on a 24-pt. Didot body was first procured from M. Emin Hindié, of Cairo, in 1909, at Professor Margoliouth's desire, for use on "Rylands Library Catalogue of Arabic MSS". In the same year 272 matrices were ordered from R. P. Bannerman. From these, including adaptations, the existing fount was cast at Oxford in 1928 on a 3-line Nonp. body. Use Points of 14-pt. Fount. Cast on 6-pt. and 2-pt. bodies. Weight of fount December 1956: 1,228 lb.'

73. There is no evidence, but at the time every type in use in Cambridge came from the Netherlands, Roper, 'Arabic Printing and Publishing in England Before 1820': 20. As mentioned in § 7.1.1, William Bedwell, the first Arabic scholar in Cambridge, never used Raphelengius' Arabic type bought in 1612.

74. This was Caslon's first major task as a punch-cutter, Roper, 'Arabic Printing and Publishing in England Before 1820': 21. The editions of the SPCK using Caslon's Arabic were exported to the Middle East achieving wide distribution, see Roper, 'Arabic Printing in Malta 1825–1845', 67–70.

75. It appears that Caslon's WC Arabic type was used for Erpenius' *Elementa Linguae Arabicae*, printed in London in 1730. The work also shows an alphabet table of the fount, see Appendix 109.

76. *Ibid.* The TR type was a copy of Savary de Brèves Arabic, as discussed in § 6.2.

77. *Ibid.*, 20–22. These were a Great Primer and an English size to rival Caslon's WC. Dr Edmund Fry

Germany

Like England, Germany was a relative late-comer to Arabic typography, with Peter Kirsten's effort in 1607 to introduce Arabic movable types. Although many others followed in the later centuries,⁷⁸ these substantially replicated several characteristics of previous European Arabic typefaces hitherto discussed. A notable example is the fount used in 1834 for a new stereotyped edition of the Qur'ān in Arabic by the Saxon scholar Gustav Flügel, printed in Leipzig by the renowned Carl Tauchnitz (Figure 7.54).⁷⁹ The Arabic type in question (FT)⁸⁰ was 'specially produced for the edition, under Flügel's supervision, by Anton von Hammer from handwritten samples and materials made available by the Vienna Orientalist Joseph von Hammer-Purgstall'.⁸¹

Nonetheless, the type does not reflect Flügel's claims that the calligraphic models of Von Hammer-Purgstall – sent from Istanbul – had been instrumental in designing the fount as, in Vroljik's words, 'it is difficult to see the resemblance between genuine Ottoman calligraphy and this product'.⁸² On the contrary, that the Arabic type of the Flügel's Qur'ān essentially embodies the evolution of the European type-makers' mindset with regard to Arabic typography. Instead of developing the appropriate sensitivities and efforts of Granjon's first approach to preserving the script requirements despite technological limitations, it departed from it, preferring a route of simplification and practical convenience over adherence to authenticity. As previously discussed, many European Arabic types share characteristics of – amongst other things – style inconsistency, poor shaping of letterforms and proportional issues, an upright static appearance, lack of understanding of the rule-based script system, with a flattening of the joining line and of multilevel (or cascading) letter connections. This resulted in Arabic types that largely did not look like the script that they were trying to reproduce but that, in replicating each other's shortcomings, contributed to establishing a new model of Arabic typography where structural errors and infidelity to manuscript practice for various reasons became accepted standards and unchallenged conventions.

The popularity of the FT type continued in the twentieth century, as it was available at the renowned Dutch publishing house Brill (Appendix 111) and type foundry Lettergieterij 'Amsterdam', formerly N. Tetterode of Amsterdam (Appendix 112).⁸³

had also purchased the London Polyglot Bible type (TR).

78. Some are presented in Krek, *Typographia Arabica*, 22–24.
79. This edition was important because it provided a convenient and affordable text, which was also more reliable and accessible than the previous European editions of the Qur'ān (Hinckelmann, Marracci and St. Petersburg). Moreover, it achieved considerable circulation, also reaching the Muslim world. See Bobzin, 'From Venice to Cairo', 169 and Roper, 'The History of the Book in the Muslim World', 549.
80. Arnoud Vroljik refers to this type as the 'Fluegel/Tauchnitz fount', see Arnoud Vroljik, "The usual Leiden types": A Compositor's Personal Account of Brill's Arabic Printing in the Late 19th and Early 20th Century', in *Books and Bibliophiles: Studies in Honour of Paul Auchterlonie on the Bio-Bibliography of the Muslim World*, (Oxford: E.J.W. Gibbs Memorial Trust, 2014), 126.
81. Bobzin, 'From Venice to Cairo', 169.
82. Vroljik, "The usual Leiden types", 126.
83. It was the great domestic competitor of the Enschedé type foundry, see John A. Lane, Mathieu Lommen, and Johan De Zoete, *Dutch Typefounders' Specimens from the Library of the KVB and Other Collections in the Amsterdam University Library with Histories of the Firms Represented* (Amsterdam: De Buitenkampt, 1998).

A second significant Arabic type of German origin was the so-called 'Berlin' typeface (BT),⁸⁴ the most widely used Arabic type at Brill in the nineteenth century.⁸⁵ Brill's earliest edition using the BT type is the Arabic thesis of the Leiden Orientalists H.E. Weyers, published in 1831 (Figure 7.55), although it seems that the type appeared in Bonn as early as 1822, if not earlier. The largest single project to use BT was the *Annales* of al-Ṭabarī, a 10,000-page edition published by Brill between 1879 and 1901; from 1907 it was used by the Haarlem type foundry of Johan Enschedé en Zonen.⁸⁶ This staple typeface of the nineteenth and early twentieth century – whose punch-cutter is unknown – is shaped and structured along similar lines of the Flügel's type, but characterised by a higher stroke contrast.

The developments of Arabic typography in Europe following the noteworthy cases of Granjon and Savary, hitherto discussed, are instrumental to document the influence that their work had on subsequent printing ventures in the field. At the same time, it proves the existence of an active trade of Arabic types amongst printers in different countries, which was partially responsible for the lack of further significant advancements and contributed to consolidate a European model of Arabic typography.

7.2.3 Some considerations on the trade of Arabic foundry types

Clearly not every new Arabic typeface that came to the market in Europe was influential in the development of Arabic typography, hence many have been left out of the discussion in this study. Likewise, the spread or popularity of a particular Arabic typeface does not necessarily define its quality as a typographic representation of the script. This implies that the significance and success of a typeface might be independent of each other; furthermore, that they are not universally definable but depend on the context of the evaluation.

It has largely been discussed how historical circumstances have played a critical role not only in the making of Arabic types but equally for their use, spread, loss or development. To this extent, the trade of types – intended as exchange, acquisition, purchase, plunder – also contributed to determining their fate. For instance, the Brill publishing house, having no foundry of its own, only used Arabic types already available on the market giving them – through the volume of their production – visibility and longevity, perhaps beyond their merits.⁸⁷ Similarly, the renowned Enschedé type-foundry created a collection of Arabic types through the acquisition of materials from other Dutch foundries (e.g. Ploos van Amstel, J. de Groot,

84. Vrolijk, "The usual Leiden types", 123–125. It was originally named 'Berlin types' by Rijk Smitskamp, who identified Berlin as the source of the typeface, more specifically the Prussian Government printing office. Vrolijk also addresses them as 'Royal types' or 'Brill types' see Vrolijk, 'Arabic Typography in the Netherlands', 156.

85. Brill started out printing Arabic with types supplied by Enschedé, which were then replaced with the BT type around 1830 as it was 'not only more economical, but also appealed more to the tastes of the time', Vrolijk, 'Arabic Typography in the Netherlands', 156.

86. Vrolijk, "The usual Leiden types", 123–125. The Enschedé Specimen of 1907, *Letterproof Van Oosterse*, shows two sizes of the typeface: a 12pt (No.4303) and a 16pt (No.4304).

87. This refers to the discussed Arabic types of the Flügel Qur'an (FT) and the 'Berlin' typeface (BT). Brill also used the so called 'Beyroot types' (from the American Board of Commissioners for Foreign Missions, see § 8.4.2) and the 'Stambouli' types (from the Imprimerie Catholique, see § 8.4.3).

Joan Blaeu and Michael Fleischman – besides Erpenius), and from abroad (i.e. the English typefounder Richard Watts),⁸⁸ but made little creative contribution to Arabic typography.⁸⁹ It appears indeed that Enschedé's only new Arabic type was a large size intended for title pages, cut by its punch-cutter G. Schlegelmilch in 1885–86, reportedly based on a Persian manuscript (Figure 7.56).⁹⁰

It should also be borne in mind that the trade of Arabic types favoured the spread of certain aesthetic models from one country to the other (e.g. the influence of Dutch Arabic types on the English market), contributing to consolidating them as standard practices for Arabic typography. As highlighted in this study, the European production of Arabic foundry types was largely based on the copy of few reference models rather than on a progressive development towards an improved typographic representation of the Arabic script. Moreover, the circumstances that caused the shortage of Arabic foundry types in Europe prompted the inclination – or rather the need – for their trade. Therefore, the printers interested in the production of Arabic books went to great lengths to obtain either those Arabic types that were more accessible to them or 'the best' that the market had to offer, including travelling abroad or capitalising on personal relationships to facilitate negotiations. Notably, the French Imprimerie Nationale resorted to less orthodox methods to build the most exhaustive collection of Oriental types, at the expense of the Italian Presses of the Propaganda Fide and the Typographia Medicea. It seems timely to remark that, according to the circumstances, the trade of Arabic types in Europe contributed to the displacement, dispersion and loss of typographic material, with very few exceptions.⁹¹ Moreover, the movement of Arabic types between printers (either in the form of punches, matrices or cast type) caused the progressive corruption of the original designs,⁹² resulting in a less straightforward process for the historical research and typographic analysis of those typefaces.

88. Instead of developing a new Arabic typeface as requested by the Dutch Bible Society, Enschedé used an Arabic type designed by Watts (which was in turn based on the Wilkins-Martin design, as mentioned earlier in the section). This Arabic typeface was also available at the Lettergieterij 'Amsterdam' (Appendix 112), see Vrolijk, 'Arabic Typography in the Netherlands', 155.

89. Enschedé, *Typefoundries in the Netherlands*. See also Lane, Lommen, and De Zoete, *Dutch Typefounders' Specimens* and Vrolijk, 'Arabic Typography in the Netherlands', 154–56.

90. Vrolijk, 'Arabic Typography in the Netherlands', 154–56.

91. For instance the typographic material plundered from Italy is conserved at higher standards at the Cabinet des Poinçons of the Imprimerie Nationale than the material that returned to Italy, and which is today in Florence.

92. For instance, different printers might have added new punches to the original set of a particular typeface, struck new matrices or made a casting of their own.

8 PRINTING ARABIC IN THE MIDDLE EAST IN THE 18TH CENTURY

8.1 Simply a matter of resistance?

Printing in Arabic characters arrived in the Middle East with a considerable delay compared to Europe, despite the printing technology being introduced in the Muslim world only a few decades later than Europe by the non-Muslim minorities that had settled there. While Jews, Armenian and Greek Orthodox communities printed in their scripts,¹ the Arab Christians introduced the printing of Arabic texts, first using Syriac characters² (Quzħayyā, Mount Lebanon, 1610), and later with Arabic characters (Aleppo, Syria, 1706). However, it was not until 1727 that printing in the Arabic script was permitted in the Ottoman Empire, restricted to non-religious materials.

This delay is often attributed to the resistance of the Islamic world to book printing, but what exactly does that mean? Evidently, the Muslims' opposition was not merely against the technology, rather it was script-related.³ In other words, their reluctance was against the technology's repercussions on the Arabic script in printed books compared to its written counterpart in the manuscripts that they were using and were comfortable with. With regard to this, the scholar Salomon Négri observed that the Turks 'accustomed to beautiful manuscripts, [...] will never have a taste for printed books'.⁴ Concerning the European Arabic characters in particular, the Director of the Cairo School of Medicine, M.A. Perron, reported in 1843 that '[...] aux yeux des musulmans, sont trop larges, trop lâches et qui n'avaient nullement l'allure orientale'.⁵ For this reason, the scholar André Demeeserman argues that the marked disaffection shown towards the European Arabic printed books was due to the fact

1. The ban on printing issued in 1485 by Sultan Bāyezīd II did not apply to any of these minorities, as non-Muslims living in the Ottoman Empire. See Roper and Glass, 'Arabic Book and Newspaper Printing in the Arab World', 177; Gdoura, *Le Début De L'imprimerie Arabe*, 75–76.

2. Known as *Karšūnī* (or *Garšūnī* or *Geršūnī*).

3. There is no documentary evidence that the Ottomans were 'negatively inclined' towards printing, but there is evidence of some Higher Muslim religious officials possessing copies of the Western editions of Arabic texts. See Olin Sabev, 'Waiting for Godot: The formation of Ottoman Printing Culture', in *Historical Aspects of Printing and Publishing in Languages of the Middle East*, edited by Geoffrey Roper (Leiden: Brill, 2014), 110. A recent study challenges the claim that Ottoman sultans banned printing based on the fact that it cannot be supported with extant documentary evidence, see Kathryn A. Schwartz, 'Did Ottoman Sultans Ban Print?', *Book History* 20 (2017): 1–39.

4. In a work printed in 1907. He is known as Victor Chauvin, professor of Arabic and Hebrew at the University of Liège. See André Demeersemann, 'Une Étage Important De La Culture Islamique. Une Parente Méconnue De L'imprimerie Arabe Et Tunisienne: *La Lithographie*', IBLA 16 (1953): 352, 358.

5. '[...] in the eyes of the Muslims, are too broad, too loose, and had no Oriental appearance at all', approximate translation by the author from M.A. Perron, 'Lettre Sur Les Écoles Et L'imprimerie Du Pacha D'Égypte, Par M.A. Perron', *Journal Asiatique* 4, II (1843): 19. It has been observed elsewhere that several European types were too large in size; on the other hand, the Arabic type of İbrahim Müteferrika (owner of the first Ottoman-Muslim printing venture, see § 8.3.1) was characteristically small because it reproduced the *nash* practiced by the Turkish calligraphers of the time, see Arberry, *Arabic Printing Types*, 21. This somewhat highlights the importance of regional taste in typographic matters as it dictates, from the readership's perspective, what is recognised as familiar.

that 'accepter les caractères d'imprimerie était certes un gain pratique mais [...] c'était en même temps, sur le plan artistique, accepter une mutilation'.⁶

As Roper remarked, the segmentation and mechanisation of the Arabic script in printing disregarded 'the intrinsic subtleties of the process of calligraphic composition and its relation to underlying aesthetic and "spiritual" considerations';⁷ therefore, it disregarded the tradition of calligraphic practice and its significance. It was inevitable for this to adversely affect the attitude to printing, especially – as Roper continues – considering 'the profound Muslim attachment to MS⁸ books and scribal culture', along with 'the supreme religious role accorded to the written word'; these were ultimately the main reasons for their reluctance to embrace printing.⁹ Particularly pertinent, in this regard, seems the observation of the German Oriental traveller Carsten Niebuhr in the eighteenth century:

The hand-writing of the Arabians in the common business of life is not legible. The orientals, however, value themselves on their writing, and have carried the art of making beautiful written characters to high perfection, but the Arabians value chiefly a species of elegance, which consists in their manner of joining their letters, the want of which makes themselves dislike the style in which Arabic books are printed in Europe.¹⁰

In relation to this issue, the Tunisian scholar Wahid Gdoura highlighted the psychological aspect of the Muslims' diffidence towards printed books, especially from the most conservative people. The manuscript had not only a historical value, but it ensured the continuity of the Muslim culture: breaking away from it to welcome 'a Christian invention' also entailed questioning the future of the Islamic civilisation.¹¹

It should also be borne in mind that the transition from manuscript to printed books had different consequences on the appearance of the book itself. In Europe 'the advent of the printing press did not mean a sudden change in the appearance of the book':¹² the earliest incunabula were indeed modelled on the manuscripts so closely that 'the layman sometimes has to examine a book very carefully before deciding whether or not it is printed or handwritten'.¹³ On the other hand, the first Arabic printed books did not resemble the manuscripts to which Arab readers were accustomed.¹⁴ The extreme care that the first European printers took to produce

6. 'Accepting the printing types was certainly a practical gain but [...] at the same time, artistically, it was accepting a mutilation', approximate translation by the author from André Demeersemann, 'Les Données De La Controverse Autour Du Problème De L'imprimerie', *IBLA* 65 (1954), 40.

7. See Roper, 'The History of the Book in the Muslim World', 541–42.

8. Abbreviation for manuscript.

9. See Roper, 'The History of the Book in the Muslim World', 541–42.

10. Carsten Niebuhr, *Travels through Arabia and Other Countries in the East* (Edinburgh: R. Morison, 1792), 261.

11. Gdoura, *Le Début De L'imprimerie Arabe*, 97. The Muslims' conservative attitude as a barrier to printing was also discussed in Thomas F. Carter, *The Invention of Printing in China and Its Spread Westward* (New York: Columbia University Press, 1931) and in Francis Robinson, 'Technology and Religious Change: Islam and the Impact of Print', in *Modern Asian Studies* 27, no.1 (1993): 229–51.

12. Febvre and Martin, *The Coming of the Book*, 78.

13. *Ibid.*, 77.

14. This is not the case of the first Muslim-owned press of the Middle East that started printing in the first half of the eighteenth century in Istanbul, discussed in § 8.3.1. İbrahim Müteferrika followed indeed the same trend to the extent that his books have been described as 'printed manuscripts', because much of their visual lexicon was inspired by the Islamic manuscript tradition; see Yasemin Gencer, 'İbrahim Müteferrika and the Age of the Printed Manuscript', in *The Islamic Manuscript Tradition: Ten Centuries of Book Arts in Indiana University Collections*, edited by Christiane Gruber (Bloomington and Indianapolis: Indiana University press, 2010), 154–93. See also Ekmeleddin İhsanoğlu and Hatice Aynur, 'The Birth of the Tradition of Printed Books in the Ottoman Empire'.

faithful imitations of handwriting in printing (e.g. the Gutenberg Bible), was not reflected in their approach to Arabic texts.¹⁵ This fact, combined with the intrinsic limitations of a technology that was ill-suited to meet the requirements of the Arabic script, created products that could not meet the high standard of manuscripts.¹⁶ As historian Orlin Sabev observed, for the Ottomans 'printing did not seem a satisfactory alternative to manuscript copying'; therefore, in the seventeenth-century Ottoman world, printing did not receive any serious attention because they 'did not feel a crucial need' for it.¹⁷ On the other hand, the success of lithography two centuries later as the preferred printing technology¹⁸ rests precisely in the fact that it supplied the Muslim world with products that looked exactly like manuscripts, including the visual appearance of the script:

Lithography enabled the calligraphic traditions of Arabic to be fully accommodated in print, something typography could never achieve. Lithography made possible the paradox of the 'mass-produced manuscript' which met the criteria of cultural authority which the typeset text could not.¹⁹

Islamic calligraphy had already reached the peak of its development long before the first Arabic printed types were produced in Europe. Moreover, calligraphy carried a lasting and significant legacy for the Arabic script, besides a fully developed rule-based system and codified letterforms. However, both these elements were not faithfully reproduced in early Arabic typography, contributing to widening the gap between the written and printed appearance of the script. The Latin script developed differently: for the so-called Gothic styles, calligraphy had also codified the letterforms before the arrival of printing but, contrary to Arabic, had a substantial influence on the typographic forms. On the other hand, the Roman type developed in greater autonomy from the calligraphic models, after the early years (i.e. the 1470s), mainly because the humanistic script was still in development when movable type arrived in Italy, and its features were not strongly codified yet. Interestingly, the Roman printed characters eventually influenced the humanistic hand, contrib-

Transition from Manuscript to Print (1729-1848)', *Archivum Ottomanicum* 24 (2007): 165-96.

15. Or, perhaps, it should be said it was not reflected in their results, but the approach may have been earnest. Some of the examples discussed in this thesis show great efforts, however, limited by knowledge and technology.
16. As already mentioned in Chapter 3, from a technological point of view, movable types were more suited to the Latin script than Arabic. Amongst other reasons, the former relies much less on contextual variants that, on the other hand, are indispensable in Arabic for the formation of words according to manuscript practice.
17. Sabev, 'Waiting for Godot', 111.
18. From 1820 onwards amongst the Muslim communities of India and Southeast Asia first, and later in other parts of the Muslim world, notably Iran, for the reproduction of the *nasta'liq* style, see Shaw, 'Non-Latin Scripts and Printing Technologies', 24 and Roper, 'Arabic Incunabula', 21. Lithography was invented in Germany by Alois Senefelder in 1798.
19. Shaw, 'Non-Latin Scripts and Printing Technologies', 24. Moreover, promoting traditional calligraphy as a method of producing books, the advent of the lithographic printing process was a not so much a threat to the calligraphers' profession as typography but rather 'a confirmation of their field of work' that contributed to its vitality. By generating new work, calligraphers could continue to make a living with their craft by being employed at lithography presses, see Ulrich Marzolph, 'Early Printing History in Iran (1817 – ca.1900). Part I: Printed Manuscript', in *Middle Eastern Languages and the Print Revolution: A Cross-Cultural Encounter: A Catalogue and Companion to the Exhibition* (Westhofen: WVA-Verlag Skulima, 2002), 263. Besides offering advantages, lithography is described as the ideal invention for the Muslim countries because it did not break with the past, Demeersemann, 'Une Étage Important De La Culture Islamique', 363. See also Gdoura, *Le Début De L'imprimerie Arabe*, 240–42.

uting to its reaching uniformity in the shape of the letters at the beginning of the sixteenth century.²⁰

It goes without saying that the transition from scribal to print culture in the Islamic world took place gradually, and involved numerous cultural and social implications – besides political and economic aspects – that have been discussed by various scholars and whose detailed account goes beyond the scope of this study.²¹ It is worth, however, touching upon some of the main reasons that have been cited to explain the delay for the introduction of printing amongst Muslims, to understand the context in which the first European Arabic printed books were received before the local presses started producing their own. Firstly, a barrier to the adoption of printing was the production of books being traditionally in the hands of professional scribes that intended to protect their livelihood against the potential threat of printed books. The opposition came particularly from the elite group of the *ulamā*, who formed part of the religious and scholarly establishment and held the monopoly of knowledge.²² Taking away from them manuscript production (and reproduction of the script) to make way for book printing (and type-making) had a greater impact than the mere transmission of texts with a different medium. The development of a new print culture served indeed to create a new approach to the selection, writing and presentation of texts, triggering processes that in turn led to a cultural revival (*nahḍah*) and to nationalists political movements.²³

Moreover, the preservation and transmission of texts was of paramount importance in the scribal culture and had critical implications particularly concerning the corruption of texts. As Roper noted, the maintenance of accuracy was a problem of manuscript text reproduction because copyists were always fallible, however well-educated and trained.²⁴ Nonetheless, historian Mushin Mahdi observed how scholars and scribes in the Islamic world had proven 'seriousness and persistence' to reach and maintain standards of accuracy, particularly for the preservation and transmission of the most important text, the Qur'ān. On the other hand, the 'disturbing manner in which European printers took liberties with the text of the Koran' proved that these standards could not be assured in printed books, especially when printing was done outside the Islamic world.²⁵ European printers had indeed limited language and script knowledge and, as discussed, a shortage of reliable expertise that could compensate for their shortcomings. Furthermore, Roper adds that the printed book 'came to have the authority and finality only the author's copy could

20. J. R. Abbey and Albinia C. De la Mare, *The Italian Manuscripts in the Library of Major J. R. Abbey* (London: Faber, 1969), xxii.

21. Only to cite some: Mushin Mahdi, Geoffrey Roper and George N. Atiyeh's essays in *The Book in the Islamic World* (Albany: State University of New York Press, 1995), Sabev's essay 'Waiting for Godot' and Demeersemann's article 'Les Données De La Controverse Autour Du Problème De L'imprimerie' in two parts (*IBLA* 65 (1954): 1–48 and *IBLA* 66 (1954): 113–40). See also Gdoura, *Le Début De L'imprimerie Arabe* and the recent Auji's *Printing Arab Modernity*.

22. Roper, 'Arabic Incunabula', 19 and from the same author 'Fāris al-Shidyāq and the Transition from Scribal to Print Culture in the Middle East', in *The Book in the Islamic World: The Written Word and Communication in the Middle East*, edited by George N. Atiyeh (Albany: State University of New York Press, 1995), 209.

23. *Ibid.*, 210.

24. Roper, 'The History of the Book in the Muslim World', 536.

25. Mushin Mahdi. 'From the Manuscript Age to the Age of Printed books', in *The Book in the Islamic World: The Written Word and Communication in the Middle East*, edited by George N. Atiyeh (Albany: State University of New York Press, 1995), 1, 4.

have claimed in the manuscript age':²⁶ this was an evident problem for corrupted texts, which with printing would reproduce faults and errors and distribute them on a large scale. It is not surprising that all these factors 'raised doubts among Muslims regarding the virtues of printing when they first came in contact with the new technology',²⁷ and that the debate in the Ottoman Empire ahead of the formal introduction of Arabic printing – following the decree of Ahmād III in 1727 – initially settled on a compromise that allowed the printing of secular texts only.²⁸ This ban has also been indicated as 'one of the chief reasons for the slow spread and acceptance of the printing industry in the Islamic world', especially considering that in Europe the production of religious works had popularised printing.²⁹ Lastly, issues relating to education and historical literacy rates in Middle-Eastern societies amongst ordinary people should be considered as factors behind the marginal interest in printed books, but also in the wider discussion regarding the reception and acceptance of Arabic typography and its readership.³⁰

Having discussed hitherto different aspects of the delay and Muslim reluctance to embrace typographic printing, it seems timely to separately address the reason for their rejection of the early European Arabic printed books that found their way to the Middle East. According to Thomas Milo,³¹ the Ottomans saw no value in those books, not only for the obvious underwhelming appearance of the Arabic typographic forms but also because these were unreadable to them.³² On the other hand, the Arab Christians accepted the European products – primarily addressed to them – because they could not find faults or objections to a script that they essentially did not know. European Arabic types felt to the eye of the Muslim Arabic readers like 'bad handwriting', missing all the ingredients to make 'Arabic look like Arabic'.³³ Those ingredients – previously collectively termed as the script's rule-based system – are essential for the shaping and composition of Arabic letterforms and are accordingly an uncompromisable feature. Not understanding the nature of the script – and overall not investing enough resources 'to get it right' – European typographers did not grasp the essence of the system, producing inadequate results that 'deviated too much from the expected patterns to be acceptable'.³⁴

26. Ibid., 11.

27. Ibid., 1.

28. İbrahim Müteferrika's pledge to advocate the utility of printing is discussed in § 8.3.1.

29. Eleazar Birnbaum, Virginia H. Aksan, Michael McCaffrey, and Noha Sadek, *From Manuscript to Printed Book in the Islamic World: Catalogue of an Exhibition* (Toronto: Thomas Fisher Rare Book Library, 1989), 2.

30. See, for instance, Auji's *Printing Arab Modernity*, 35 and Gdoura, *Le Début De L'imprimerie Arabe*, 179, cited in § 8.3.1, note 62.

31. From a personal conversation with the author, 28 March 2015, Amsterdam.

32. The script did not look like the *nash* and *nasta'liq* styles they were accustomed to for book reading. On the contrary, it can be argued that for the Latin script printing helped legibility and that 'people soon came to prefer printed texts which were more readable and accurate than the older manuscripts', see Febvre and Martin, *The Coming of the Book*, 77.

33. Thomas Milo, from a personal conversation with the author, 28 March 2015, Amsterdam.

34. Ibid. These issues worsened due to the lack of expertise and to the unsuitable technology, as already discussed. On the basis of these considerations, Milo also points out that the often-raised argument that Muslims' arrogance was at the root of their rejection of the European works is untruthful. Ottomans encouraged the collaboration of expertise between Western typographers and Muslims to make Arabic types, like that of Armenian Poghos Arapian with the calligrapher Deli Osman, see § 9.1.1.

The poor typographic quality of the European Arabic printed books – both in form and content due to the orthographical and grammatical errors – appears to be the reason behind their low demand and sales in the Middle East, despite being cheaper than their manuscript counterparts.³⁵ This is partially testified by the French Orientalist Antoine Galland³⁶ and by the Director of the Cairo School of Medicine, M.A. Perron, who wrote in 1843 that amongst the Arabic characters made in Europe:

On ne trouve bien que le petit caractère arabe de l'Imprimerie Royale de France (...) tous les autres son jugés détestables sans grâce, leur seul aspect fait souvent refuser d'acheter les livres arabes imprimés en Europe.³⁷

These arguments were also raised by İbrahim Müteferrika in the treatise submitted to the grand vizier to promote the project of a printing press to cater for the Muslim audience.³⁸ The Arabic foundry types produced in Europe embodied – with sporadic exceptions – the Western typographers' drive to change the Arabic script because it was 'inconvenient' to handle in the typographic environment.³⁹ This attitude towards the script was reflected in the numerous attempts to find technical solutions that could facilitate either the type-making process or the typographic composition, as discussed with the analysis of types in previous chapters and as stated – and illustrated – by William Wright in his well-known grammar (Figure 8.1).⁴⁰

Having covered a large part of the European production of Arabic foundry types, it seems timely to investigate how the local type-makers tackled the typographic adaptation of the Arabic script in the Middle East, and to analyse its typographic development in those regions with selected case-studies.

35. 'Generally speaking, a printed book cost only a tenth of the price demanded for a manuscript or, viewed from another perspective, by using printing methods it was possible to produce ten times more copies of a text than by using manuscript techniques, although the same sum of money and less time were spent', Reinhard Schulze, 'The Birth of Tradition and Modernity in 18th and 19th Century Islamic Culture – the Case of Printing', in *Culture & History* 16 (Oslo: Scandinavian University Press, 1997), 43.

36. With regard to the unsold copy of the *Avicenna* book of the *Typographia Medicea* in a bookshop in Istanbul, as mentioned in § 6.1.2. See also Sabev, 'Waiting for Godot', 108–09.

37. 'Only the small Arabic character of the Imprimerie Royal of France can be considered good (...) all the others are deemed detestable without grace, their appearance alone makes often refusing to buy the Arabic books printed in Europe', approximate translation by the author from M.A. Perron, 'Lettre Sur Les Écoles Et L'imprimerie Du Pacha D'Égypte, Par M.A. Perron', *Journal Asiatique* 4, II (1843): 19.

38. This is discussed in greater depth in § 8.3.1.

39. It could be argued that this approach has not changed in the hot-metal or digital environment that has produced many 'simplified' Arabic typefaces.

40. William Wright, *A Grammar of the Arabic Language*, 3rd ed. (Cambridge: Cambridge University Press, 1967). I am indebted to Thomas Milo for pointing out this source. He has also previously raised and discussed the issue of Arabic's inconvenience for typographers in conferences (e.g. ATypI 2013 and Granshan 2015) and printed articles such as 'Arabisch – Lastig Voor Drukkers. Schrift Op Het Scherp Van De Snede', *De Gids* 6 (2012): 6–7.

8.2 Christians printing Arabic in 18th-century Syria and Lebanon: pioneers

8.2.1 The Byzantine Orthodox press of Athanasius Dabbās

The first printing house of the Arab world that printed in Arabic was set up in Aleppo in 1706 by Athanāsiyūs al-Dabbās (Athanasius Dabbās), the leading representative of the local Byzantine Orthodox Congregation.¹ This city of Ottoman Syria was – until the seventeenth century – the main market of all the Levant, superior in importance to Alexandria and Istanbul,² and had become a significant cultural and trading centre. Following different interests, various European diplomats, scholars, merchants and missionaries had converged in Aleppo for the benefit – amongst others – of the Christian minorities, which at the time amounted to one-quarter of the city's estimated population of 200,000 people.³ The import of European Arabic books – that had found in Aleppo an interested readership – had indeed spurred the local initiative of the Melkites to start printing, having recognised the advantages of the printed editions over the manuscripts.⁴ Furthermore, in the seventeenth century, the Melkite Church had replaced Syriac with Arabic as its liturgical language, thus eventually increasing the need for Arabic printed text in their community.⁵

The Aleppo Press was active between 1706 and 1711, printing a total of ten books with Arabic types.⁶ The reasons for its closure are uncertain – but most likely attributable to the lack of financial support⁷ – and some scholars' hypotheses about later editions attributable to the Press have been dismissed.⁸ All the books printed at the Aleppo Press were of a religious nature, either on liturgy or asceticism, intended for the use of the Melkite Church.⁹

For the same purpose, prior to the founding of the press in Aleppo, Athanasius Dabbās had carried out the printing of two other liturgical books in Arabic, thanks to the support and financial contribution of the Voivode of Walachia Constantin Brâncoveanu.¹⁰ These editions were printed in 1701 (a *Liturgicon*) and in 1702 (a

1. Also referred to as Melkite or Greek Orthodox. Dabbās was also Patriarch of Antioch between 1685–1694 and 1720–1724, and spent his life alternating between being Catholic and Orthodox. See Gdoura, *Le Début De L'imprimerie Arabe*, 135.

2. Ibid., 125.

3. Roper and Glass, 'Arabic Book and Newspaper Printing in the Arab World', 178.

4. Especially regarding the text alteration due to errors introduced by negligent copyists, and their expensive price beyond the means of the Syrian Melkite priests. See Gdoura, *Le Début De L'imprimerie Arabe*, 144 and Ioana Feodorov, 'Beginnings of Arabic Printing in Ottoman Syria (1706–1711). The Romanians' Part in Athanasius Dabbās's Achievements', in *ARAM* 25, no. 1&2 (2013): 239.

5. Gdoura, *Le Début De L'imprimerie Arabe*, 127.

6. Two of them are re-editions. For the complete list see Nasrallah, *L'imprimerie Au Liban*, 23–25.

7. The initial funding came from the Prince of Walachia Constantin Brâncoveanu. Other contributions came over the years from rich Christian Melkites and other pious foundations, Gdoura, *Le Début De L'imprimerie Arabe*, 140 and Feodorov, 'Beginnings of Arabic Printing': 243.

8. Gdoura, *Le Début De L'imprimerie Arabe*, 150–52.

9. The books were freely distributed to the clergy, who in return would read them to the illiterate community of faithful. Besides the pastoral role, the books also served for education: the Aleppo *Psalter* was indeed used to teach Arabic to the children, Gdoura, *Le Début De L'imprimerie Arabe*, 148–49.

10. The Greek Melkite Christian community of Aleppo capitalised on their close relationship with the

Horologion) in the monastery of Snagov, near Bucharest, by Anthim the Iberian.¹¹ Despite the name, the latter was a Georgian monk, typographer and skilled engraver; he had also taken on the design of the Arabic types, admittedly without having knowledge of the language.¹²

The scholar Joseph Nasrallah reported that the Aleppo Press used three Arabic types:¹³ the first (AD1), 'grèles et fluets, sans beauté'¹⁴ were used for the first works of 1706, the *Psalter*¹⁵ (Figure 8.2, Appendix 114) and the *Gospels*,¹⁶ plus two works in 1708.¹⁷ The other two Arabic types (AD2 and AD3) 'sont plus ressemblants à l'écriture nashi en usage chez les copistes chrétiens de Syrie':¹⁸ they are used in the editions of 1707,¹⁹ 1711 (Figure 8.3, Appendix 115),²⁰ and in the preface of the *Gospels* of 1708.²¹ The designated types are employed to set the main text and are the object of analysis. Larger Arabic characters appear in the books of the Aleppo Press' to set titles; these are carved in woodblocks and are not further discussed.

It has already been established by other studies that the Arabic typeface of the Aleppo Psalter is different from that used in the Romanian *Horologion* (Appendix 116), contrary to the initial supposition of some scholars: 'Les caractères de Snagov sont grèles tandis que ceux d'Alep sont plus fins, marquant ainsi une certaine évolution'.²² Nonetheless, the two types are so closely related to appear the same at a first glance or to the inexpert eye. A definite answer as to whether the Aleppo Arabic types were manufactured in Aleppo or in Snagov (or Bucharest) is yet to be given. While some scholars have supported the idea that Anthim the Iberian was also the

Melkites of Romania (sharing the same religion and being both under the Ottoman rule), as they did not have the sufficient financial resources nor the experience to print books in Syria. Gdoura, *Le Début De L'imprimerie Arabe*, 137.

11. Also known as Antim Ivireanul in Romanian, and Anthime d'Ivir in French.
12. Gdoura, *Le Début De L'imprimerie Arabe*, 136 and Feodorov, 'Beginnings of Arabic Printing': 239–40.
13. Nasrallah used the expression 'trois sortes de caractères', meaning three different types, without any specification about the type size, Nasrallah, *L'imprimerie Au Liban*, 21. On the other hand, Gdoura mentioned 'trois corps de caractères' suggesting that they had different sizes, Gdoura, *Le Début De L'imprimerie Arabe*, 142.
14. 'Spindly and slender, without beauty', approximate translation by the author from Nasrallah, *L'imprimerie Au Liban*, 21.
15. *Kitāb Az-Zabūr Ash-Sharīf* [...] *Wayatlūh 'Ashar Tasābīh* (*Psalter*), Aleppo, 1706, CUL [7828.c.5]
16. *Kitāb Al-Injil Al-Sharīf Al-Tāhir Wa-L-Miṣbāḥ Al-Munīr Al-Zāhir*, Aleppo, 1706.
17. The *Livre des Prophéties* and the *Épistolier*, see Nasrallah, *L'imprimerie Au Liban*, 21, 25.
18. 'Are more resembling the nashi script used by the Syrian Christian copyists', approximate translation by the author from Nasrallah, *L'imprimerie Au Liban*, 21. In relation to this, Gdoura (*Le Début De L'imprimerie Arabe*, 144) added that 'Abdallāh az-Zāhir – possibly the type-maker of the Aleppo types, see below – copied the nashī handwriting of a Christian copyist of the Lubbad family from the Syrian city of Hama. It is not clear if he referred here to the Arabic types of Aleppo or those that Zāhir later made for the press of aš-Šuwayr (see § 8.2.2). It was not possible at this time to identify these Syrian handwritten models and compare them with the typographic forms of both the Aleppo and aš-Šuwayr types to further verify Gdoura's statement.
19. The *Kitāb ad-Durr al-Muntaḥab*, see Nasrallah, *L'imprimerie Au Liban*, 23.
20. The *Homélies D'Athanase, Patriarche De Jérusalem*, the *Paracletique*, and the *Traité Sur La Confession*, see Nasrallah, *L'imprimerie Au Liban*, 21, 25.
21. Ibid., 21. According to Nasrallah, the main text of this work is printed with other types similar to those of the second group.
22. 'The characters of Snagov are spindly while those of Alep are finer, marking a certain evolution' approximate translation by the author, Gdoura, *Le Début De L'imprimerie Arabe*, 140–41. See also Feodorov, 'Beginnings of Arabic Printing': 245–46.

type-maker of the Aleppo types,²³ others have excluded his involvement: according to Gdoura, the Aleppo Arabic types were of better quality than those from Snagov and it is unlikely that he could have improved on his earlier work. Moreover, in 1705 he had left Bucharest to become Bishop of Râmnic, to where he had also moved the printing shop.²⁴

It is possible, however, that the Aleppo Arabic types were modelled on those from Snagov, perhaps copied in Syria by local goldsmiths under the supervision of Dabbās,²⁵ or by expert Romanian typographers who arrived in Aleppo together with the typographic material imported from Bucharest.²⁶ A closer inspection shows indeed the influence of the Snagov's Arabic on the AD1 type: besides the verticality, the low contrast, the shaping of many letterforms (e.g. alif, final hā', final lām-alif, ġim group) and the mixture of styles, the types also share the inconsistency in the correct implementation of the script rules (Figure 8.4). It goes without saying that many of these features were not only common to other European Arabic types, but that by the eighteenth century they had become standard conventions of Arabic typography, and thus were frequently replicated. Moreover, as previously mentioned, various European Arabic printed books circulated in the territories of the Eastern Churches and were available to Arab Christians communities, like the Melkites. It is important to note, however, that these features could be also easily found in manuscripts, especially in those produced by authors with little or no competence of Arabic (i.e. the level of technical skills, language and script expertise). It would not be surprising, therefore, if the Aleppo types (AD2 and AD3 according to Nasrallah) were influenced by handwritten models of Christian Arab copyists, who were likely to reproduce the script oblivious of several script requirements according to calligraphic practice.

Nonetheless, the European influence on the overall appearance and structure of the Aleppo types is evident, and their significance in the development of Arabic typography is purely historical. Nonetheless, the analysis of the AD1 type has highlighted two additional elements worth mentioning. Firstly, whereas both pairs of variants of the ġim letter group in medial and final position in AD1 seem to also directly match and derive from those in Snagov's *Horologion*, one of them is used differently, echoing a similar use in Granjon's first Arabic type used in the *Kitāb Al-Bustān* (Figure 8.5).²⁷ There is also another detail that links AD1 directly with Granjon's work: the letter kāf in initial position has a variant with a detached flag. This flag appears with and without a final hook (as also seen in Granjon), although in AD1 it is represented upside down, pointing upwards (Figure 8.6).²⁸

The AD2 and AD3 types, which appear to be different point sizes of the same typeface, show an improved design compared to the earlier type of the Aleppo Press. Whereas the low contrast of AD1 echoes the trait produced by a pointed nib, the

23. Ibid., 244–45.

24. Gdoura, *Le Début De L'imprimerie Arabe*, 141.

25. It has been suggested that Dabbās received the Snagov Arabic types (possibly incomplete) and the press as gifts: in support of these thesis there is also the fact that the Snagov printing house closed in 1702 and never printed in Arabic again. Gdoura, *Le Début De L'imprimerie Arabe*, 138, 142 note 94 and Feodorov, 'Beginnings of Arabic Printing': 242.

26. See Basile Aggoula, 'Le Livre Libanais De 1585 À 1900', in *Le Livre Et Le Liban Jusqu'à 1900: Exposition*, edited by Camille Aboussouan, 111–16 (Paris: Unesco, 1982), 301.

27. It should be noted that also the design of the second pair of the ġim group variants in AD1 can be traced back to Granjon's Arabic types.

28. As previously said, the downward hook at the end of the flag of the kāf letter is a feature of the *ṭulut* style, which was incorrectly incorporated in the *nash* style in European Arabic types.

higher contrast that can be appreciated particularly in the larger sized AD3 type suggests more attention in reproducing the stroke modulation of the slanted nib.

Nonetheless, the AD3 type maintains some elements already seen in the AD1 type, like the shaping of some characters, the use of the straight kashida extension for justification, and certain ligatures that possibly reproduce the handwriting of the previously mentioned Syrian copyists (Figure 8.7). On the other hand, the AD3 type appears to have overall closer resemblance with the Arabic type used by 'Abdallāh az-Zāhir in the press of aš-Šuwayr.²⁹ This consideration reinforces the hypothesis of a common punch-cutter for the two types, and a closer analysis suggests the hypothesis that the design concept of the AD3 typeface was later developed into a new type (AZ) for the Lebanese press. Besides the higher contrast and some letterforms (Figure 8.8), the AD3 and AZ types share other significant features like the use of 'peak' ending character variants – in addition to the straight-ending default design – and the curved connectors used as teeth characters by adding dots (Figure 8.9). These elements are critical to support the argument of a common design concept and punch-cutter: they appear in AD3 first and were later also adopted in the AZ type.³⁰ Finally, it is important to highlight the shaping of the ܓ ܡ ܠ ܗ ܂ ܂ ܂ letter group in the AD3 type, which shares common features with both the AD1 and AZ types (Figure 8.10). For all these reasons it seems fitting to describe the AD3 type as a hybrid between the AD1 and AZ types: its analysis has indeed provided more elements that connect the Arabic type production of the Aleppo Press with that of aš-Šuwayr.

The previously mentioned hypothesis that the Aleppo types were manufactured in Aleppo is primarily based on the figure of the Syrian 'Abdallāh az-Zāhir,³¹ a skilled goldsmith and Dabbās' assistant in the Aleppo Press. His role in the creation of the Aleppo Press has been variously defined and reassessed. The claims that he was the sole maker of all the types and tools for the Aleppo Press without any external assistance has been more or less dismissed as unlikely and as an exaggeration of Zāhir's disciple in writing the biography of his teacher.³² It seems more realistic that Zāhir worked in a team: according to Gdoura, the Aleppo Arabic types resulted indeed from a shared effort of a group of goldsmiths supervised by Dabbās.³³ The historian Basile Aggoula reduced the role of Zāhir to that of a simple workman; his involvement in the Aleppo printing house is even doubted, considering that there is no mention of it in his autobiography.³⁴

Besides the uncertainties regarding Zāhir's role, it is yet to be clarified if the Aleppo movable types were made of metal or wood. It has been suggested that for lack of money and experience, Zāhir cut them in wood: this material was less expensive

29. See below for a more in-depth discussion about this man and his printing press in Lebanon.

30. All these features were originally introduced by Granjon, as discussed in the analysis of AZ in the next section.

31. See § 8.2.2.

32. See Gdoura, *Le Début De L'imprimerie Arabe*, 142 and Aggoula, 'Le Livre Libanais', 301. The author of Zāhir's biography is Yuākim ibn al-Mutrān: the sole manuscript copy is in the Pauliste library in Harissa, Lebanon. It was published for the second time in the journal *Al-Maçarrat*, vol. XXXIV, 1948, 385–97: the French translated text is reported in Joseph Elie Kahale, *Abdallah Zakher El-Halabi. Inventeur De L'Imprimerie Arabe En Orient*, 2nd ed. (Alep, 2016), 43–56.

33. Gdoura, *Le Début De L'imprimerie Arabe*, 142.

34. Aggoula, 'Le Livre Libanais', 301. The existence of this source has been contested, Gdoura, *Le Début De L'imprimerie Arabe*, 154, note 130. There is no mention of an autobiography of Zāhir in Kahale, *Abdallah Zakher El-Halabi*.

than metal, which on the other hand required more sophisticated tools and skills.³⁵ However, until further evidence is uncovered, this remains a hypothesis, which could not be confirmed through the observation of the primary sources (i.e. the Aleppo printed books).

Zāhir eventually interrupted the collaboration with Dabbās due to dogmatic disagreements and moved on to establish the first Arabic printing press in Lebanon, which is introduced below.³⁶

8.2.2 The Catholic press of 'Abdallāh az-Zāhir

The second local printing house of the Middle East was set-up more than twenty years after the closure of the Aleppo Press. In contrary to the first, this was the initiative of a Greek Catholic and resulted in a more lasting venture that, despite a few temporary interruptions, existed for more than 150 years.³⁷

'Abdallāh az-Zāhir was born in Aleppo in 1684 from an Orthodox family, and during his youth, he converted to Catholicism.³⁸ A goldsmith by trade, like his father, Zāhir applied his skills in other fields like engraving, watchmaking and painting; he translated and composed various works – only a part of which was printed – and worked as a copyist for the Patriarch Dabbās.³⁹ In Aleppo he also received his education; he learned to write and read Arabic and learned literary Arabic with Muslim scholars.⁴⁰ After few years of collaboration at the Aleppo Press, his relationship with Dabbās degenerated from 1720, after the latter pronounced himself against Catholicism. In the controversy between Catholics and the Orthodox – that became violent in the first part of the eighteenth century – Zāhir became the 'champion of Catholicism',⁴¹ publishing various polemic works against Orthodoxy for which he was eventually persecuted. He left Aleppo in 1722 and initially found refuge in the monastery of St. Jean of aš-Šuwayr⁴² that housed the Greek Catholic Congregation of the Basilians. He spent the next few years moving around different monasteries, one of which was in the village of Zouk Mikael.⁴³ Here he allegedly started working on the materials for a printing press that would allow him to produce and spread his re-

35. Gdoura, *Le Début De L'imprimerie Arabe*, 144.

36. Another Arabic printing press (Imprimerie de Saint-Georges) was established by the Greek Orthodox community in Beirut: it printed only two books, in 1751 and 1753, reportedly with Arabic types imitating those of aš-Šuwayr (discussed in the next section), see *L'Imprimerie Catholique De Beyrouth Et Son Oeuvre En Orient (1853-1903)* (Bruxelles: Polleunis et Ceuterick, 1903), 11–12 and Nasrallah, *L'imprimerie Au Liban*, 46.

37. Gdoura, *Le Début De L'imprimerie Arabe*, 153.

38. There is discordance in the sources about the biography of Zāhir. The most up-to-date source on this matter is by Kahale, *Abdallah Zakher El-Halabi*, 57–64. According to other sources he was born in Hama in 1680 from Catholic parents and moved to Aleppo in 1701, see Gdoura, *Le Début De L'imprimerie Arabe*, 154.

39. Kahale, *Abdallah Zakher El-Halabi*, 62.

40. Gdoura, *Le Début De L'imprimerie Arabe*, 155.

41. Nasrallah, *L'imprimerie Au Liban*, 27.

42. Otherwise known as Dhour El Choueir (also spelt Deir es Šueir, Dair Shuair or Alchouir); the location of aš-Šuwayr is variously spelt in the sources as Šuwaïr, Shuair or Šueir. The Greek Catholic monastery of Saint John the Baptist is situated in Mount Lebanon, near Khenchara. Today is still known as the 'Couvent Saint Jean Khonchara' (according to their spelling).

43. Variously spelt in the sources as Zuk-Mikhail or Zük Mikäel.

ligious books.⁴⁴ The press was eventually established in the monastery of aš-Šuwayr, where he returned in 1731 and settled until his death in 1748.

The investigation of the sources leaves uncertainties about the history of the press of aš-Šuwayr (variously designated as Zāhir's Press or the 'Khenchara Press') and the role of its protagonists.⁴⁵ However, historians seem to agree that Zāhir was the sole founder and owner of the Khenchara Press, whereas the involvement of the Jesuits – particularly in the person of the Priest Fromage – was only secondary.⁴⁶ According to the most likely hypothesis found in the sources, Zāhir used the experience acquired while working in Aleppo to establish the press in aš-Šuwayr, and used his skills as a goldsmith to prepare the punches, the matrices and cast the new Arabic types.⁴⁷ At the Khenchara Press, he used the materials prepared in Zouk Mikael, additional instruments imported from the workshop in Aleppo and printed with a press sent from Europe (possibly France).⁴⁸ Zāhir did not work alone: he used another goldsmith whilst in Zouk Mikael,⁴⁹ and the novice priest Yuākim ibn al-Mutrān helped him when he first arrived in aš-Šuwayr.⁵⁰ Suleīmān Qatṭān became his disciple and successor and, in accordance with Zāhir's will, took on the direction of the press after his death in 1748.⁵¹ At his own expense, Qatṭān also renovated some instruments of the workshop and refreshed the Arabic characters, but came into conflict with the Congregation that accused him of deliberately destroying the materials of the foundry in 1765, which caused the interruption of printing activity at the Khenchara Press for two years.⁵² In 1776 the team working in the press counted six Basilian Fathers, three of which were printers, two compositors and one type-founder. In 1784 the number of people employed in the press decreased to four as reported by the French traveller Volney who spent, in that year, eight months in the monastery. The press was closed again between 1797 and 1802: the slow manual composition of the Arabic types affected the production of books; on the other hand, the sales of books were low against the considerable expenses required to run the press, particularly for the purchase of paper from Europe.⁵³ The Khenchara Press closed eventually in 1899 unable to withstand the competition of modern presses, having printed a total of 69 works, 36 of which were re-editions.⁵⁴

Despite starting operation in 1733, the press published its first book in 1734: it was the *Mizān Az-Zamān*, Arabic translation of a treatise written by the Spanish Jesuit

44. Nasrallah, *L'imprimerie Au Liban*, 30.

45. The most important sources are collected in Aggoula, 'Le Livre Libanais', note 39, 317–19. An autobiography of Zāhir has also been used by scholars as a source of information, however, the existence of this document has been contested, see Gdoura, *Le Début De L'imprimerie Arabe*, 154, note 130.

46. For instance, for the collection of financial resources for the press in the form of donations, Gdoura, *Le Début De L'imprimerie Arabe*, 161–62. Eventually, also the excellent relationship between Zāhir and Fromage turned sour, see Nasrallah, *L'imprimerie Au Liban*, 33–34.

47. Gdoura, *Le Début De L'imprimerie Arabe*, 160.

48. Ibid., 160–61.

49. He helped him and supplied the materials and tools necessary to start the making of the Arabic metal types, Gdoura, *Le Début De L'imprimerie Arabe*, 163 and Nasrallah, *L'imprimerie Au Liban*, 29.

50. Ibid., 30.

51. This was Zāhir's condition to bequeath his typographic material, manuscripts and printed books entirely to Basilian Congregation of the monastery. The text of his will in Arabic is reported in Nasrallah, *L'imprimerie Au Liban*, 145; a French translation is in Kahale, *Abdallah Zakher El-Halabi*, 105–06.

52. Gdoura, *Le Début De L'imprimerie Arabe*, 164. Nasrallah reports that he was accused of destroying the matrices to cast the types, see *L'imprimerie Au Liban*, 36.

53. Gdoura, *Le Début De L'imprimerie Arabe*, 164 and Constantin-François Volney, *Voyage En Syrie Et Égypte Pendant Les Années 1783, 84 Et 85*, 4th ed. (Paris: Courcier, 1807), 90.

54. For the complete list see Nasrallah, *L'imprimerie Au Liban*, 37–44.

J.E. Nieremberg, with a print run of 800 copies (Figure 8.11).⁵⁵ The second edition was a Psalter, the *Kitāb Al Mazāmir*, printed the following year; its fifteenth re-edition was the last work published in aš-Šuwayr.⁵⁶ In contrast to the Aleppo Press, the books were not free: the price varied according to the edition but it was moderate to be accessible to all readers.⁵⁷ The Khenchara's editions initially sold well and were reportedly bought even by Zāhir's enemies, who found the Arabic types 'si corrects et si beaux'.⁵⁸ However, after his death, the press started to decline as well as the sales of books with the exception of the Psalter that, with his vocalised text, served both as manual for schools (to teach the Arabic language, to learn reading and writing) and for religious education.⁵⁹ Volney attributed the low sales of books to the Press' choice to print religious editions that did not attract many readers, instead of printing works of practical utility that could awaken the taste of the arts among all the Arabs without distinction.⁶⁰ Besides excluding the Muslim readers, the Khenchara's books also excluded certain communities among the Christian Arabs that were independent of Rome, and therefore not concerned with the subject of some of their editions.⁶¹ It should also be noted that the number of people who could use the books was further reduced by the illiteracy amongst common people: this limited the readership mainly to those in the ecclesiastic circle, including the students of the few schools created by the missionaries.⁶²

Types and surviving typographic material

The attribution of the Khenchara Press' Arabic types to Zāhir has been questioned, mainly due to the striking difference with the Arabic types that he had previously made for the Aleppo press:

Ceux de Šueir trahissent des matrices en acier gravées par des typographes professionnels, c'est-à-dire venus d'Europe. Celle en argent massif signalées par Nasrallah et conservées jusqu'à nos jours à Deir al-Šueir ne peuvent pas préserver longtemps les formes des caractères. Nous préférons accorder à ces matrices une origine européenne. [...] Une chose reste certain: l'origine des premiers caractères arabes de Šueir est Rome.⁶³

In a letter written in 1726, the Jesuit Priest Fromage claimed that he was assembling the various pieces of a press, for which he had ordered the making of Arabic types similar to those in use at the Propaganda Press in Rome, mentioning as well the forthcoming arrival of skilled typographers.⁶⁴ In this regard, Gdoura specified that the European typographers (from Rome) would have made the Arabic types in Syria,

55. Ibid., 30.

56. Three other books of the of the Khenchara Press are shown in Appendix 117 and Appendix 118.

57. Gdoura, *Le Début De L'imprimerie Arabe*, 175–76.

58. 'So correct and beautiful', approximate translation by the author, from Volney, *Voyage En Syrie Et Égypte*, 89.

59. Gdoura, *Le Début De L'imprimerie Arabe*, 172–73, 177.

60. Volney, *Voyage En Syrie Et Égypte*, 90.

61. Gdoura, *Le Début De L'imprimerie Arabe*, 180.

62. Ibid., 179.

63. 'Those of Šueir reveal steel matrices engraved [struck] by professional typographers, that is to say from Europe. Those in solid silver reported by Nasrallah and conserved to the present day at Deir al-Šueir cannot preserve for long the forms of the characters. We prefer to give these matrices a European origin. [...] One thing remains certain: the origin of the first Arabic characters of Šueir is Rome', approximate translation by the author from Aggoula, 'Le Livre Libanais', 306.

64. See the original source *Lettre Du Père Fromage À Truithillier*, reported in Aggoula, 'Le Livre Libanais', 318–19.

rather than importing them ready-made, as differently interpreted in other sources.⁶⁵ However, Fromages' sources are contradictory: in a different letter, he attributed the founding of the printing shop to Zāhir, reserving for himself the role of collecting funds from his European contacts, with no other mention regarding the typographic material.⁶⁶

Although doubts may remain regarding the attribution of the aš-Šuwayr's Arabic types until new evidence becomes available, it seems certain that they were influenced or based on European models. Whilst being in accordance that Zāhir did not base his new Arabic types on those he had made in Aleppo, the sources discordantly report on the models that he might have used. Nasrallah stated that Zāhir modelled his new types 'sur ceux de l'Imprimerie de la Propagande, qui ressemblaient davantage à l'écriture *kanasi* (ecclesiastique), employée par les copistes dans la transcription des livres liturgiques'.⁶⁷ On the other hand, Gdoura reported this statement slightly differently, suggesting that Zāhir cut his new types 'prenant pour modèle l'écriture *kanasi* faite par un copiste de la famille des Lubbad. Les types grêles d'Alep furent délaissés pour de nouveaux plus fins et plus perfectionnés'.⁶⁸ In the same source, Gdoura had previously reported that Zāhir and his team 'ont copié les jolis modèles de l'écriture *naskh* faits par un copyist chrétien de la famille de Lubbad de Hama',⁶⁹ seemingly referring to the Aleppo Arabic types and not the Arabic types of aš-Šuwayr. This statement seems to reinforce Nasrallah's assertion that the AD2 and AD3 Aleppo types resembled the *nashī* script used by the Syrian Christian copyists.⁷⁰

Some sources⁷¹ mention that two Arabic typefaces were used in the books printed at the Khenchara Press, one for the text setting and one larger and bolder size for the titles (see Figure 8.11). However, this might be misleading. The typeface used for text setting (AZ) is the only movable metal type used at the Khenchara Press that, for this reason, is the focus of the analysis in this study. The larger sized Arabic characters are engraved on blocks of either wood or metal (of varying thickness, see Appendix 119). There are also titles in a different style, on thinner metal plates attached to wooden blocks to reach type-height, seemingly obtained with a different technique, discussed briefly (Appendix 120). Because the large Arabic characters exist in different sizes, weights and styles, it does not seem appropriate to group them as belonging to one and the same display typeface (Figure 8.12).

The surviving material of the Khenchara Press is still exhibited in its original location in the Monastery of St. Jean.⁷² Besides all the tools for printing and type-mak-

65. By the French traveller De La Roque, see Gdoura, *Le Début De L'imprimerie Arabe*, 158.

66. Ibid.

67. 'On those of the Propaganda Press, which resembled more the *kanasi* writing (ecclesiastical), used by copyists in the transcription of liturgical books', approximate translation by the author from Nasrallah, *L'imprimerie Au Liban*, 29.

68. 'Taking as a model the *kanasi* writing made by a copyist of the Lubbad family. The slender types of Aleppo were abandoned for some new and more sophisticated ones', approximate translation by the author from Gdoura, *Le Début De L'imprimerie Arabe*, 163.

69. 'Have copied the pretty models of *naskh* writing made by a Christian copyist of the Lubbad family of Hama', approximate translation by the author from Gdoura, *Le Début De L'imprimerie Arabe*, 144.

70. See § 8.2.1. In this regard Roper reports that the Syrian and Lebanese Christians used types 'modelled partly on local Christian bookhands', see 'The History of the Book in the Muslim World', 543.

71. Atiyeh, 'The Book in the Modern Arab World', 237 and Klaus Kreiser, *The Beginnings of Printing in the Near and Middle East: Jews, Christians and Muslims* (Wiesbaden: Harrassowitz in Kommission, 2001), 26.

72. The press consisted of three rooms, one for composition, one for printing and one for type-making and casting, see Gdoura, *Le Début De L'imprimerie Arabe*, 163. Zāhir burial site is also in the nearby

ing and the engraved blocks – not only of Arabic titles, but also of illustrations and decorations for which Zāhir was known – 6 cases of matrices and 2 of punches survive (Appendix 121, Appendix 122) in addition to cast metal type, some of which are arranged on wooden composing tools (Appendix 123). Although it represents a significant testimony to the activity of the Lebanese Press, the study of the movable type-related material is particularly compromised by the deteriorating conditions and the display in a museum-like setting that hinders a closer inspection.

The material is also instrumental for uncovering some of the printing techniques used at the Khenchara Press: it appears indeed that books were printed from letterpress plates, either in addition to or replacing the standard method of printing directly from movable type composed forms. The Lebanese Press' museum displays four whole-page letterpress plates of the *Kitāb Tafsīr Sab'at Masmūrāt At Tawbat* (Psalms) printed in 1753 (Figure 8.13);⁷³ it is not clear if more plates of the same or other books survive. The letterpress metal plates are mounted on wood blocks to bring them to type-height for printing: it appears that these are made either by shallow casting (e.g. with a papier-mâché negative)⁷⁴ or etching. The surface of the page-plate looks rough, either paper or eaten away as if by acid and not scratched by a burin, which excludes engraving (Appendix 124).⁷⁵

Regardless of the technique used – that requires further research to determine – it seems clear that the letterpress plates were obtained from movable type composed pages because they reproduce the AZ text typeface used for all the other editions. While adding a significant amount of work for preparation, they were perhaps preferred because they could be stored for future reprints of the same editions, although this does not seem to be the case for the Psalms book.⁷⁶ It is also possible that making plates contributed to overcoming the shortage of cast metal type that could be kept in composed forms until the book completion, especially if more books were prepared contemporaneously.

Concerning the Arabic characters of the Khenchara Press, whether or not Zāhir made them, the AK type shows much more refined typeforms than those used in Aleppo and a more confident design, particularly in the handling of the stroke contrast (Figure 8.14). Regarding the previously mentioned relationship with the European Arabic types of the Propaganda pointed out in some sources, it should be said that the AK type is visually closer to the type appeared in the *Grammatica Arabica* of 1631 (SCPF2)⁷⁷ than the type of the Bible (SCPF1).⁷⁸ Furthermore, it appears that the AK type shares even more common ground with Savary's types (SDB2

chapel. The material of the Khenchara Press from the Monastère St. Jean, MSJK, was photographed by the author on the 13 July 2016.

73. 'Livre du Commentaire des sept Psaumes du Prophète David', entitled 'Psaumes de la Pénitence', see Nasrallah, *L'imprimerie Au Liban*, 39.
74. Stereotype (also known as a cliché, stereoplate or simply a stereo) is a printing plate which is a duplicate of a typesetting or engraving, used for printing instead of the original. It is defined as 'the method or process of printing in which a solid plate of type-metal, cast from a papier-mâché or plaster mould taken from the surface of a forme of type, is used for printing from instead of the forme itself', from *Oxford English Dictionary*, 1st ed. Vol.9, part 1 (Oxford: Clarendon Press, 1919), 925.
75. The same technique of the letterpress plates was possibly used for the Arabic titles in Appendix 120.
76. It was previously mentioned that more than half of the Khenchara Press' publications were indeed re-editions.
77. Which is directly related to Granjon's RG1, as discussed in § 7.1.3.
78. It should be borne in mind that the Propaganda types were inspired by Savary and Granjon's types, but far less accomplished.

in particular)⁷⁹ – which in turn reflect characteristic features of Granjon's work – and also a close resemblance to the French punch-cutter's hand (RG1 and RG3) although far less skillfully executed (Figure 8.15 and Figure 8.16). A further evidence of these marked similarities is the use in the AK type of Granjon's trademark system of 'peak' ending characters to indicate teeth in medial position, in addition to the straight-ending variants; this method was previously also adopted by Savary (Figure 8.17). Moreover, the AK type uses the curved elongations of the connections between letters that follow the same principle (Figure 8.18). Finally, the character set of the AK type includes independent sorts for teeth characters in medial position used in combination with straight-ending characters and sorts for tall tooth variants, as seen in Granjon (Figure 8.19 and Figure 8.20).

The analysis of the Arabic types used in the first two Arabic printing presses of the Middle East has revealed a strong influence of the European models that were followed and copied including their flaws and shortcomings originating in the lack of knowledge or access to people with script and language expertise. Despite their local production, the typographic quality of the earliest Middle Eastern produced Arabic types did not benefit from the geographical settings, that were potentially more favourable to accessing the right models and expertise to assist and inform the type-making. The Arabic types of the Aleppo and Khenchara presses were indeed made in similar conditions to those produced in Europe, meaning by people with a Christian background and in a Christian environment, in relative isolation from the Muslim community. For this reason, the faults of the European Arabic production (e.g. the style inconsistency present in both types) were not recognised as such and therefore not amended: this fact, in combination with the less accomplished craftsmanship, did not contribute to improving the typographic standards of what was previously produced in Europe and imported in the Middle East.

The next section moves the focus to Turkey, to evaluate the Arabic type production of the first typographic venture founded by the Muslim convert Ibrahim Müteferrika and its contribution to the development of Arabic typography.

79. Discussed in § 6.2.

8.3 The first Ottoman-Muslim printing venture: a turning point

8.3.1 İbrahim Müteferrika

The Ottoman Turkish printing venture of İbrahim Müteferrika can be situated in the transitional phase that paved the way – albeit slowly and fragmentarily – to a consistent development of the Islamic printing culture, after the first phase of rejection or apathy towards printing technology.¹ The beginning of this intermediate phase took place in the context of the Ottoman Tulip Age (1718–1730), a period characterised by an openness of the Ottoman Empire towards various aspects of Western culture (e.g. lifestyle, art, architecture, education and technology), which were adapted to the Ottoman culture.² The establishment of typography to print books for the Turkish-speaking Muslim readership came to fruition in this cultural climate, and although being considered Müteferrika's personal undertaking, it benefited from the support of Ottoman authorities.³

As the man who made the first step in the formation of Ottoman print culture,⁴ İbrahim Müteferrika has also been defined as the most enlightened figure of the eighteenth-century Ottoman Empire.⁵ Müteferrika was a true polymath with the project of spreading literacy by disseminating knowledge of humanistic and natural sciences through printing. Besides his role as a printer (*basmacı*) – for which he became most known⁶ – he was indeed also an intellectual, an editor, a physicist, a geographer, a map-maker, a soldier, and a historian.⁷

1. Gencer, 'İbrahim Müteferrika and the Age of the Printed Manuscript', 181.
2. The first long-term Ottoman embassy to France in the year 1720–21 majorly contributed to spark this interest and to influence the early manifestations in the Empire; this was thanks to the detailed account of the Western society experienced by the Turkish ambassador Yirmisekiz Çeleb Mehmed Efendi, recorded in the work *sefâret-nâme*. See Niyazi Berkes, *The Development of Secularism in Turkey* (Montreal: McGill University Press, 1964), 33–36 and G. Veinstein, 'Mehmed Yirmisekiz', in *Encyclopaedia of Islam*, edited by P. Bearman, Th. Bianquis, C.E. Bosworth, E. van Donzel, W.P. Heinrichs. Brill online 2012, accessed 09 October 2017, http://dx.doi.org/10.1163/1573-3912_islam_SIM_5147.
3. It is known that during his stay in Paris, Mehmed Efendi visited a printing shop – which he failed to record in his journal – and that his son Saïd Efendi was reportedly impressed by the 'ingenious and easy multiplication of books' obtained with typography. Returned to Istanbul, Mehmed Efendi appears to have discussed with the grand vizier the idea of introducing an Arabic printing press; this was followed by a project prepared by Saïd Efendi and İbrahim Müteferrika, presented to the sultan for his approval. See Giambattista Toderini, *Letteratura Turchesca*, Vol. 3 (Venezia, 1787), 6–8; Gdoura, *Le Début De L'imprimerie Arabe*, 192–95.
4. Sabev, 'Waiting for Godot', 106.
5. Vefa Erginbaş, 'Enlightenment in the Ottoman Context: İbrahim Müteferrika and His Intellectual Landscape', in *Historical Aspects of Printing and Publishing in Languages of the Middle East*, edited by Geoffrey Roper (Leiden: Brill, 2014), 53–100. Erginbaş argues that the eighteenth-century Ottoman Enlightenment did not fully resemble its European counterparts, and developed in a more conservative way; the progressive ideas were indeed adapted to work in a society where religion was still the dominant force.
6. With the name 'Basmacı İbrahim Efendi', see Erhan Afyoncu, 'İbrâhim Müteferrika'. In *İslam Ansiklopedisi*. Accessed 09 October 2017. <http://www.islamansiklopedisi.info/dia/pdf/c21/c210256.pdf>.
7. Erginbaş, 'Enlightenment in the Ottoman Context', 53.

Müteferrika was a Transylvanian-born Hungarian Protestant, from Kolozsvár, today Cluj in Romania.⁸ According to recent findings, he was born between 1670 and 1674 and died in 1747.⁹ Although there are controversial views amongst scholars about his biography and background, it appears that Müteferrika followed the Unitarianism movement, which facilitated his conversion to Islam due to the compatibility with the Muslims' beliefs.¹⁰ Furthermore, it seems that he converted voluntarily after taking refuge in the Ottoman Empire – instead of being enslaved – taking the name of İbrahim.¹¹ He owed the nickname Müteferrika to his career in the Ottoman army, being elevated to the permanent position of *müteferrika* in 1716.¹² He was employed in various diplomatic missions and some bureaucratic services and appointed as the scribe of the Ottoman artillery between 1738 and 1743.¹³

Before starting his printing undertaking, in 1726 Müteferrika wrote a treatise to present his project to the grand vizier Damad İbrahim Paşa. The *Er-Risāletü'l-müsemma bi- Vesileti't-Tiba'a* (The usefulness of printing)¹⁴ was a manifesto-like essay where Müteferrika discussed the importance of printing, listing ten eventual benefits to Muslims and the Ottoman state. In particular, he remarked its educational advantages: boosting the widespread dissemination of affordable books, printing contributed to reducing ignorance, favouring access to education for both rich and poor.¹⁵ Moreover, Müteferrika presented printing as a mean to prevent the destruction of rare books and to ensure more durable, reliable and error-free texts. In the *Vesileti't-Tiba'a* Müteferrika also raised an important argument against the quality of the European printed Arabic, Persian and Turkish books circulating in the Ottoman Empire, whose commerce created profit for the Christian countries that had recognised their value:

Cependant comme il s'est trouvé personne chez eux en état de faire la différence d'une bonne à une mauvaise écriture, et qui scut assez bien l'orthographe et même les susdites langues [i.e. Arabic, Persian and Turkish], pour

8. Ibid., 63. This is based on the *Risale-i İslamiye*, Müteferrika's only authentic autograph source, and the first known document after his conversion to Islam, see also 'Risâle-i İslâmîye (1710)', *Muteferrika.Mtak.Hu*, accessed 29 September 2017, <http://muteferrika.mtak.hu/en/risale.htm>.
9. Erginbaş, 'Enlightenment in the Ottoman Context', 63 and Sabev, 'Waiting for Godot', 102.
10. Unitarianism and Islam share common ground on the non-Trinitarian monotheism, viewing Jesus as a Prophet of God and rejecting his divine nature, Erginbaş, 'Enlightenment in the Ottoman Context', 63.
11. Ibid., 63–64.
12. Ibid., 64–65. *Müteferrika* was the name of a corps which had a special position in the Ottoman askeri class, an elite of imperial administrators (special servants of sultans, viziers, and high-ranking bureaucrats). It seems that he received this post owing to his extensive knowledge of European languages as well as for his role as an interpreter between the Ottoman sultans and the Transylvanian prince Ferenc Rakoczi. See also Sabev, 'Waiting for Godot', 102.
13. Erginbaş, 'Enlightenment in the Ottoman Context', 65–66 and Sabev, 'Waiting for Godot', 102.
14. See English translation by Christopher M. Murphy, 'Appendix: Ottoman Imperial Documents Relating to the History of Books and Printing', in *The Book in the Islamic World: The Written Word and Communication in the Middle East*, edited by George N. Atiyeh (Albany: State University of New York Press, 1995), 286–92. For a translation into French see Henri Auguste Omont, 'Documents Sur L'imprimerie À Constantinople Au XVIIIe Siècle', in *Revue Des Bibliothèques*, N.5, 1895: 193–200.
15. Müteferrika's goal/intention of producing affordable books readily available to everyone contradicted the high price of his publications, which appears to be one of the reasons that undermined the sales, thus affecting the success of his printing venture. See Gencer, 'İbrahim Müteferrika and the Age of the Printed Manuscript', and Orlin Sabev, 'The First Ottoman Turkish Printing Enterprise: Success or Failure?', in *Ottoman Tulips, Ottoman Coffee. Leisure and Lifestyle in the Eighteenth Century*, edited by Dana Sajidi (London, New York: Tauris Academic Studies, 2007), 63–89.

pouvoir conduire l'impression à quelques degrés de perfection, il est arrivé que les ouvrages, qui ont été ainsi imprimés, se sont trouvés remplis de fautes, sans parler du mauvais choix des caractères, qui approchent fort de l'écriture employée par les Musulmans d'Afrique.¹⁶ Ces défauts ont été cause que ces livres n'ont point eu cours dans notre Empire et que personne ne s'est empressé d'en faire l'acquisition. Mais il peut se faire que ceux dirigeant l'imprimerie chez les Européens, pour donner cours aux livres qui sortent de leur presses, s'appliqueroient à la réformer en faisant fondre des caractères modelés par quelqu'habile maître, qui atteindroient à la perfection de ceux de l'écriture à la main. C'est alors que, s'ouvrant une branche de commerce chez nous par la vente de leurs livres, ils en tireroient un profit qui serait préjudiciable à nos intérêts, par le somme qui sortiroient des provinces de notre Empire; il est donc convenable que les Musulmans, ayant précédé les nations infidèles en tous genres de sciences, ils ne se laissent pas devancer par eux, quant aux langues dont nous faisons usage, dans un art aussi utile que l'imprimerie, aussi en a-t-on senti la conséquence par l'approbation que l'ont vient de donner à son établissement.¹⁷

In addition to the *Vesiletü't-Tiba'a*, Müteferrika also submitted an application for an official permit to run his printing house, declaring his intention to publish exclusively works on secular subjects.¹⁸ Along with this document, Müteferrika presented a few sample pages from the Arabic-Turkish dictionary of Vankulu, asking for a permit to print 500 copies,¹⁹ and prepared some samples of punches and Arabic types to reassure the *ulamā* and the Ottoman authorities 'on the future of Arabic calligraphy' according to his typographic vision.²⁰

16. Perhaps meaning the *maghribi* influence on certain European Arabic types (e.g. Erpenius), although there is not a specific reference. In a previous passage of his statement, speaking about European presses printing in Oriental languages, Müteferrika mentioned explicitly only three works of the Medici Press (the *Avicenna*, the *Geographia*, and the *Euclid*).

17. 'However, as there was no one among them able to differentiate between good and bad writing, and who was acquainted well enough with the spelling of the aforementioned languages [Arabic, Persian and Turkish] in order to drive printing to some degrees of perfection, it has happened that the works, which have been printed, have found themselves full of faults, not to mention the bad choice of the characters, which are very close to the writing used by the Muslims of Africa. These defects have caused these books to have had no course in our Empire, and no one hastened to acquire them. But it may happen that those directing printing among the Europeans, in order to give a course to the books which issue from their presses, would apply themselves to reforming it by casting characters modelled by some skilful master, who would attain the perfection of those of writing by hand. That is when, opening up a branch of commerce with us by the sale of their books, they would derive from it a profit which would be detrimental to our interests, by the sums which would leave the provinces of our Empire; it is appropriate that the Muslims, having preceded the infidel nations in all sorts of sciences, do not let themselves be preceded by them, as to the languages of which we make use, in an art as useful as printing, and the consequence has been felt by the approval which it has just been given to its establishment'. Approximate translation by the author from Omont, 'Documents Sur L'imprimerie À Constantinople', 199.

18. Either due to his personal interests or in order to win the favour of the scribes and religious class, who were otherwise ill disposed towards his printing enterprise, Gencer, 'Ibrahim Müteferrika and the Age of the Printed Manuscript', 157.

19. Orlin Sabev, 'Formation of Ottoman Print Culture (1726-1746): Some General Remarks', edited by Irina Vainovski-Mihai (Bucharest: New Europe College. Regional Program 2003-2004, 2004-2005, 2007), 298.

20. Gdoura, *Le Début De L'imprimerie Arabe*, 103.

The Müteferrika Press (*Dār-i Tibā'a-yi Āmira*, The Imperial printing House)²¹ was also supported by the *fevtā*, the official religious verdict of the progressive *şeyhülislam* (mufti) Yenişehirli Abdullah Efendi,²² and the *fermān*, a special decree signed by the Sultan Ahmet III in 1139/1727, giving Müteferrika and Sa'id Efendi an official permit to run the printing house.²³ These documents were included in the Press' first printed book *Lugat-i Vankulu*, an Arabic-Turkish dictionary printed in 1729 (Figure 8.21), and many other of its following publications. The Müteferrika Press closed immediately after the death of its founder; it was shortly revived to print one edition in the mid-1750s and it resumed a stable activity later in the century, from 1784.²⁴ In 1797 the printing establishment was bought up by the state and transformed into a state printing press.²⁵

The books and the success of the press

Müteferrika began experimenting with printing ahead of the official establishment of his printing shop producing two maps: the first was a woodblock print of the Marmara Sea in 1719–20 and the second was a map of the Black Sea in 1724–25 from four engraved copper plates.²⁶ It is reported that in the application of 1726, Müteferrika declared that he had 'been attempting to print for eight years, while enjoying the support of the Istanbul-based Jewish printer and punch-cutter Jona²⁷ and the facilities of his printing house'.²⁸ Before his death, Müteferrika published seventeen books on secular subjects such as language, humanistic (history and geography), natural (physics, astronomy, chronology) and military sciences, mainly in Ottoman Turkish.²⁹ Müteferrika was directly involved with his publications not only as the printer, by also in the role of author, editor and translator. Furthermore, he was supported by an editorial board formed by carefully selected members of the *ulamā*, for the preparation and proofreading of the works for printing, to ensure correct and accurate texts.³⁰

21. Erginbaş, 'Enlightenment in the Ottoman Context', 69.

22. The issue of the *fevtā* permitted the printing of books except for the Qur'an and other religious subjects. This refrained the *ulāma* and calligraphers, in particular, to make further opposition to the press' opening in name of the safety of religion, see Berkes, *The Development of Secularism in Turkey*, 40–41.

23. After offering initial moral and financial support to petition for the printing press, he withdrew in the early 1730s, leaving Müteferrika to run the enterprise alone, Sabev, 'Waiting for Godot', 103. For the English translation of the sultan's decree by Christopher M. Murphy see 'Appendix: Ottoman Imperial Documents Relating to the History of Books and Printing', 283–85. See also. These three documents were also included at the beginning of Müteferrika's first publication, *Lugat-i Vankulu*, in 1141/1729.

24. Some of the reasons attributed to the closure of the Press are discussed in Sabev, 'Waiting for Godot', 112–13. Müteferrika's successor at the direction of the Press was his disciple Kādī İbrāhīm until 1756. After the reopening in 1784, the directors were two high-court officials, Ahmad Vāsīf and Rāshīd Mehmed Efendi, see Gdoura, *Le Début De L'imprimerie Arabe*, 230–37.

25. Christoph K. Neumann, 'Book and Newspaper Printing in Turkish, 18th–20th Centuries', in *Middle Eastern Languages and the Print Revolution: A Cross-Cultural Encounter: A Catalogue and Companion to the Exhibition* (Westhofen: WVA-Verlag Skulima, 2002), 232–33.

26. Two more maps were printed in 1720–30 (of Iran) and in 1730 (of Egypt), Gencer, 'İbrahim Müteferrika and the Age of the Printed Manuscript', 158. According to Roper, the plates and technique were probably imported from Vienna, see Roper, 'The History of the Book in the Muslim World', 543.

27. Intended as Yonah ben Yakov Ashkenazi, discussed later in this section.

28. Sabev, 'Formation of Ottoman Print Culture', 298.

29. Reaching this way not only Muslims but also Turkish-speaking non-Muslims. The rest of the works was in Arabic, Persian and French, see Gdoura, *Le Début De L'imprimerie Arabe*, 208–19.

30. Gencer, 'İbrahim Müteferrika and the Age of the Printed Manuscript', 158 and Gdoura, *Le Début De*

It has been observed that Müteferrika's books resemble manuscripts in appearance, with which they share a number of basic visual and functional characteristics including illuminated title pages (*sarlawh*, head panel),³¹ colophons, and catchwords; this also applies to the artistic elements used in the bindings.³² On the other hand, he introduced new elements breaking with manuscript tradition, such as tables of contents, indices, forewords, postscripts and page numbers.³³ A traditional title page was included in the *Grammaire Turque*, the only book produced entirely in a Western format, whereas the last three of Müteferrika's editions included what visually resembled a title page but instead of bearing the title it featured the honourable titles of the sultan, the Grand Vizier and the Grand Mufti of the time, as well as the place and year of printing³⁴ (Figure 8.22). According to historian Yasemin Gencer, Müteferrika decidedly fused the two book forms together (printed and manuscript) being familiar with both formats and their individual elements; however, it is more difficult to establish whether he intentionally had planned for his books to resemble manuscripts.³⁵

The first publication was the Arabic-Turkish dictionary *Lugat-i Vankulu* (known in Ottoman Turkish as *Sihah-i Cevheri*) printed in 1729.³⁶ In the same year, he printed the *Tuhfetü'l-Kibar Fi Esfari'l Bihar*, a compendium on the Ottoman maritime wars that included a series of maps, for which he was renowned (Figure 8.23). The following year he also published a Turkish grammar in French, the *Grammaire Turque*, prepared by the Jesuit priest Jean Baptiste Holdermann to teach Turkish to French translators/interpreters (dragomans), who were extensively used by Ottoman officials:³⁷ this book was the second best-seller amongst Müteferrika's publications after the *Lugat-i Vankulu*.³⁸ Nevertheless, his greatest achievement is considered to be the *Cihannüma*: this work, published in 1145/1732, was a revised and extended edition of Katip Çelebi's great geographical compendium.³⁹ Müteferrika also composed a book of his own, the *Usulü'l Hikem Fi Nizamü'l Ümem* printed in 1732 (Appendix 125):⁴⁰ in this work he proposed solutions for the reorganisation of the Ottoman army based on the principle of order applied in European armies, including also his political philosophy and highlighting the significance of the science of geography.⁴¹

L'imprimerie Arabe, 202.

31. The first printed one appears in the ninth book published by Müteferrika, see Appendix 125; occasionally they were added and illuminated by hand, see Gencer, 'İbrahim Müteferrika and the Age of the Printed Manuscript', 168.
32. Gencer, 'İbrahim Müteferrika and the Age of the Printed Manuscript', 161–62.
33. Ibid., 161, 179–81.
34. Sabev designates these as quasi-title pages in 'Formation of Ottoman Print Culture', 318.
35. For an overview of various arguments see Gencer, 'İbrahim Müteferrika and the Age of the Printed Manuscript', 179–80.
36. Scholars have praised Müteferrika's choice of debuting with a dictionary, as he filled a gap in the market. The edition was allegedly printed for students; however, its high price might reveal that Müteferrika was targeting a wider audience, trying to also reach bureaucrats and officials. See Erginbaş, 'Enlightenment in the Ottoman Context', 69.
37. This edition was also of interest to the French merchants who traded with the Ottoman Empire, Erginbaş, 'Enlightenment in the Ottoman Context', 69–70. Two hundred copies of this book were also sent to Paris for the Jesuit school students, Gencer, 'İbrahim Müteferrika and the Age of the Printed Manuscript', 166.
38. Erginbaş, 'Enlightenment in the Ottoman Context', 70.
39. Ibid., 71.
40. A manuscript copy of this work is shown in Appendix 126.
41. It is worth recalling that the year 1730 was characterised by the Patrona Halil rebellion that resulted in the deposition of Sultan Ahmed III and the execution of his Grand Vizier Damad İbrahim Paşa, Erginbaş, 'Enlightenment in the Ottoman Context', 85. See also Berkes, The Development of Secu-

The widespread claim that the 18th-century Müteferrika Press was a failure⁴² – especially in terms of the social and cultural impact of its editions and their low sales – was re-evaluated by Orlin Sabev's recent research. In 2002, he came across to a probate inventory dated 1747 in the Archive of the Istanbul Mufti, which listed Müteferrika's goods after his death, including the unsold books he had printed.⁴³ Whilst this document shows the difficulty in selling the printed books, it also proves that it was far from a failure as presented by previous scholarship. Juxtaposing the figures of unsold books with the total number of the initial print run, Sabev inferred that Müteferrika sold 69.3 percent of his editions, making his enterprise comparable with that of early European presses.⁴⁴ As remarked by Roper and Sabev, despite this relative success, the impact of the first Ottoman Turkish printing enterprise was at a very modest level compared with earlier western incunabula, and it happened in a social context where the new print culture did not replace the scribal culture, at least not immediately. For this reason, the success of Müteferrika's printing venture fell short when evaluated in terms of being an 'agent of change' – according to Eisenstein's theory – for the Muslim world, although it represented the starting point in the formation of their print culture.⁴⁵ In this regard, Erginbaş highlighted the lasting impact of Müteferrika's enterprise on the Mühendishane Press opened in Istanbul in 1794–5,⁴⁶ which followed a similar path publishing titles in geography, military tactics, and engineering (although preferring religious works to history). Moreover, Müteferrika's books also gave European intellectuals access to these works for the first time, and as a result, many were translated and published by European printing houses in the eighteenth and nineteenth centuries.⁴⁷

About the types

There are controversies in the sources about the provenance of Müteferrika's Arabic types. The matter was already discussed by the Italian scholar Giambattista Toderini in the eighteenth century and his review is still the most convincing.⁴⁸ The claim of a European origin of the types – imported from either France or Holland – lacks documentary evidence;⁴⁹ on the other hand, there are testimonies about their manufacture in Istanbul. Firstly, Toderini reports that Lomaca – one of the interpreters to Sa'īd Efendi's embassy to Paris – had personally assured him several times that the Arabic type had been made in Istanbul. Secondarily, if the French type used for Müteferrika's *Grammaire Turque* had been made in Istanbul – as declared in

larism in Turkey, 42–45.

42. Scholars have attributed the failure of the Press to various reasons such as the insufficient sales, the limited number of literate Turks, a lack of interests in the subject of the editions and their high price.
43. Sabev, 'Waiting for Godot', 102–03 and Sabev, 'Formation of Ottoman Print Culture', 294. Sabev published also a monograph in Bulgarian entitled *Първото османско пътешествие в света на печата книга (1726–1746). Нов поглед* [First Ottoman Trip in the World of Printed Books (1726–1746). A Reassessment] (Sofia: Avangard Prima, 2004).
44. Sabev estimated that Müteferrika presumably printed a total of 10,000 to 11,000 books against the 2,981 unsold copies left upon his death, see 'Waiting for Godot', 104. For a more detailed analysis of the Müteferrika Press' commercial success and other issues such as the pricing of his books see Sabev, 'The First Ottoman Turkish Printing Enterprise: Success or Failure?'.
45. Roper, 'The History of the Book in the Muslim World', 543 and Sabev, 'Waiting for Godot', 104–05.
46. Discussed in § 9.1.2.
47. Erginbaş, 'Enlightenment in the Ottoman Context', 82.
48. Toderini, *Letteratura Turchesca*, 11–15. His work was also translated into French in 1789.
49. Although it is still reported in recent literature such as Bernard Lewis, *The Emergence of Modern Turkey*, 3rd ed. (New York and Oxford: Oxford University Press, 2002), 51.

the book itself – there is no reason to believe that the Arabic would be imported.⁵⁰ Thirdly, the imperial decree issued by Sultan Abdulhamid I for the re-establishment of an official printing house in 1784 explicitly stated that Müteferrika had personally manufactured the type: ‘Ibraimo compose, e scolpì sopra l'acciaio, il ferro, il rame, il piombo li caratteri della Stampa’.⁵¹ Finally, as a supporting argument, Toderini reported the observations of the Hungarian Orientalist Charles Reviczki: on examining the type, the latter had remarked the close resemblance of Müteferrika’s characters to those found in Turkish manuscripts, especially in their adherence to the rules of writing for the shaping and joining of Arabic letters. This characteristic set them apart from the Arabic characters of the books printed for Christianity and is a reason to believe that Müteferrika’s type was made in Istanbul rather than being imported.⁵² A further confirmation came from a document written by the Swedish diplomat Edvard Carleson on the 20th July 1735, in which he described Müteferrika’s printing office. Carleson stated that Müteferrika had ‘acquired some indispensable workers from Germany together with some type founders, who made the characters, so he was able to start working immediately’.⁵³

It has been previously mentioned that Müteferrika took on various roles for his printing enterprise but there is no historical record that he had learned or applied the art of type-making. It appears that his main collaborator was the Ottoman Jewish master Ribi Yonah ben Yakov Ashkenazi (or Jonah ben Jacob Ashkenazi),⁵⁴ used for his skills in the art of printing.⁵⁵ According to some sources he was Müteferrika’s punch-cutter, ‘who designed and cast the Arabic letters and advised him on how

50. Müteferrika tried to import the Latin types from Paris but in vain, see Gdoura, *Le Début De L'imprimerie Arabe*, 206–07.

51. ‘Ibrahim composed, and sculpted on steel, iron, copper, lead the characters for printing’, approximate translation by the author from Toderini, *Letteratura Turchesca*, 14. It appears that this statement should not be taken literally: as discussed below it appears that Müteferrika was a printer, not a punch-cutter.

52. Toderini, *Letteratura Turchesca*, 13–14.

53. In the same document Carleson reported that Müteferrika’s German helpers ran away from the press during the revolution of 1730 but he and his five sons successfully took on the work, having learned the whole craft of printing including the type foundry. However, no historical evidence has been provided to support the veracity of this particular matter. See Edvard Carleson, *İbrahim Müteferrika Basımevi Ve Bastığı İlk Eserler: İbrahim Müteferrika's Printing House and Its First Printed Books*, edited by Mustafa Akbulut (Ankara: Türk Kütüphaneciler Derneği, 1979), 21–26. Other sources report that the foreign workers employed at Müteferrika’s Press were from Austria or France, see Gdoura, *Le Début De L'imprimerie Arabe*, 200 and Lewis, *The Emergence of Modern Turkey*, 51.

54. Müteferrika himself had mentioned this man in the application of 1726, see above. Born in Poland, Ashkenazi was a refugee from Galicia who emigrated to Istanbul. Here he established a press for Hebrew printing in 1710 – for which he engraved the Hebrew types – in partnership with another emigrant, Ribi Naftali ben Azrial of Vilna (Vilnius, Lithuania). A year later Ashkenazi moved the press on his own in Ortaköy, north of Istanbul, and in 1728 he opened a new printing venture in Izmir (Smyrna), this time in partnership with Rabbi David Hazzan. See Stanford J. Shaw, *The Jews of the Ottoman Empire and the Turkish Republic* (Basingstoke: Macmillan, 1991), 145–46 and Leah Bornstein-Makovetsky, ‘Ashkenazi, Jonah Ben Jacob’, in *Encyclopedia of Jews in the Islamic World*, edited by Norman A. Stillman (Brill online, 2010), accessed 09 October 2017, http://referenceworks.brillonline.com/entries/encyclopedia-of-jews-in-the-islamic-world/ashkenazi-jonah-ben-jacob-SIM_0002420.

55. Gdoura, *Le Début De L'imprimerie Arabe*, 200.

the press should be operated';⁵⁶ others attribute him the role of typefounder,⁵⁷ chief typesetter, employed at the press until Müteferrika's death.⁵⁸

The names of Ottoman engravers Ahmad al-Karimi, Nigirdiz Galata and Ibrahim Tufani appeared in the maps of the *Cihannüma* book: however, they were probably only the maps' copperplate engravers, with no relation to the type-making. It is reported that in 1830 the Press had ten workers, of which two were proofreaders, six compositors and two pressmen.⁵⁹

Regarding the press equipment, it is known that initially the printing shop had a total of six printing machines, two of which exclusively for printing maps; in 1785 the number was reduced to two, and increased to six again in 1830.⁶⁰ it is not clear if Müteferrika obtained them from the printing shops of local minorities active in Istanbul or imported them from Europe.⁶¹ The paper was also supplied mainly from Europe⁶² and from the paper mill that Müteferrika had established in Yalova, near Istanbul.⁶³

The Turkish Press used only one text typeface (IM) for all its publications⁶⁴ – before and after Mütererrika's death – reportedly measuring 'slightly heavier than a 16pt'.⁶⁵ Various scholars have remarked on the difference between this typeface and the European predecessors, particularly for being 'modelled on the neat Ottoman *naskhī* bookhand of the period'.⁶⁶ The style inconsistency typical of European Arabic typeforms is indeed much improved, resulting in a stylistically pure *nash*⁶⁷ (Figure

56. Shaw, *The Jews of the Ottoman Empire and the Turkish Republic*, 146.

57. İhsanoğlu and Aynur, 'The Birth of the Tradition of Printed Books in the Ottoman Empire', 191.

58. Wayne H. Osborn, 'The Type of Calligraphy: Writing, Print, and Technologies of the Arabic Alphabet', PhD thesis, UC San Diego, 2008. See also Osman Ersøy, *Türkiye'ye Matbaanın Girişisi ve İlk Basılan Eserler* (Ankara: Güven basimevi, 1959), 35.

59. Gdoura, *Le Début De L'imprimerie Arabe*, 201.

60. Ibid., 207.

61. 'Presses and types were at first obtained from the local Jewish and Christian printers [...]. Later, [...] were imported from Europe, especially from Leiden and Paris', Lewis, *The Emergence of Modern Turkey*, 51. See also Gdoura, *Le Début De L'imprimerie Arabe*, 207.

62. This was the case also for the manuscript industry, see Gencer, 'İbrahim Müteferrika and the Age of the Printed Manuscript', 159. A delay in the arrival of paper from Venice for printing one of the Müteferrika Press' book in 1784 is mentioned in Toderini, *Letteratura Turchesca*, 226.

63. The paper mill was active for ten to fifteen years, between 1741 and 1755, supplying paper perhaps only for the final book produced by Müteferrika in 1742, Gencer, 'İbrahim Müteferrika and the Age of the Printed Manuscript', 159.

64. The larger characters used for the Basmalah and for titles are made of woodblocks (see Appendix 125).

65. Osborn, 'The Type of Calligraphy', 191 from Selim Nüzhet Gerçek, *Türk Matbaacılığı, 1. Müteferrika Matbaası* (İstanbul: Devlet Basimevi, 1939). Elsewhere, the type is designated as a 12–16pt, see İhsanoğlu and Aynur, 'The Birth of the Tradition of Printed Books in the Ottoman Empire', 191. The fate of the type at the final closure of the Press is unknown. On the other hand, it is reported that before 1784, the French ambassador Choiseul-Gouffier tried in vain to buy Müteferrika's Arabic punches, matrices and types for the new printing office of the French Embassy in Istanbul which printed three books (two on military topics and one on Turkish grammar) between 1787 and 1790. See Gdoura, *Le Début De L'imprimerie Arabe*, 238 and G. Oman, Günay Alpay Kut, W. Floor and G.W. Shaw, 'Matba'a', in *Encyclopaedia of Islam*, edited by Th. Bianquis P. Bearman, C.E. Bosworth, E. van Donzel, W.P. Heinrichs. Brill online 2012, accessed 2 December 2017, http://dx.doi.org/10.1163/1573-3912_islam_COM_0705.

66. Roper, 'The History of the Book in the Muslim World', 543. According to Berkes the beauty of Müteferrika's type and the accuracy of his early publications were not surpassed till the middle of the nineteenth century, see Berkes, *The Development of Secularism in Turkey*, 41.

67. This was also the case for Granjon's earliest Arabic type, RG1 (Figure 6.14).

8.24). On the other hand, the quality of Müteferrika's letterforms, stroke treatment and weight distribution is less accomplished, lacking accuracy in the outlines. Some characters appear as if they were designed with a pointed nib whereas in others the stroke modulation is more obvious. Moreover, many characters that should mutually relate are visually discordant, showing coherency issues also from a proportional point of view (Figure 8.25).

The IM type attempts to implement various features of the Arabic script belonging to *nash* calligraphic practice, more or less successfully. The subtle slant in the ascenders is not consistent, compromising the pattern along the reading direction: this occurs mainly with the pair alif-lam (definite article 'the' in Arabic) and the letter *ṭā'*/*ẓā'* in medial position that presents a more pronounced angle, especially visible when followed by alif (Figure 8.26). The design of some characters (in initial position, like *mīm* and *sīn*/*šīn*) fails to reproduce the slant along the joining line of the *nash* style according to calligraphic practice because the rest of the characters join sitting flat on the notional baseline (Figure 8.27).

Regarding the implementation of the cascading feature, Müteferrika's type used various methods to obtain the multilevel connection of Arabic characters. The vertical joins of some letter combinations (usually 2 or 3) are achieved by ligatures or by stacking individual sorts on top of each other⁶⁸ (Figure 8.28). Other multilevel connections are obtained by shifting the sorts used for the standard joins along the notional baseline to the second level of composition, as already seen in many previous European Arabic types⁶⁹ (Figure 8.29). The *ġīm* letter group always requires a multilevel connection when in medial and final positions: for these, the IM type has two sets of variants (to represent them individually and not in a ligature): one is in accordance with calligraphic practice whereas the other seems influenced by the approach previously adopted by European typographers (Figure 8.30). Finally, Müteferrika's type shows an impressive effort to implement many of the rules that govern the Arabic system but, even from this point of view, the type is not without faults (Figure 8.31).

The IM type is not vocalised, in accordance with the predominantly historical and scientific subject of the Müteferrika Press' publications. Concerning the treatments of the diacritic dots, it appears that there are different techniques used: whereas some characters are clearly cast together with the dots, there are repeated instances in which those appear too far from the base-form to be on the same sort and are evidently set separately. The changing position of the diacritic dots in different instances of the same printed character or letter combination is also evidence of this approach. Overall, the IM type lacks accuracy in the positioning and alignment of the diacritic dots in relation to the base-forms, which partly reveals the technical difficulties of handling dots cast on independent sorts (Figure 8.32).

The uneven impression (and perhaps also problems related to the properties of the ink and the paper) affects the visual quality of the typeface, its colour and texture on the printed page, compromising the legibility. This is caused by a much darker or lighter appearance of the same characters in different instances, the disappearance of entire letters (or parts of them) from the printed text, the closure of small counters clogged with ink, and the loss of distinctive features necessary for a comfortable identification of characters (Figure 8.33).

The Müteferrika type has good kerning capacity, although sometimes it is fitted too tightly (Figure 8.34). Moreover, it does not appear to make use of stretched let-

68. See more on this technique in Figure 3.62.

69. See more on this technique in Figure 3.63.

ters or *kašida* sorts to adjust the fitting. Besides the already mentioned ligatures used to represent vertical connections,⁷⁰ the IM type's character set also includes other typographic ligatures for common combinations. Both these types of ligatures provide a more authentic representation of the chosen letter combinations according to calligraphic practice – that would otherwise be compromised by having separate sorts – and facilitate the typesetting. However, being evidently unfeasible to provide ligatures to capture every letter combination of a script whose characters interact dynamically with each other, the type's synopsis reflects the necessary compromise, with a limited selection of ligatures chosen according to the punch-cutter's own criteria. Occasionally, in Müteferrika's books, ligatures are not used even when available (Figure 8.35). Finally, it is worth mentioning that the IM type lacks refinement in the joining line, failing to achieve seamless connections between characters.⁷¹ The gaps between the metal sorts become more evident when combined with issues in typesetting and alignment of characters (Figure 8.36).

Following the analysis of IM, it can be concluded that Müteferrika's efforts resulted in a typeface that is mostly accurate in the structure but graphically weak. This means that the IM type correctly reproduces the rule system at the core of the Arabic script but uses letterforms that are poorly shaped, despite being coherent with the *nash* style.

It is not known – and difficult to establish – whether the typeface was modelled on good calligraphic examples sub-standardly reproduced by the type-makers, or following the handwriting of a Muslim scribe who produced Arabic text with script competence but lacked the skill set to perform at calligraphic standards.⁷² Aside from the lack of refinement in the shaping of letterforms – which can be attributed to the punch-cutter regardless of the models he was following – only a systematic analysis of the errors occurring in Müteferrika's printed texts can provide a better understanding. In particular, this is necessary to attempt the identification – and possibly estimate a percentage – of the mistakes that might have been made at typesetting stage (e.g. using the wrong sort when the correct one was available in the fount's character set); those that can be attributed to the pre-production stage (essentially, design defects due to faults in planning the system⁷³); and those that can be ascribed to technological limitations or that occurred as a result of the type-makers' decisions and approach in dealing with the technology, regardless of a sound script awareness (e.g. casting the dots independently from the base-forms that consequently are too distant from them or generally badly positioned).

It could be hypothesised that the handwriting model in question was Müteferrika's: he was not a calligrapher but had worked as a scribe for the Ottoman artillery. Despite not receiving Muslim education as a child, Müteferrika gained access to Arabic script knowledge with his conversion, which was of paramount importance to his work as a printer of Arabic. As a Muslim, he was able to work with experts or receive

70. Some shown in Figure 8.27.

71. As already discussed, this was a shared problem of all Arabic type makers, although Granjon's work had proved that it was possible to reach higher standards.

72. Anybody with a Muslim education in the Ottoman Empire would learn to write structurally correct Arabic, even without calligraphic training. People with this background would share the same script competence but perform differently in writing depending on the level of their manual skills and an eventual additional training.

73. These faults can denote the type-maker's lack of knowledge of the Arabic system; they possibly originate from flawed models.

answers and advice by simply communicating with the people who were familiar with the script.⁷⁴ The hypothesis that the IM type was inspired by Müteferrika's own handwriting requires further evidence: this can only be supplied by an in-depth analysis of the manuscripts attributed to him such as the *Risale-i İslamiye*, which survives in a single copy at the Süleymaniye Library in Istanbul (Appendix 127). At first glance, the handwriting appears to share significant common ground with the type, including features discussed in the type analysis (e.g. style consistency, letter-forms' selection, fitting) (Figure 8.37).

It is not known if the character table appeared in the *Grammaire Turque*⁷⁵ (Appendix 128) was handwritten by Müteferrika: it shows competence regarding the Arabic calligraphic styles, but poor performance in their execution; the same could be said of the title page appeared in three of Müteferrika's editions (see Figure 8.22).

Some conclusions

It goes without saying that the contribution of İbrahim Müteferrika to the development of Arabic typography lies beyond the accomplishment of his typeface: as previously remarked by other scholars, he was the first to alert Muslims that without a printing press they could not make any progress,⁷⁶ and as the pioneer for the formation of Ottoman print culture his reputation rests 'in having argued his case masterfully in the councils of the Sultan'.⁷⁷ However, it should be noted that he had also the ability to identify the flaws of the European Arabic printed books – in the eyes of the Muslim readership – with the mistakes and lack of beauty of their Arabic types; and to indicate that the way for improvements was to provide characters skilfully modelled on the perfection found in Arabic manuscripts. Nonetheless, his ambition of creating a typeface that conformed to calligraphic practice and manuscript tradition was fulfilled more structurally than aesthetically, thus proving script knowledge (competence) over typographic crafting mastery (performance). The first-hand contact with the Muslim culture, the access to Islamic script expertise and Ottoman calligraphic manuscripts is clearly reflected in the quality of Müteferrika's Arabic typography, which for various aspects was superior to what was previously produced by non-Muslims in Europe. On the other hand, the analysis of the IM type has highlighted traces of the European influence on Müteferrika's typeforms and approach. Moreover, it exposed the limits and flaws of the technical execution, besides the lack of refinement that Granjon's expert sensibilities (i.e. for the treatment of joins) had achieved with his first Arabic typeface.

74. Thomas Milo, from a personal conversation with the author, 28 March 2015, Amsterdam.

75. There are eight works of Müteferrika at the Biblioteca Marciana in Venice (plus two additional copies of the same works for a total of ten books). I am indebted to Erica Ianiro (in charge of the ongoing digital cataloguing of the Turkish books at the Marciana Library) for making me aware of the Müteferrika collection and for sharing the updated information about these works.

76. Thomas Milo, from a personal conversation with the author, 28 March 2015, Amsterdam.

77. Michael W. Albin, 'Early Arabic Printing: A catalogue of Attitudes', *Manuscripts of the Middle East* 5 (1990–1991), 115.

8.4 A new wave of 19th-century missionary presses for the Middle East

8.4.1 The English CMS Press in Malta

The nineteenth century was characterised in typographic terms by a new wave of missionary bodies, Protestant and Catholic, whose efforts contributed significantly to spread Arabic typography within the Middle East.¹ The missionary activity originated from the renewed need to disseminate religious messages at first through the distribution of printed works,² and later by establishing printing presses that could produce them locally, in direct contact with the intended readership. The new evangelical fervour came from the English Churches directed to the Oriental Christians, and also their neighbouring Muslim and Jewish communities.³

The first body to establish a Mediterranean Mission to evangelise the people of southern Europe, North Africa and the Middle East was the Church Missionary Society (CMS), founded in London in 1799, although it took this name only in 1812.⁴ Coming under British rule in 1800, the island of Malta was chosen as the headquarters of this new venture: its convenient location in the Mediterranean and its multicultural nature (Arab and European) made it the ideal centre of distribution of missionary Christian literature in Middle Eastern languages, especially Arabic.⁵ Nevertheless, Malta soon became also the CMS's centre of publication, with the establishment of a printing house that remained in operation until 1842.

The history and book production of the CMS Press in Malta has been most comprehensively described by Roper;⁶ therefore, it suffices to report here the most significant events in relation to its Arabic type production.

A key figure in this context was the English missionary William Jowett, the first Superintendent in Malta and correspondent to the CMS Committee in London. Setting out in 1815, he toured the Eastern Mediterranean for nine years investigating the various religious communities, their level of literacy and the nature of the books in use amongst them. As a supporter of 'the power of the Press in the diffusion of knowledge',⁷ in 1822 Jowett encouraged the establishment of a press in Malta instead of simply distributing in the Middle East the printed books supplied from London, reasoning the advantages of such an enterprise to the CMS Committee.

1. Dagmar Glass, *Malta, Beirut, Leipzig and Beirut Again: Eli Smith, the American Syria Mission and the Spread of Arabic Typography in 19th Century Lebanon* (Beirut: Orient-Institut der Deutschen Morgenländischen Gesellschaft, 1998), 9. Historian J.F. Coakley indicates nine missionary presses in Ottoman territory between the years 1833 and 1914 located in Smyrna, Constantinople, Beirut (2), Damascus, Jerusalem (2), Harput, and Mosul, see Coakley, 'Mission Presses in the Ottoman Empire'. The CMS press in Malta is excluded from this list simply for geographical reasons: its books were largely produced for and exported into Ottoman territories.
2. The initial conviction was that this should be done through the distribution of copies of the Bible, hence the establishment in 1804 of the British & Foreign Bible Society (BFBS), see Roper, 'Arabic Printing in Malta 1825–1845', 75.
3. *Ibid.*, 74.
4. *Ibid.*, 105.
5. Roper and Glass, 'The Printing of Arabic books in the Arab World', 188. The British and Foreign Bible Society had also a depot in Malta for the distribution of the Bible.
6. Roper, 'Arabic Printing in Malta 1825–1845'.
7. *Ibid.*, 107.

It is worth noting that Jowett's main concern was to give the missionary books a 'native aspect' to appeal to Arab readers, observing that 'the kind of paper and typography to which the eye is accustomed, will give more ready acceptance to Books'.⁸ This consideration emerged from his firsthand experience with the reception of the English Arabic printed books in the Middle East, in particular of the BFBS' Bible: besides the 'foreign' look, some Arab readers also complained about the small size of the Arabic typeface, in comparison to that of other European (e.g. the Rome Arabic Bible) and local editions.⁹

Despite the CMS Committee's prompt endorsement of Jowett's request, the Malta printing house started its activity only in 1825. The delays were mainly due to the faulty Arabic fount sent from London¹⁰ and the lack of people competent in Arabic, including the printer, Henry Andrews, and Jowett himself. In 1826 Andrews was replaced by the printer August Köllner and joined the following year by John Kitto, who had acquired experience of Arabic type-setting in London.¹¹ In 1828, they were followed by the competent printer Matthäus Weiss from Basel, who worked at the Malta Press until its closure.¹² Eventually, more missionaries knowledgeable in Arabic were sent out to assist Jowett, in addition to Arab and Turkish assistants – most notably the Lebanese Fāris aš-Šidyāq – recruited from the Middle East to prepare and revise translations, and correct the proof-sheets.¹³

On the other hand, the problems with the deficiencies of the Arabic typeface continued to hinder the activity of the Press urging Jowett, in 1829, to request its replacement with new types that were ultimately manufactured in Malta.¹⁴ By that time, Jowett had been replaced by the Arabist Christoph Schlienz, who was also determined to adopt a new style of type with 'Arabic taste' like – in his opinion – those in use at the Būlāq Press and at the Roman Propaganda Fide.¹⁵

Despite the lack of clarity in the sources in the references to the making of the new Arabic typeface, it appears that the punches were cut in Malta 1836 by Friederich Wilhelm Franz, a German punch-cutter and typefounder from Württemberg, under the guidance of Schlienz and/or Šidyāq.¹⁶ In the same year, the matrices were prepared by a Swiss typefounder from Basel, although the CMS was insistent that Franz should also produce the matrices and cast the type of his new Arabic.¹⁷ Another 'larger and better set of punches' was made at the beginning of 1837, but due to delays in casting the new fount was used only from 1838.¹⁸ In 1837, the punches were prepared by the printer Weiss in collaboration with George Percy Badger, who

8. Ibid., 108.

9. Ibid., 97.

10. It reportedly lacked essential characters, ligatures and sufficient quantities of some sorts.

11. Trained by Richard Watts, the CMS's printer and typefounder.

12. Ibid., 111–12. Weiss was seconded by the Missionary Society in Basel.

13. Ibid., 148–51. Other employers were recruited in Malta like the punch-cutter George Percy Badger, briefly introduced below, but also lithographers and compositors. It is reported that the latter did not read Arabic, but eventually became more familiar with the script.

14. Ibid., 112–13. Jowett was also worried about the increase of competitors, the main being the Būlāq Press set up in Cairo in 1822, discussed in greater depth in § 9.2.1. Moreover, the London types were starting to wear out.

15. Ibid., 125. However, Schlienz observed that the latter was unattainable because it belonged to the Catholics, whereas he criticised the Būlāq type for its disjointed appearance due to ill casting.

16. Ibid., 168–69. Franz had reportedly a slight knowledge of Arabic.

17. Ibid., 113, 169.

18. Ibid., 113.

had acquired mechanical skills, typographical experience and knowledge of Arabic, besides having worked as an editor and translator.¹⁹

The production of the new typeface was overall assisted by Fāris aš-Šidyaq,²⁰ who had also prepared the calligraphic models. He was one of the principal pioneers of the nineteenth-century *nahda* – the cultural and literary renaissance of Arabs – and was a leading figure in the transition from scribal to print culture,²¹ becoming a renowned Arabic scholar and journalist. Šidyaq had worked as a professional copyist in his youth in Lebanon, and reportedly ‘from the outset strove for high technical and aesthetic standards in his copying’.²²

The CMS Press published a total of 111 editions using Arabic types, 103 in Arabic and eight in Ottoman Turkish.²³ Accordingly to its missionary purposes, it produced mostly Christian religious works to promote the Protestant faith amongst Arab Christians. Nevertheless, the Press also published secular works for educational purposes that could appeal to adult Muslim, Jewish and Christian readers (e.g. geography, history, English literature and art), besides elementary works for teaching in the missionary schools. These included Arabic readers, grammars, primers and manuals in Arabic for students of English.²⁴

The first books printed in Malta received from the Arab readers the same criticism reserved for the Arabic books previously printed in England, especially on account of their appearance and type-style.²⁵ Already in 1831, the CMS’s Secretary in Malta reported that ‘the Arabs generally disliked the characters of the books issued from our Press’: this clearly referred to the Arabic types sent from London that had been used until then, reinforcing the previously mentioned desire of both Jowett and Schlienz to replace them. Nevertheless, although it may be partly true that the new types cut and cast in Malta following Šidyaq’s models ‘achieved new standards of elegance and authenticity’,²⁶ their description in recent literature as ‘more or less perfect’ may require a more critical evaluation.²⁷

The first Arabic types supplied from London

The first Arabic types used at the Malta Press (CMSW1 and CMSW2) were supplied by the London printer and type-founder Richard Watts. These were almost identical to the Martin-Wilkins typeface produced in London in the early 1800s for the East India Company, most probably obtained from the same punches and/or matrices.²⁸

It’s been already discussed in the previous chapter that the Martin-Wilkins types displayed a quality superior to many earlier European Arabic typefaces, although

19. Ibid., 158, 261. Badger had worked between 1835 and 1836 at the ABCFM Press in Beirut, see § 8.4.2.

20. Ibid., 125.

21. Ibid., 204. See also Roper, ‘Fāris al-Shidyaq and the Transition from Scribal to Print Culture in the Middle East’, in *The Book in the Islamic World: The Written Word and Communication in the Middle East*, edited by George N. Atiyeh (Albany: State University of New York Press, 1995), 209–31.

22. Ibid., 211.

23. Roper, ‘Arabic Printing in Malta 1825–1845’, 236.

24. The press also published an Arabic newspaper between 1833 and 1834.

25. Ibid., 261. Other features of the Malta books that determined their impact on the Arab readers are discussed in depth by Roper in the same source. Particularly worthy of note is Šidyaq’s attempt to introduce modern punctuation using Western signs (see Figure 8.57). The proposal of full punctuation in Arabic orthography was, however, far ahead of its time and had to be removed; it was widely adopted only in the twentieth century.

26. Roper and Glass, ‘The Printing of Arabic books in the Arab World’, 190.

27. Glass, *Malta, Beirut, Leipzig and Beirut Again*, 12.

28. Roper, ‘Arabic Printing in Malta 1825–1845’, 260.

they still failed to break from the established typographic conventions of the script (e.g. style inconsistency). In other words, while following 'the best specimens of Arabic writing'²⁹ – reportedly *nash* models – they gained elegance and legibility but not to the extent of being 'identifiable with any authentic Arabic *ductus*'.³⁰

Observing the character table of the larger sized WM1 (Figure 8.38), the calligraphic nature of this design is evident; nevertheless, it is conveyed more in the stroke contrast than in the faithful and satisfactory shaping of the letterforms. It is worth noting two innovative features of this typeface in the design of the *ba'* and *ġim* letter groups in medial position. In the first case, the tooth is not centred but has a long joining stroke on the left-hand side on which rest the diacritic dots. While this design disrupts the correct positioning of the dots in relation to the character, it occasionally avoids clashes with preceding characters that would otherwise occur because the dots are all aligned at the same height and are not cast independently from the base-form (Figure 8.39). In the second case, the shorter top stroke of the *ġim* letter group in medial position conforms more to calligraphic practice – although still rigidly horizontal – allowing for better positioning of the preceding characters; technically this is obtained by the character overhanging the body of the type (Figure 8.40).

Like the Martin-Wilkins founts that existed in two sizes – MW1 and MW2³¹ – also those sent to Malta had two sizes, a Great Primer (18pt, CMSW1) and an English (14pt, CMSW2); these were used exclusively until the 1830s.³² One of the CMS works printed in Malta that uses the Watts types is the Arabic grammar *Kitāb Baḥth Al-Maṭālib Fī ʻIlm Al-ʻArabīyah* printed in 1836³³ (Figure 8.41). These Arabic types were also used in the books of the ABCFM Press after their move to Beirut,³⁴ like the work *Kitāb Faṣl Al-Khitāb Fī Uṣūl Lughat Al-ʻArāb*, also printed in 1836 (Appendix 129).

According to Roper, the criticism that these types received is attributable to the fact that they 'still lacked the authentic calligraphic quality needed to gain approval and acceptance among educated Arab readers'.³⁵ In particular, he remarked that certain features 'such as the opaque "eye" in letters such as *fā'*, *qāf* and *wāw*, must have seemed somewhat alien' to them.³⁶ While this is true because the counters of these letters are open in the *nash* style, it should be noted that even the typeforms that adhered to calligraphic practice in that regard, presented other issues that affected the visual appearance of the typeface and its appeal to the reader, like poor design and proportions. The lack of balance was only one of the consequences; the closed counters created repeated spots of colour that disturbed the colour of the type and therefore its texture (Figure 8.42). Furthermore, it is worth pointing out that the lack

29. See § 7.2.2.

30. Roper and Glass, 'The Printing of Arabic books in the Arab World', 190.

31. According to Roper a Double Pica, 22pt (WM1) and an English, 14pt (WM2), as mentioned in § 7.2.2, note 48. See also Figure 7.42.

32. Being two sizes of the same typeface design, only the large one is examined in this study. Arabic characters larger than the CMSW1 type in the Malta books were specially engraved or lithographed, Roper, 'Arabic Printing in Malta 1825–1845', 260 (Appendix 132).

33. It was regarded as the basic work for learning Arabic among the Christians of Lebanon, see Glass, *Malta, Beirut, Leipzig and Beirut Again*, 11.

34. This press is discussed more in depth in the next § 8.4.2.

35. Geoffrey Roper, 'The Beginnings of Arabic Printing by the ABCFM', *Harvard Library Bulletin* 9, no. 1 (1998): 61.

36. He adds that 'the use of the Persian form of the numeral 4 (presumably derived from Wilkin's Indian models), and Western numeral and letters for sheet signatures, would also have contributed to the "foreign" look', Roper, 'Arabic Printing in Malta 1825–1845', 260–61.

of competence in the typographic reproduction of Arabic, which was evident in the handling of script rules, cannot be overlooked as another reason that these types may have alienated readers (Figure 8.43).

The closed-counters feature was clearly already problematic in the Martin-Wilkins typeface, like many other characteristics that the Watts type of the CMS inherited from it. In addition to the design and proportional issues mentioned earlier – not only for individual letterforms but also in their relationship to each other – the stroke modulation and weight distribution were also not resolved, as well as the inconsistency in handling common elements and the stylistic adherence to *nash* (Figure 8.44). The evident work of redesign for numerous characters in the CMSW1 type did not necessarily improve its overall appearance in comparison to MW1; on the contrary, it created a less sharp and dynamic typeface, despite maintaining the slant in the ascenders³⁷ (Figure 8.45). Regarding the *ğim* letter group, the CMSW1 type uses the same typeforms seen in MW1, adding more variants (Figure 8.46).

The CMSW1 type allowed full vocalisation (see Figure 8.41). The marks were clearly cast separately and positioned at the same height above and below the characters: while this facilitates the typesetting, it also contributed to the departure from the authentic representation of the script, adding rigidity and a rather mechanical feel. Finally, the fitting of CMSW1 did not improve its appearance on the printed page: the justification of the text increased the interword spacing causing a loose and stretched out look.³⁸ On the other hand, the intraword spacing suffered from the design of some characters that created particularly tight or loose letter combinations (e.g. in the occurrence of the final *yā'* and of the *lām-mīm* ligature in initial position).

The new Arabic types manufactured in Malta

The new *nash* typeface prepared in Malta under the supervision of Šidyāq was designed in three sizes: a Great Primer (CMSS1) and an English (CMSS2) to replace the types supplied by Watts (respectively, CMSW1 and CMSW2) and a larger type in Double Pica size (22pt, CMSS3) for headings and titles, occasionally used to set entire texts. A fourth type was also available for titles but in the *tulut* style (CMSS4): being larger than CMSS3, it is probably a 2-line Pica size (24pt) or more (Figure 8.47 and Figure 8.48).

The two smaller sizes of Šidyāq's types have been described as 'considerably more authentic than their predecessors, being fair reproductions of good *naskhī* styles. They do, however, inherit a few of the Martin characteristics, as well as introducing some oddities of their own, such as the curiously lopsided isolated *nūn*'.³⁹ On the other hand, the CMSS3 type has been described as 'impressively calligraphic' and as being 'of extreme beauty of script excellence and typography'.⁴⁰ This type was chosen for the typographic analysis, mainly because the larger size shows the features of the new design with more definition; a table of characters is included in one of the Malta editions from 1839 (Figure 8.49).

37. This slant was not homogeneous and disturbed by the poor design of certain characters, such as the *lām-mīm* ligature that looks like is falling backwards.

38. The type did not particularly benefit from the use of the *kašida* sorts widely used in the book of the ABCFM employing the same type (Appendix 129).

39. Ibid. The successor of Jowett at the Malta Press Christoph Schlienz described them collectively as 'the most perfect types in Arabic that I have ever seen', Roper, 'Arabic Printing in Malta 1825–1845', 125.

40. Roper, 'Arabic Printing in Malta 1825–1845', 261.

The new types of Šidyāq are indeed more calligraphic and overall characterised by high level of clarity and distinctiveness. However, they still present shortcomings that failed to fulfil his intention to ensure – as the maker of the calligraphic models – ‘that type styles reflected the best scribal norms’.⁴¹ The stroke modulation and weight distribution is still problematic and not consistently handled: some letterforms are rather monolinear and others are highly contrasted (Figure 8.50). The shaping of the letterforms improved, as well as the observance of proportional relationships and adherence to the *nash* style, but there are a few exceptions. Likewise, for the handling of common elements between letterforms that overall appear more coherent.

In the CMSS3 type, the ġīm letter group in medial and final position shows for the first time a curved top stroke, closer to calligraphic practice; this is also shorter to provide a better fitting for the connecting characters. The usage in the text of the ġīm letter group reveals more variants for the final position and the use of different techniques to allow typesetting on one or two levels of composition (Figure 8.51). The bā’ and the sīn letter groups are also significant for the visual evaluation of the typeface, especially regarding the varying orientation of the denticles that creates unpleasant word-images. Furthermore, it appears that there are two variants of short and tall teeth, but their difference is too subtle and their use is not consistent (Figure 8.52 and Figure 8.53).

The positioning of dots in CMSS3 is also overall improved in comparison to Watts’ types, although the shaping is not homogeneous.⁴² Worthy of mention is the existence of two variants for the initial bā’ and yā’, with differently positioned dots, to avoid clashes with the tails of rā’/zā’ and wāw. It should be noted, however, that these are not consistently used and the positioning of the dots could be improved (Figure 8.54). The CMSS3 type also improved the vocalisation and the connection between characters, which is almost seamless; the remaining issues are more related to the alignment of the typeforms than the gaps between the sorts that are reduced to a minimum (Figure 8.55). On the other hand, the fitting is too loose especially in terms of intraword spacing; this is mainly due to the justification of the text (Figure 8.56). As previously mentioned, Šidyāq’s Arabic types introduced the use of full punctuation for Arabic, but the proposal was not successfully received in the Middle East (Figure 8.57).

As highlighted by the analysis, the types of the CMS Press were influential to the development of Arabic typography, especially those made with the involvement of an important Arab figure like Šidyāq. On the other hand, it is undeniable that the most critical contribution is attributable to the growing awareness regarding the acceptance of Arab readers, which encouraged the replacement of flawed and inadequate types with new ones that could be better suited for the intended purpose. In other words, Šidyāq’s types hold more significance in relation to their functional aspect than for their printed image, which is not faultless. Furthermore, the types’ value lies in the attempt to meet the readership’s expectation rather than in fulfilling it through the typographic reproduction of the script.

41. Roper, ‘Fāris al-Shidyāq’, 219.

42. It appears that in the CMSS3 type the dots are cast together with the base-forms.

8.4.2 The American ABCFM Press in Beirut

One of the most important Arabic missionary presses in the nineteenth century was that of the American Board of Commissioners for Foreign Missions (ABCFM), a body founded in Boston in 1818; in the same year, the Board decided to establish a mission in Jerusalem and parts of Western Asia.¹ One of its missionaries, Daniel Temple, was sent out in 1822 with a small press to serve the American missionaries in the Mediterranean: the chosen location for the printing office was initially Malta because, being under British rule, it represented a safe place for the mission.² By the end of 1833, the Board decided to remove its establishment from the island and to set up separate presses: one in Smyrna (modern İzmir) for Armenian, Greek and Turkish, and one in Beirut for Arabic.³

The American mission arrived in Malta at the same time as the British CMS, discussed in the previous section. The two Protestant Missionary establishments shared a similar interest in the Middle East and invested in printing as an evangelical activity;⁴ they eventually cooperated.⁵ Furthermore, they faced the same difficulties regarding the activity of the printing offices due to delays caused by the lack of a competent printer and of people knowing the Arabic language, in addition to continued difficulties with the same defective Arabic types cast by Richard Watts in London.⁶ These were obtained 'through the good offices' of William Jowett, Superintendent of the CMS, but delivered only in late 1829, four years after the missionary Jonas King was sent to Europe to secure them.⁷ By then, the qualified printer Homan Hallock had arrived in Malta, but Temple reportedly was unable to work well with him; moreover, neither of them knew Arabic. A new American missionary, Eli Smith, had been sent to Malta specifically to undertake the preparation and publishing of Arabic works for the ABCFM Press but, for various reasons, no progress was made.⁸

1. Geoffrey Roper, 'The Beginnings of Arabic Printing by the ABCFM, 1822–1841': 50. See also Faith L. Winger, 'Books and the Early Missionaries in the near East', *The Journal of Library History* (1966–1972) 6, no. 1 (1971): 21–33 and Auji, *Printing Arab Modernity*.
2. It should be noted that the American Board established printing offices all over the world besides those of Malta and Beirut discussed in this thesis, see J.F. Coakley, 'Printing Offices of the American Board of Commissioners for Foreign Missions, 1817–1900: a Synopsis', *Harvard Library Bulletin* 9, no. 1 (1998): 5–34.
3. Whilst in Malta, the ABCFM Press printed only in Italian, Greek and Armeno-Turkish (Turkish using Armenian characters) and nothing in Arabic, despite some scholars having claimed otherwise, see Roper, 'The Beginnings of Arabic Printing by the ABCFM': 55–57. The ABCFM Press in Beirut came to be known simply as the 'American Press', Coakley, 'Mission Presses in the Ottoman Empire': 101.
4. Coakley, 'Mission Presses in the Ottoman Empire': 97.
5. Despite being sent from Beirut by American Missionaries to work with them in Malta, Fāris aš-Šidyaq was employed by the CMS Press since they were already set for printing Arabic. In turn, the CMS produced editions supplied to the American missionaries, especially in Lebanon, and was willing to accept commissions from them. Roper, 'The Beginnings of Arabic Printing by the ABCFM': 52–54.
6. A.L. Tibawi, *American Interests in Syria 1800–1901* (Oxford: Clarendon Press, 1966), 72.
7. He had succeeded to obtain quickly only the Armenian type that the ABCFM Press started using in 1828, Roper, 'The Beginnings of Arabic Printing by the ABCFM': 53–54.
8. Ibid., 54–55. Smith almost immediately travelled to Egypt and Lebanon to improve his knowledge of Arabic; he later went to Armenia, Turkey and America, returning to Malta only in October of 1833. Further issues arose from the management of Šidyaq's service between the CMS and ABCFM presses.

The ABCFM Press started printing in Arabic only after its move to Beirut in 1834, not without difficulties: Hallock, the only professional printer, was stationed in İzmir, whereas the Beirut office inherited a press and Watts' defective and unused Arabic types.⁹ Moreover, there was a shortage of Arabic texts ready for printing, due to the fact that the Mission had insufficient staff proficient in Arabic.¹⁰ Smith did not settle in Beirut until 1847, thus the Press resorted to Christian Arab writers to provide content and support in translating and correcting Arabic texts; one of them was Nāṣif al-Yāzīgi, employed as a corrector and author of the Arabic grammar *Faṣl Al-Khitāb* published in 1836.¹¹ In 1835 George Percy Badger served for one year as the printer of the ABCFM in Beirut, after being trained by Hallock. At the end of his one-year contract, Badger returned to Malta to work for the CSM Press; he was succeeded at the American Press in Beirut at first by his young apprentice, and by George Hunter from 1841.¹²

During his time at the ABCFM, Badger attempted to remedy the defects of the Watts Arabic types available to the Press, obtaining thirty additional sorts 'cut and cast at the Hebrew press at Safad in Palestine' while others came from the ABCFM Press in İzmir.¹³ As a consequence, the first types used by the ABCFM in Beirut (APBW1 the larger and APBW2 the smaller, see Appendix 129) mixed old and new sorts, which contributed to a different appearance from the original design of the Martin-Wilkins typeface (from which Watts' Arabic type derived).¹⁴ Eventually, the troublesome Arabic types of Watts in use at the ABCFM Press in Beirut were replaced: like Jowett at the CMS Press in Malta, Eli Smith was also determined to adopt a new typeface based on calligraphic models.

The new Arabic types manufactured in Beirut/Leipzig

The need for a new Arabic typeface highlights more similarities between the printing ventures of the CMS and the American missions, particularly the awareness shown in recognising the deficiencies of the Watts' typeface and in identifying the reason at the root of its inadequacy for Arabic printing. As stated by the Board Secretary Rufus Anderson: 'As it did not conform to the most approved standard of Arabic calligraphy, it did not meet the popular taste'.¹⁵ Similarly, the two missions were concerned with the acceptability of their Arabic types in relation to the intended readership, which in turn was the criterion used to evaluate their work and that of others. In mentioning previous 'good' Arabic type available in Europe,¹⁶ the author of the *Annual Report* of the Board dated May 1844 observed that:

9. In addition, it received a lithographic press in 1833, used to produce the first works in Arabic (spelling cards) and installed a power press in 1852, when it was occupied with printing the Bible, see Coakley, 'Printing Offices of the American Board': 14.
10. Roper, 'The Beginnings of Arabic Printing by the ABCFM': 57.
11. Ibid., 58 and Appendix 129. Other local helpers were employed, more as teachers in the Missions' schools than as authors.
12. Ibid., 60.
13. Ibid., 59, 61. Roper reports that Badger received also punches and matrices from which he cast letters and leads having made the moulds himself. Before Badger's intervention, Smith had tried to order supplementary types from Paris, that turned out defective, and arithmetical sorts from Boston.
14. Ibid., 61. See also § 7.2.2 and § 8.4.1.
15. Rufus Anderson, *History of the Missions of the American Board of Commissioners for Foreign Missions to the Oriental Churches*, Vol. I (Boston: Congregational Publishing Society, 1873), 233.
16. The mentioned Arabic types are: a *nasta'liq* produced in Vienna; a *nash̄* in Paris under the direction of de Sacy (possibly the SCPF2 type in this thesis, originally of the Propaganda Fide but retouched in Paris at the Imprimerie Royale, see § 7.1.3); one in London (probably Watts' type). Moreover,

none of these are satisfactory to the Arabs themselves, who are fastidious in their taste, and great admirers of fine manuscripts. Not more satisfactory to them are the fonts used in their own printing offices at Constantinople and Cairo. For this reason, the Rev. Eli Smith was authorized, in 1837, to prepare a new font, with the aid of Mr. Hallock, then at Smyrna. This was done with great care, after a comparison of a large number of the most beautiful specimens of Arabic calligraphy, and with the advice and approval of the most learned and skilful Arab and Turkish judges at Cairo, Jerusalem, Beirut, Smyrna, and Constantinople.¹⁷ From that font, which is now in constant use in Beirut, the middle specimen is taken (Figure 8.58).

In another Report of the Board dated September 1844, the question of acceptability is listed as the first advantage of the new Arabic type (eventually produced in 1841) compared to the old Watts' types:

1. It is vastly superior in respect to *the form of the letters*. Such is the uniform and decided testimony of intelligent natives everywhere. Our books are incomparably more acceptable than those which were printed with the old type; more acceptable we may safely say, in respect to typography, than any that were ever printed in the language. And not only are the letters more beautiful than the old; but bearing a closer resemblance to the best calligraphy, they are, of course, far preferable for the use of schools and especially for all who are learning to write.¹⁸

A similar observation is made by the punch-cutter himself in his short autobiographical memoir dated 1883.¹⁹ Praising his Arabic type for being 'so complete an imitation of the very taste of the manuscript', he remarked that he succeeded to satisfy and please the Arab readers, something that a multitude of people in England, France, Germany, Constantinople, Damascus and Egypt had failed to do.²⁰

Regarding the calligraphic models, it is reported that Eli Smith sought to procure a treatise on Arabic calligraphy²¹ and that in 1836 he embarked from Beirut to Smyrna to supervise the cutting of a new fount by Hallock 'with specimens of Arabic letters written by recognised calligraphers in Cairo, Mt. Lebanon, and Syria'; these were lost in a shipwreck. Nevertheless, in the same year, Smith was able to obtain other specimens in Constantinople 'by renowned Turkish and Arabic writing masters [...]. Of these he most joyfully took possession and found in them a key on which he could rely implicitly for all the ovals and curves, slopes and other nice forms and proportions for which this writing is so remarkable'.²²

two types in Germany: one prepared at the expense of the Prussian government (i.e. the BT type) and the other produced by the Tauchnitz foundry in Leipzig (i.e. the FT type, used to print Flügel's *Qur'ān*, see § 7.2.2.).

17. *The Missionary Herald*, Vol. XL (Boston: Press of T. R. Marvin, May 1844), 171.
18. *Thirty-Fifth Annual Report of the American Board of Commissioners for Foreign Missions. September, 1844* (Boston: Printed for the Board, by T. R. Marvin, 1844), 135.
19. The memoir was written when Hallock was eighty years old apparently for family circulation although it was eventually printed in 1929: Homan Hallock, *The New Arabic Type* (New York: Privately printed, 1929).
20. *Ibid.*, 3–4. Curiously, he does not mention Italy.
21. 'A competent calligraphist was found ready to copy all the rules governing Arabic letters, separate or joined, for a fee of 350 pilasters, and he needed two months to complete the work', see Tibawi, *American Interests in Syria*, 81. From a letter dated 17 September 1835 from Jurus Ilyān to Eli Smith.
22. Hallock, *The New Arabic Type*, 4. These calligraphic specimens were 'drawn with a most infinite care and perfectly measured in every direction, which the great Turkish masters use in instructing others to write', see Coakley, 'Homan Hallock, Punchcutter': 23–24.

This collection of Arabic samples were used by Homan Hallock to make the punches of the new type. As the punch-cutter remarked, despite being 'wholly un-acquainted' with the script, he accepted to make a trial: in preparing for the 'almost hopeless attempt' he resorted to 'some mechanical contrivance which should be a substitute for genius and taste and skill'.²³

An accurate report on Hallock's Arabic type-making process is given by scholar J.F. Coakley in an article that draws largely on the Archives of the ABCFM in Houghton Library, Harvard University.²⁴ This document – together with Hallock's memoir previously mentioned – collects the significant testimony of a punch-cutter's process of trial and errors in making an Arabic type, possibly for the first time. Referring to Coakley's source for the detailed account, it suffices here to note some important points regarding Hallock's technical innovations that influenced the making of the American Press' new Arabic typeface, which came to be known as 'American Arabic'.²⁵

Hallock's most important invention to handle the Arabic type-making was a pantographic device²⁶ to trace the outlines of the letters from the pattern onto the surface of the punches 'larger or smaller according as the gauge is set, in all exact proportions'.²⁷ Hallock began making the Arabic punches in Smyrna in February 1837, from a set of about two hundred patterns prepared by Smith (i.e. reduced and re-drawn for tracing); after five months about 100 of them were ready. However, Hallock had an idea for replacing his device with an improved kind of pantograph that allowed tracing larger-sized models²⁸ (Appendix 131): the prospect of having more accurate punches that could possibly enable consonants and vowels to occupy the same matrix persuaded Smith to re-draw larger patterns and start 'almost anew'. In the space of seven months (January–July 1834) Hallock prepared a new set of 240 punches: the first proof of type cast from matrices prepared by Hallock himself had vowels cast on (Figure 8.59). Despite having a device to facilitate the driving of the matrices – called 'slope-gauge' – the results obtained did not satisfy Smith. It is perhaps for this reason that Hallock re-evaluated the handling of the marks, deciding against matrices that

23. Hallock, *The New Arabic Type*, 4–5.

24. Particularly on Hallock's correspondence with members of the Board while in Malta, Smyrna, and after his return to the United States, see Coakley, 'Homan Hallock, Punchcutter': 20, note 7.

Equally important are the personal papers (i.e. missionary and family correspondence) of Eli Smith, acquired by the ABCFM in 1944 and now assembled under the Houghton call number ABC 60, see Coakley, 'Homan Hallock, Punchcutter': 20, note 7. The letters with more relevance to this study (e.g. the time Smith was in Leipzig) appear to be contained in ABC 60 vol. 2 no. 105: 'Letters to various correspondents, 1826–1856. 18 folders'. There are further papers of Smith, in Arabic, in ABC 50 which have not been consulted. The author is indebted to Dr. J.F. Coakley for pointing out this body of documents and for kindly sharing a copy of Smith's letters mentioned in this section, including the transcriptions quoted.

25. See, for instance, George Antonius, *The Arab Awakening. The Story of the Arab National Movement* (London: Hamish Hamilton, 1938), 42 and Miroslav Krek, 'Some Observations on Printing Arabic in America and by Americans Abroad', *Manuscripts of the Middle East* 6 (1992): 85. According to Vrolijk, it was known as the 'American' typeface in Beirut, to distinguish it from the 'Stambouli' type of the Imprimerie Catholique (discussed in § 8.4.3), Vrolijk, "The usual Leiden types", 127.

26. Which he also designated with the terms 'broomhandle' or 'scratching machine'. This device appears to pre-date the earliest punch-cutting machine (a pantograph engraving machine) developed by the American Linn Boyd Benton and patented in Great Britain in 1885, although the pantograph was adapted to the manufacture of wood type in 1834, see Legros and Grant, *Typographical Printing-Surfaces*, 195–96. Further research is necessary to establish the differences between the machines.

27. Coakley, 'Homan Hallock, Punchcutter': 24. See also Hallock, *The New Arabic Type*, 5.

28. 'It may now trace a letter or figure a foot in diameter, whereas before it could not well draw one of more than half or three fourths of an inch', Coakley, 'Homan Hallock, Punchcutter': 25.

included vowels. This resulted in a reduced set of 300 matrices instead of 834, 'the smallest number of matrices needed to include all the letter-plus-vowel combinations', saving Hallock not only time but also a few troubles in the matrix-making process.²⁹

An important technical innovation for Arabic vocalisation: the grooved types

The casting of the type was entrusted to the renowned German foundry of Carl Tauchnitz in Leipzig, where Smith stayed between October 1838 and June 1839: during this time, a font of type was made consisting of 1,200 sorts.³⁰ The size of the type was double pica (22pt).³¹ The decision to resort to a commercial foundry, apparently in agreement with Hallock, was probably motivated by the complexity of the operation, taking into account the unresolved matter of the vowels and the 'variable baseline of the letters in Arabic'.³² These two technical aspects are of great significance for the understanding of Arabic typography with foundry types: the 'American Arabic' greatly contributed not only to the introduction of innovations for both these elements but also to the documentation of some aspects of Arabic type-making.

Regarding the first matter of the vowels, the technique devised to handle vocalisation was recognised by the Board as the second advantage of the new Arabic type (in addition to the first one mentioned above), explained as follows:

2. Another advantage of the new type arises from an expedient in relation to the vowel points. In printing with the old type the vowels are set up in separate lines above and below the lines of letters — every line of letters requiring two lines of vowels. This makes the work of composing very slow and difficult. Besides it separates the vowel point so far from the letter that oftentimes the reader is at a loss to know whether it belongs to the line above or to that below it. Moreover, the vowels are constantly liable, especially in correcting proofs, to be displaced horizontally and so to be brought over or under the wrong letter. But in the new type an expedient has invented which obviates both these evils, and which is believed to be entirely new. It consists in having the vowel attached to, or rather inserted in the letter itself, by means of a groove; in such a manner that it cannot get out of place, and is brought so near the line that the mistake of referring the vowel to the wrong line is never made. Besides, the time and labor of composing, when the vowels are used, are by this system diminished at least one half. Also the labor of correcting the

29. As remarked by Coakley, some matrices must have been the product of three punches (base-character, diacritical point, and vowel). However, it is worth noting that on other occasions Hallock changed his method of working for making the matrices. For instance, it is reported that during the making of his second Arabic type, he preferred to strike the matrices with individual punches that contained both the base-forms and the diacritic dots, because he found impracticable to drive correctly the matrices striking them with separate punches (one for the base-character and one for the dots). *Ibid.*, 26, 32.

30. Intended as individual letterforms (thus in terms of character set). This number 'did not include vowels, numerals, and several such things'. Smiths stated that of the 1200 sorts more than 550 'occur so rarely that they need not be in the cases which are constantly in use', to reassure those printers that might be frightened by such large number. From the letter 'Eli Smith to Hallock, Leipzig, 1 April 1839'.

31. Coakley, 'Homan Hallock, Punchcutter': 27. In the specimen of the Imprimerie Catholique (Appendix 137) the type was indicated as a 23pt; at Brill, it was indicated as a 24pt, see the catalogue from 1938.

32. *Ibid.*

vowels is rendered comparatively trivial; for when a vowel is to be changed it is simply to be taken out of the groove and another dropped into its place.

In printing with the vowel points there is also a saving of paper, in the use of the new type. By a careful comparison of the old and new founts, it is found that in the use of the latter there is a gain of ten per cent in *compactness*; and a gain of about eight per cent in respect to *space between the lines*. This remark applies only to printing *with the vowel points*.

When the points are not used there is no saving of paper.³³

This technical innovation originated at the stage of casting the type at the Tauchnitz foundry, as described by Smith in the letters sent from Leipzig to Hallock in Smyrna to update him of the progress in the manufacturing of the type. In two passages of these letters, Smith included a sketch to visualise and describe the form of the grooved type (i.e. sort) (Figure 8.60); a more illustrative example is included in Legros and Grant's book, *Typographical Printing-Surfaces*, where the grooves are designated with the term 'recesses'³⁴ (Figure 8.61).

Without dwelling on the details of the process – that would require a more in-depth work on the correspondence³⁵ – Smith describes that the groove 'is 1½ lines wide and 3½ high, and the vowels are cast on a body of that width and height. The body of the letters, in order to admit of the vowels thus, is much longer, viz. [sic] 15 lines high, 5 lines being left below the lowest letters, instead of 4 as we calculated'³⁶ (Figure 8.62). In the letter, Smith describes that Tauchnitz's workman had to make four moulds: the first was grooved to cast letters for use with separate vowels;³⁷ the second mould served to cast narrow letters that were too thin to admit of the groove;³⁸ the third mould without grooves was used to cast letters on a body 15 lines high (most of the letters were cast from this mould); the fourth mould was for the vowels (Figure 8.63).

A further important piece of information about the technical aspect of this fount's manufacture was that the characters were cast on five different alignments:

I have said that 5 lines are left below the lowest letters, instead of 4 as we calculated. Five, thus, is the line on which all the matrices are fitted up, i.e. those which join with other letters. Letters are then cast on a higher or lower line from these same matrices, not by means of different pieces fitted to the

33. *Thirty-Fifth Annual Report*, 135.

34. Legros and Grant, *Typographical Printing-Surfaces*, 542. An interesting variation of the concept of the grooves for the insertion of diacritic dots has been found in a set of wood types from Roman Scherer, Lucern, c. 1930 (Appendix 133) and in the Arabic wooden letters used at the Egyptian Būlāq Press in 1820 (Appendix 134). The complete set of Scherer is in the personal collection of Professor Rudolf Barmettler of Zurich University of the Arts (ZHdK) whereas a reconstructed sample of this type is in Fiona Ross' personal collection. I am indebted to Professor Rudolf Barmettler for sharing this example and to Fiona Ross for making me aware of it.

35. Firstly for the complete transcription of all the letters, operation not straightforward due to the fact that the documents are copy-book copies (like carbons) that, in addition to Smith's handwriting, are not easy reading.

36. From the letter 'Eli Smith to Hallock, Leipzig, 1 April 1839'.

37. Ibid. Smith added: 'The grooved mould has a double set of pieces, which determine the size of the body (I do not know what they are called). So that if it be required, a type can be cast grooved at the end instead of the beginning, & also both at the end & beginning'.

38. Ibid. Smith continues: 'so it happens that they, with only one exception, are just the width of the groove itself, so that we have them cast on a body 8 lines high, & then they admit the vowels above and below them. What we shall do with the exception I do not yet know'.

mould at the head of the matrices, but by a screw at the place. This was a suggestion of the maker of the mould, who said it was a French improvement.³⁹ All the moulds were adjustable with the screw system, even the one for the vowels; Smith describes them as 'beautiful specimens of exact workmanship'⁴⁰ (Figure 8.64). From the information which can be gathered from Smith's account – of which only a part has been reported⁴¹ – the manufacturing of the Arabic fount in Leipzig was slow and troublesome. After ten months of work, the type was eventually sent to Smyrna – with the moulds and matrices – in August 1839.⁴² However, a few issues delayed the delivery of the finished type to the ABCFM Press in Beirut, where it arrived only in April 1841, brought by the new assigned printer George Hurter; two months later, Hallock left Smyrna to return to America.⁴³ The first appearance of the new type was in the *Acts of Apostles, Al-Abrahsays ay Akhbār al-Rasul* printed in July 1841 in 2000 copies,⁴⁴ followed by a Gospel extract, *Qissat ālām Sayyidinā Yasū 'al-Masīh* in 1842, and four more volumes in the same year.⁴⁵

On the challenges of typesetting the 'American Arabic' type

Having stressed the significance of the technical innovations introduced by the American Arabic type cast in Leipzig, it is important to give a brief insight to the disadvantages caused to the usage of the type by the manufacturing decisions, especially in terms of its typesetting. A first observation comes from Jules Ferrette, the missionary in Damascus who had introduced a simplified method to vocalise Arabic in 1859.⁴⁶ Although he recognised the advantage of Tauchnitz's groove system for the quality of the vocalisation of the Arabic text, he remarked on the difficulties that this method caused to the compositors: 'Ce système a le grand avantage de prévenir le glissement de la ligne des points sur celle des consonnes; mais la composition devient nécessairement très lente, en sorte que l'on perd d'un côté ce que l'on gagne de l'autre'.⁴⁷

Another important testimony comes from the Brill company that acquired the 'American Arabic' type (designated at Brill as the 'Beyroot type') in view of using it to print the large edition of the *Annales of al-Tabarī* by M.J. de Goeje published by Brill between 1879–1901.⁴⁸ The choice of the 'American Arabic' was initially made

39. Ibid.

40. Ibid. The technique of the screw affected Smith's calculation for the line height at which to cast the letters (originally on 4, 5 1/4, 5 1/2 & 9). Smith eventually added a fifth line between the last two, so that the letters were finally cast on 5, 5 1/2, 7 1/2, 8 3/4 & 10. Smith had supplied a table with the calculations for the whole fount as a guide for the typefounder. In the letter, he states that the table would be sent to Hallock with the delivery of the type, and 'explained by a special letter'.

41. There are additional letters sent to Hallock in which Smith gives a further account of the process of trial and error for the making of the type, the handling of vowels, the making of the moulds, etc. An important letter of this kind is that dated 16 December 1838.

42. It was agreed that Tauchnitz would receive a set of the matrices. Hallock had been instructed to remake a large number of matrices and some punches before the type was delivered to the ABCFM Press in Beirut. It is known that the number of the matrices made at Tauchnitz was 310, although in 1852 Hallock inventoried 389 matrices. See Coakley, 'Homan Hallock, Punchcutter': 27–28, 32.

43. Ibid., 28.

44. Roper, 'The Beginnings of Arabic Printing by the ABCFM': 62, 66.

45. One of them is shown in Appendix 132.

46. Discussed in § 3.3.3.

47. 'This system has the great advantage of preventing the slippage of the line of points on that of the consonants; but the composition becomes necessarily very slow, so that one loses on one side what one gains from the other', approximately translated by the author, from Ferrette, *Méthode Simplifiée*, 13.

48. The type was acquired in three sizes, 'large, text letter and a smaller size for the notes', Vrolijk, "The

on the basis that it would appeal more to the Arabic readers in Muslim countries than the old-fashioned types used at Brill (i.e. the BT type).⁴⁹ Eventually, the idea was discarded in favour of the BT type due to the compositors' issues to master 'the many difficulties' of typesetting with the 'Beyroot type': 'The complexity of the fount with its eight or nine hundred combinations and its unfamiliar method of inserting vowels simply proved too much for Brill'.⁵⁰

The 'American Arabic' was later used by Brill in 1886 and 1889,⁵¹ when the printing house temporarily hired a 'Syrian compositor to handle the material and train the Dutch typesetters, apparently with success'.⁵² Nothing is known about the identity of this Syrian typesetter besides that, before being engaged by Brill, he worked for a certain time at the Imprimerie Nationale in Paris; attempts to trace more information about this man at the archive of the Brill company have been fruitless so far.⁵³ A testimony about the Syrian composer comes from an interview⁵⁴ with the Dutch Kloos,⁵⁵ who took over from him after working at Brill for a year: 'the Arab had claimed that no Dutchman could ever learn it, for even his own countrymen needed a whole year to become proficient in setting the Beirut types'.⁵⁶ However, after only three months of working alongside with the Syrian composer for the typesetting of Landberg's *Primeurs Arabes* printed in 1886–89, Kloos had eventually learned 'the ins and outs of this fount [...] typesetting just as quickly'. It is reported that after the departure of the Arab before the work was finished, Kloos was able to complete the last six sheets on his own although 'he does not really understand what he is typesetting'.⁵⁷ In commenting about the 'American Arabic', Kloos lamented that the main difficulty was the insertion of the vowels in special incisions (i.e. the grooves) to have one line of typesetting instead of three (Figure 8.65), besides the issue of the large character set. By his own admission, Kloos added that for a Dutch typesetter,

usual Leiden types", 129.

49. 'As it seems probable that the Annals [sic] will be so in demand in Moslem countries, we resolved to try whether we could find types agreeable both to European and Oriental taste. Our choice fell upon those employed at Beyroot', Vrolijk, "The usual Leiden types", 126.
50. *Ibid.*, 127.
51. The 'Beyroot type' appeared first in the Brill catalogue from 1883, and later in those of 1931 and 1938 (Appendix 135) that show the three sizes purchased. It was also used between 1936 and 1955 for an edition aimed at the Muslim world, the *Concordance Et Indices De La Tradition Musulmane* by A.J. Wensick.
52. 'A real Arab compositor from Damascus', Vrolijk, "The usual Leiden types", 127–28, 131. However, Vrolijk thinks that he was most likely a Lebanese (parts of what was then Syria is now Lebanon), Vrolijk, e-mail message to author, 17 May 2016.
53. Vrolijk, "The usual Leiden types", 127–28. The author is indebted to Dr Menno Polak, curator of Book Historical collections at Amsterdam, who has scanned without success Brill's archive (currently inaccessible) in search of information on this matter. According to Polak, very little has survived from the nineteenth century, although the archive holds copies of outgoing letters from 1870, which might contain records of the hiring or of the work of this typesetter. A similar search should be attempted in the archive of the Imprimerie Nationale.
54. The interview was conducted by Marie Joseph Brusse, a Dutch journalist, and published on the 7th January 1927 (with no specific title) in the *Nieuwe Rotterdamsche Courant* (NRC), where he had a column called 'Onder de Menschen' ('Among the People'). The interview, translated in English, is included in Vrolijk, "The usual Leiden types", 128–32.
55. Apparently, Willem Hendrik Kloos, born in Leiden in 1850. He had started working at Brill around 1878 and at the time of the interview he had forty-eight years of service behind him: he was the oldest Arabic compositor at the printing press of Brill, Vrolijk, "The usual Leiden types", 120.
56. *Ibid.*, 131.
57. *Ibid.*, 132.

however much familiar with Arabic, it was quite impossible to execute the work of typesetting with the 'American Arabic' to satisfaction.⁵⁸

The 'American Arabic' type family

Ahead of a closer analysis of the type, it should be noted that the term 'American Arabic' is often loosely used by scholars to designate the typeface designed by Homan Hallock – the type family as a whole or part of it – without necessarily referring to a body size in particular. In this thesis, the first nash text type made by Hallock from Smith's models and cast in Leipzig – the double pica size – is designated as APBH1: a progressive number is assigned to all other types, in correspondence to the table compiled by J.F. Coakley⁵⁹ (Figure 8.66). After moving back to America in 1841, Hallock indeed supplied more Arabic types to the ABCFM.⁶⁰ Speaking about his Arabic types in his memoir, Hallock mentions the completion of 'the same series of seven fonts of Arabic punches, matrices and type', later adding: 'I made seven different sizes of type, embracing some four or five thousand steel punches'⁶¹ (in two languages, Arabic and Turkish). However, it appears that Hallock made nine Arabic types (as listed in the table compiled by Coakley): therefore, it is not clear which types Hallock did not consider as part of the same 'series' (seemingly intended as the 'American Arabic' type family).⁶² Despite the lack of clarity on this specific matter, it is certain that no other Arabic type existed in such a range of sizes as the 'American Arabic' type family.⁶³

Three sizes of Hallock's types appear in the *Kitāb Rawdat 'Al-'Adab Fī Ṭabaqāt Shū'arā' Al-'Arab* by Iskandar ibn Ya'qub Abkāriyūs, printed in Beirut in 1858 (Figure 8.67). The most important book published by the American Press in Beirut was certainly the translation of the Bible in Arabic, *Al-Kitāb Al-Muqaddas*, a work 'almost universally praised'.⁶⁴ Initiated by Eli Smith, the work was completed by his successor Cornelius Van Dyck,⁶⁵ the New Testament appeared in 1860 (using the APBH3 type) and the whole Bible in 1865 (using APBH1, APBH2, APBH3 and the titling fonts, Appendix 136): the printing was done in Beirut and the 'electrotyping'⁶⁶ of a new edition in 1866 in New York, overseen by Van Dyck; a fully vocalised edition appeared in 1871.⁶⁷

58. Ibid., 129.

59. For this reason the number's progression is not chronological, but matches as much as possible the names of the fonts given by Hallock or with which they were known in Beirut, according to the records of the ABCFM. See also Coakley, 'Homan Hallock, Punchcutter' 35, note 92.

60. Refer to Coakley, 'Homan Hallock, Punchcutter' for more information about Hallock's work from America on the other Arabic type sizes and, additionally, the 'experimental' Arabic from 1864, possibly the precursor of the Arabic script reform proposed by the Cairo Academy in 1933.

61. Hallock, *The New Arabic Type*, 3–4.

62. Hallock gives a different account of his Arabic types in other sources, see Coakley, 'Homan Hallock, Punchcutter': 35. Further research is required to clarify this matter.

63. Coakley, 'Homan Hallock, Punchcutter': 35.

64. Margaret R. Leavy, *Eli Smith and the Arabic Bible* (New Haven, Connecticut: Yale Divinity School Library, 1993), 21.

65. It was revised by some of the Lebanese Arab helpers engaged by Smith, such as Butros al Bustāni, Nāṣif al-Yazījī and Yūsef al Asīr, Nasrallah, *L'imprimerie Au Liban*, 51. See also Leavy, *Eli Smith and the Arabic Bible*, 21.

66. 'That is, the typesetting, plate-making, and eventually printing', see Coakley, 'Homan Hallock, Punchcutter': 34.

67. Glass, *Malta, Beirut, Leipzig and Beirut Again*, 26. See Figure 8.77.

Besides the use in Europe by Brill, and that of the ABCFM Press, the 'American Arabic' appeared in other nineteenth-century Christian and Muslim publications, including Lebanese periodicals, newspapers and magazines.⁶⁸ The 'American Arabic' type family began indeed to be sought by other presses such as the Jesuit Imprimerie Catholique in Beirut,⁶⁹ furnished in 1860 or 1870 'with types in six sizes from which to make electrotype matrices', and the Dominican press in Mosul that received 'three cast fonts'.⁷⁰ However, towards the end of the century, it disappeared within the Arab world, where it was successively replaced by indigenous Arabic types.⁷¹

Type analysis

The 'American Arabic' typeface is regarded by scholars as a notable success, due to its popularity in the nineteenth century and 'in view of the acceptance that it subsequently gained in the Arab world'.⁷² The first evidence of its reception with Muslims is the response Hallock received on showing a 'writing master' in Smyrna the first proof sent by Smith from Leipzig: 'in general it is good'.⁷³ Smith himself recorded his enthusiasm for the new typeface in a letter written to Hallock in 1838: in speaking about the shape of the letters he stated 'it is either good, or I know nothing about Arabic calligraphy. My expectations are more than realized [sic]. I think we may consider our efforts as having met with entire success'.⁷⁴

Nonetheless, the typeface had some drawbacks that Roper specified as being 'somewhat ill-proportioned, with the vertical strokes too thin in relation to the curves and horizontals, and an exaggerated forward slope'. Whereas the first and last observations appear legitimate, it does not seem that the thickness of the ascenders is an issue, at least not in the APBH1 type⁷⁵ (Figure 8.68). From a style consistency point of view, the type shows a high level of adherence to nash (Figure 8.69), with occasional exceptions; moreover, some letterforms would benefit from a more accurate shaping and more control over the relative proportions (Figure 8.70). The design at an angle of some letterforms (in initial position) fails to reproduce the slant along the joining line of the nash style according to calligraphic practice because the rest of the characters join sitting flat on the notional baseline (Figure 8.71).

Regarding the implementation of the rule-based system of the Arabic script, the APBH1 type shows a good attempt to fulfil its requirements, without fully accomplishing it (Figure 8.72). The attention to adhering to manuscript practice can be noticed in a few details and in a new approach to certain elements that add to the aesthetic qualities of the type (Figure 8.73). This includes the گim letter group in medial and final position that always requires a multilevel connection. Moreover, the shaping of these letterforms aims to faithfully replicate manuscript practice with

68. Ibid., 25–31.

69. See § 8.4.3 and Appendix 137.

70. Coakley, 'Homan Hallock, Punchcutter': 35.

71. For instance, the 'American Arabic' was replaced by the 'Stambouli' type in the Bible printed at the Imprimerie Catholique (§ 8.4.3) and by the types of İbrâhim al-Yâzîğî in the magazine *al-Dirâ'a* (§ 8.5).

72. Roper, 'The Beginnings of Arabic Printing by the ABCFM': 63.

73. According to Coakley, the letter 'Hallock to Smith, 25 July 1839' also reports the writing master's criticism of certain letters, 'Homan Hallock, Punchcutter': 27, note 43. A different version is reported in Hallock, *The New Arabic Type*, 5–6.

74. Smith continues ascribing the success of the type to the Hallock' skills and the two machines he invented, in particular, the pantograph that has done 'wonders in Arabic typography', from the letter 'Eli Smith to Hallock, Leipzig, 16 December 1838'.

75. The comment might apply particularly to the smaller sized APBH3, although the quality of the impression must be considered in the evaluation of the colour of the typeface.

a top stroke that is shorter for better fitting and inclined for improved joins⁷⁶ (Figure 8.74). The cascading feature of the Arabic script is obtained both by vertical joins of stacked individual letters (more often than with ligatures) and by shifting the sorts used for the standard joins along the notional baseline to the second level of composition (Figure 8.75).

The APBH1 type rarely makes use of letters combined in ligatures; therefore, its segmentation is almost entirely made of individual characters. This approach influences the visual quality of the typeface: the small sorts are indeed more difficult to align and to control during the impression, making the joins between characters rather imperfect and affecting the colour of the type (especially in the smaller sizes). The type shows an attempt to maintain a rounder joining line through the design of some characters and the addition of curved kašida extensions. The latter also serves to improve the fitting, together with additional extended characters and swashed letters, although they are used sparingly (Figure 8.76). Moreover, in addition to the overall balanced fitting, the APBH1 type has a good kerning capacity that contributes to a more compact appearance of the text.⁷⁷ In conclusion, it is worth noting the improved quality of the full vocalisation in the APBH1 type, which proves that the new method produced notable results, however challenging for the compositors (Figure 8.77).

The technical innovations introduced by the 'American Arabic' – and the fragmentary records of the type-making process – mark the significance of this typeface in the development of Arabic typography. As discussed for the CMS Press, the growing awareness in producing Arabic types to accommodate the Arab taste in order to gain acceptance was equally a critical contribution for the ABCFM Press. The popularity of the 'American Arabic' in a number of other Arabic presses in the Middle East testifies that Smith's efforts to meet the expectations of the Arab readership proved somehow successful. This happened predominantly through the recognition of calligraphy as an important tool to inform and guide the type-making process, and subsequently, through the adoption of the necessary technical solutions to accommodate its requirements.

76. The MW1 type proposed a similar solution with a shorter top stroke which was, however, still rigidly horizontal, see Figure 8.40.

77. Like most Arabic foundry types, the fitting tends to be loose, especially in terms of interword spacing. The justification of the text should be taken into consideration as an element affecting the fitting of a type, although the typesetter has a degree of control over the quality of the printed page.

8.4.3 The Imprimerie Catholique in Beirut

The Imprimerie Catholique was an important Arabic press that belonged to the Jesuits mission in Syria.¹ It was established in Beirut for the need to counteract the spread of Protestant literature of the American Press, which was gaining strength through constant printing efforts and the educational work of their schools.² The first editions of the Imprimerie Catholique (ten Arabic books and pamphlets) were printed with a lithographic press installed in 1847,³ from the handwriting of the Maronite priest and calligrapher Abd-Allah Ghousn, otherwise known as Mr Allâm.⁴ A typographic press arrived from Paris in 1852 and two years later the first work was printed in 2000 copies, an Arabic translation of the *Imitation of Christ*. Eventually, the Imprimerie Catholique grew into a large industrial press adding also a steam-powered machine in 1867 and a type foundry around the same time; in 1875 it was moved to the newly established Université Saint-Joseph, becoming a commercial and academic printing house. It was in activity until the late 1970s.⁵ It is reported that together with the press, the Imprimerie Catholique received from Paris also Arabic types 'grèles et décousus'.⁶ These were eventually replaced in 1868 with the Arabic types of the American Press and, in turn, were replaced in 1875 by Arabic types newly appeared in Istanbul.⁷

The adoption of the 'American Arabic' types at the Imprimerie Catholique is ascribed to the priest Elias, who chose them in 1874 for his project of printing the Bible, because they were 'les plus agréable de tous ceux qu'on connaissait en Syrie'.⁸ However, he planned to modify the 'American Arabic' by casting a new fount that had the vowels included in the same sort as the characters and not added separately. This was mainly in an attempt to facilitate and regularise the composition, even though it would have increased the composing case from 825 compartments to 1369.⁹ After he had completed casting the newly modified fount of the 'American Arabic' he came across a new Arabic typeface made in Istanbul, which was preferable 'pour son élégance et sa netteté'.¹⁰ Elias decided to restart the work and adopt the new typeface, designated at the Imprimerie Catholique as 'Stanbouli': this was used from 1875 to print the Bible, *Al-Kitâb Al-Muqaddas*, which was considered as 'one of the most beautiful monuments of Arabic printing'¹¹ (Figure 8.78).

1. Coakley, 'Mission Presses in the Ottoman Empire': 101.
2. *L'Imprimerie Catholique De Beyrouth*, 20 and Nasrallah, *L'imprimerie Au Liban*, 52.
3. The editions are dated 1848–53 but probably no copies survive, Coakley, 'Mission Presses in the Ottoman Empire': 101. A list of the works is in *L'Imprimerie Catholique De Beyrouth*, 18–19.
4. He collaborated with the Catholic Press for many years. Mr Allâm is described as 'the most distinguished calligrapher of all Syria' (perhaps intended as today's Lebanon); 'his classical calligraphic models are adopted throughout the Orient', approximate translation by the author from *L'Imprimerie Catholique De Beyrouth*, 37, note 1.
5. Coakley, 'Mission Presses in the Ottoman Empire': 102.
6. 'Spindly and disjointed', approximate translation by the author, from *L'Imprimerie Catholique De Beyrouth*, 33, note 1. It is not known which were the French Arabic types received.
7. Nasrallah, *L'imprimerie Au Liban*, 53.
8. 'The most pleasant of all those known in Syria', approximate translation by the author from *L'Imprimerie Catholique De Beyrouth*, 34. In that year Elias had returned from an internship at the Imprimerie Nationale to learn the art of printing.
9. *L'Imprimerie Catholique De Beyrouth*, 34.
10. Ibid. 'For its elegance and sharpness', approximate translation by the author.
11. Ibid., 34, 67. The Bible was sent to the exhibition in Paris in 1878 where it received a gold medal for being superior to all the known Arabic publications of the time, due to the printing and the beauty of its characters. The type used was Ohannes Mühendisyan's vocalised 24pt nash, possibly with

Around the same time (c. 1877), the Imprimerie Catholique published a specimen of its types: the Arabic types for text (between 11 and 23pt) included the 'Type Américain' of the ABCFM Press, the 'Type de Constantinople' (i.e. 'Stanbouli') of Ohannes Mühendisyan from Costantinople and the 'Type Égyptien'¹² (Appendix 137).

In 1903, the Arabic types possessed by the press were listed as follows:

Arabes:

Type Allam, corp 32, avec et sans accents.

Type Stambouli, corp 18, 20 et 22, avec ou sans accents.

Type Beyrouthin, corp 9, avec et sans accents.

Type Égyptien, corp 14, avec et sans accents.

Caractères arabes variés pour titres, etc, etc.

Turcs:

Stambouli corps 14, 18 et 22.¹³

The importance of the Imprimerie Catholique in the context of Arabic typography is that it validated which Arabic foundry types were recognised and sought-after in the late nineteenth century in the Middle East. Whilst one of them was analysed in the previous section, those from Turkey and Egypt are discussed more in depth in the next chapter.

some modifications, that had been produced in 1866 (discussed in § 9.1.2).

12. Supposedly from Egyptian Būlāq Press, § 9.2.1.

13. *L'Imprimerie Catholique De Beyrouth*, 37.

8.5 The indigenous simplified Arabic types of Ibrāhīm al-Yāzīgī

One of the typefaces that replaced the 'American Arabic' within the Middle East was that designed by Ibrāhīm al-Yāzīgī,¹ Lebanese poet and linguist, founder of the newspaper *al-Naġāh*, and the magazines *al-Bayān* and *al-Dīyā*, and also able engraver. In 1886 he conceived a project to simplify the character set usually necessary to set Arabic with foundry types, by producing a series of characters that could be placed indistinctly at the beginning, in the middle or at the end of a word.² It appears that he intended to reduce the set from 300 characters to approximately 60, but the project failed.³ He thus reportedly turned to the improvement and a slight simplification of the already existing type, creating new matrices in three different sizes, 24pt, 20pt and 16pt. These Arabic types were more graceful than those in use in other printing offices and were used to print his magazine *al-Dīyā*, appeared between 1898 and 1905 in Cairo (Figure 8.79).⁴

1. Glass, *Malta, Beirut, Leipzig and Beirut again*, 31.

2. Nasrallah, *L'imprimerie Au Liban*, 62.

3. Paul Soueid, *Ibrahim Al-Yazigi. L'homme Et Son Oeuvre* (Beyrouth, 1969), 113. The author mentions that the project will be picked up later, at least in part, by the inventors of Arabic keyboard typewriters. The types were reportedly destroyed in a fire at the Imprimerie al Adabyat, Nasrallah, *L'imprimerie Au Liban*, 62.

4. Ibid.

9 TOWARDS THE ACCEPTANCE OF ARABIC TYPOGRAPHY IN THE MIDDLE EAST

9.1 The role of 18th–19th century Armenian printers in Istanbul

The presence of the Armenian communities in the Ottoman Empire was already discussed in the context of the migration of communities that took place from the West to the East following the fall of Constantinople to the Ottomans in 1453.¹ Additionally to benefiting (economically and socially) from the peaceful environment of the Ottoman region, Armenians contributed to the Ottoman printing industry through the establishment of printing houses.² According to an official statistic published in 1870, at this time, Istanbul had 16 Armenian printing houses in contrast to 8 Greek, 8 Turkish and 3 Jewish.³

The history of the Armenian printing houses and their owners was published by the scholar T. L. Teodik in his well-known *Tip u Tar* in 1912, on occasion of the 400th anniversary of Armenian printing.⁴ The contribution of Armenians was significant not only for the development of their own script, but because it influenced that of Arabic typography. In fact, Armenians are considered the main supporters and craftsmen of Turkish printing.⁵ Two of these important figures – Poghos Arapian and Ohannes Mühendisyan – are introduced in the following sections.⁶

Before discussing in greater depth the work of these two Armenians, it should be noted that the eighteenth-century reform movement prompted by Sultan Selim III⁷ saw the appearance of printing presses as a state instrument, which grew during the following century with the development and modernisation of bureaucracy and education.⁸ In this context, after the transformation of the Müteferrika Press into a state printing press in 1797, the Turkish state founded three additional printing presses. The first was opened in the School of Engineering and Artillery (*Mühendishane*)⁹ at Hasköy in 1210/1795–6, named *Mühendishane Press* or *Dār al-tibā'a*.¹⁰ The

1. See § 1.3.2.

2. See *Les Arméniens Et L'Imprimerie* (Istanbul: Imp. Kéchichian Fils, 1920) and Türkler Ve Ermeniler, 'La Contribution Des Arméniens A L'Imprimerie Ottomane', accessed 25 November 2017, <http://turksandarmenians.marmara.edu.tr/fr/la-contribution-des-armeniens-a-l'imprimerie-ottomane/>.

3. *Les Arméniens Et L'Imprimerie*, 59.

4. [Teodoros Lapchinyan] Teodik, *Tip u Tar*, 2nd ed. (Lisbon: Calouste Gulbenkian foundation, 2006). This is a reproduction of the first edition from 1912. The book originally in Armenian was translated into Turkish under the name *Ermeni Matbaacılık Tarihi*.

5. *Les Arméniens Et L'Imprimerie*, 57. Armenians had a great tradition of craftsmanship, especially that of goldsmithing, a know-how that certainly had to facilitate their entry into the printing press, see Türkler Ve Ermeniler, 'La Contribution Des Arméniens A L'Imprimerie Ottomane'.

6. Besides these names, the work of craftsmen such as Haçık Kevorkyan was also important for Arabic typography, see Türkler Ve Ermeniler, 'La Contribution Des Arméniens A L'Imprimerie Ottomane'.

7. Sultan between 1789 and 1807.

8. See Türkler Ve Ermeniler, 'La Contribution Des Arméniens A L'Imprimerie Ottomane'.

9. Also spelt in other sources as Mühendishāne.

10. Also known under the name *Basmahane*, see Uğur Derman, 'Yazi San'atının Eski Matbaacılığımıza Akısları', in *Türk Kütüphanecile Derneği Basım Ve Yayıncılığımızın 250. Yılı Bilims Toplantısı* (Ankara: Türk Kütüphaneciler Derneği, 1979), 98. The Turkish state reportedly purchased in 1797 the equipment (including the types) and the books in possession of Rāshid Mehmed Efendi (who closed down the Müteferrika printing house, § 8.3.1) and appointed director of the press 'Abd al-Rahmān

second press was opened in Üsküdar (on the Anatolian shore of the Bosphorus) in 1218/1803–4, eventually recorded in the printed books as *Dār al-ṭibā'a al-djадīda* [meaning 'the new Dār al-ṭibā'a¹¹']. The third state press was the *Takvimhane*, established specifically for the purpose of printing the newspaper *Takvim-i Vekayi* in 1831, discussed later.¹² This press merged in 1840 with the old state press that under the reign of Sultan Mahmud II¹³ was transferred from Üsküdar to the European side of Istanbul and increasingly referred to as *Maṭba'a-i Āmire*; the two combined presses took the name of *Takvimhane-i Āmire*.¹⁴

9.1.1 Poghos Arapian

Poghos Arapian¹⁵ was born in 1742 in the village of Aboutchekh near the city of Agna.¹⁶ He learned the typographic craft from his father – the printer Hovhannes Atsaturean¹⁷ – after moving with him to Istanbul, by organising and refining the letters available in the printing house and finalising those that were incomplete.¹⁸ Poghos Arapian – described as the Armenian Gutenberg¹⁹ – was a respected typographer and type-maker who was at first involved with Armenian printing but later ventured also into Georgian and Turkish printing.²⁰ Overall, Arapian spent over seventy years

Efendi, a teacher in the School. In 1792 Arapian 'salvaged this material and cast new letters', see İhsanoğlu and Aynur, 'The Birth of the Tradition of Printed Books in the Ottoman Empire': 191; Oman, Kut, Floor and Shaw, 'Maṭba'a', and Bosworth, *Encyclopédie De L'Islam*, 791.

11. Variously indicated in the sources as Dārūttibāa, Daru't-tab, Dar't-Tibāatū'l-Āmire. This press remained at this location until 1247/1831–2 when Mahmūd II transferred it to the building known as the Bath of Ḳapudan Ibrāhīm Pasha, which stood where the Central Library of Istanbul University now stands. The Üsküdar Press was used for general printing (books on language, history and medicine), whilst the Mühendishane Press, after a period of inactivity, was used to print school books and continued until the First World War, see Oman, Kut, Floor and Shaw, 'Maṭba'a'.
12. It was located in the house next to the building where the Dār al-ṭibā'a al-djадīda press was located, see Oman, Kut, Floor and Shaw, 'Maṭba'a'. In different sources, the name of this press is spelt also as Taqvīm-hāne or Takwīm-khāne.
13. Derman, 'Yazi San'atinin Eski Matbaacılığımıza Aksileri', 98.
14. Also spelt as Taqvīm-khāne-yi 'āmire, see Oman, Kut, Floor and Shaw, 'Maṭba'a'. In 1863 it relocated to the building on the outskirts of the Topkapı Palace, and still serves as the press for the Ministry of Education, see Neumann, 'Book and Newspaper Printing in Turkish', 234.
15. His name is also spelt as Boghos Arapian in Eastern Armenian, and in Turkish as Araboglu or Araboğlu. It is reported that the surname Arapian was converted from the original 'Hohanessian' (also spelt Hovannisyan), see Teodik, *Tip u Tar*, 65. The section of the *Tip u Tar* regarding Arapian was translated for the author by Nare Kalemkerian.
16. Ibid. Also spelt Apudjekh (and Abuçeh in Turkish) and Akn see Genocide-Museum.Am, 'Poghos Arapian - The Father Founder of the Ottoman Print Media', accessed 25 November 2017, http://www.genocide-museum.am/eng/g_brief_08.php. Most of the information about Arapian contained in Teodik's book were also reported by Kevork Pamukcuyan, 'Araboğlu (Boğos)', in *İstanbul Ansiklopedisi* (İstanbul, 1959), 956.
17. Also spelt Hohaness Asdvatzadourian, see Teodik, *Tip u Tar*, 66.
18. Ibid., 66. According to other sources, these letters were of Armenian types made by his father, see Genocide-Museum.Am, 'Poghos Arapian'.
19. In Teodik's book it is reported that also Ohannes Mühendisyan was called 'the Gutenberg of the Turks' by the Turks themselves, *Tip u Tar*, 79.
20. Owing to his reputation, in 1770 Arapian was called by the last King of Georgia Heraclius to establish a printing house in Tiflis (today's Tblisi). He worked there until 1779, producing also Georgian types. See Teodik, *Tip u Tar*, 66–67; genocide-museum.am, 'Poghos Arapian' and *Les Arméniens Et L'Imprimerie*, 37.

in printing and type-making, passing his knowledge to his children like his father had with him.²¹

The contribution of Poghos Arapian to Arabic typography was the creation in 1791 of Arabic types in *nash* and *nasta'l*q styles²² that were later called 'Arapoglu', after his family name.²³ These were manufactured in his own printing establishment and were eventually used in the Royal Printing House (i.e. the state/imperial press). In 1820 Poghos Arapian opened a new large printing press in a two-storey building in Ortaköy, in Istanbul.²⁴ The Arabic characters produced here were only for the Royal Printing House: it was forbidden to take them out, without specific approval from the Sultan.²⁵ Arapian's work and skills were so appreciated by Sultan Mahmud II, that after visiting his printing house in 1816, he issued a decree to appoint him inspector (i.e. director) of the Royal Printing House.²⁶ The latter was for a very long time run by the Armenians: his successors until 1870 were indeed Hovhannes Muhendissian,²⁷ Hagop Boyahjian and Djanik Aramian.²⁸ This added to the contribution of Armenians to the development of Turkish printing;²⁹ more importantly, two of them (i.e. Arapian and Mühendisyan) are praised to have 'conformed and regularised the Turkish characters'.³⁰

An important work that showcases Arapian's Arabic types is the *Hamse-i Şanizade*, printed in 1820 at the state press of Istanbul; this was the first medical book printed in the Ottoman Empire (Figure 9.1).³¹ From 1 November 1831, his Arabic types appeared in the *Takvim-i Vekayi*, the Ottoman government gazette published by Arapian in the Royal Printing House of Takvimhane³² (Figure 9.2).

Poghos Arapian died in 1835 and was buried in the Armenian Cemetery of Ortaköy in Istanbul.³³ It is reported that after his death, to prevent their loss the Turkish

21. Arapian had four children: Asdvatzadour, Kevork, Kalouds and Simeon. Except for Simeon, all others have worked with their father as typefounders, typesetters and printers. His nephew Khatchig Arapian also worked as a type-maker, see Teodik, *Tip u Tar*, 69.

22. In Turkish designated as 'nesih' and 'talik'.

23. Or 'Araboglu', see *Les Arméniens Et L'Imprimerie*, 58; Teodik, *Tip u Tar*, 67.

24. Meliné Pehlivanian, 'Mesrop's Heirs: The Early Armenian Book Printers', in *Middle Eastern Languages and the Print Revolution: A Cross-Cultural Encounter: A Catalogue and Companion to the Exhibition* (Westhofen: WVA-Verlag Skulima, 2002), 79.

25. Teodik, *Tip u Tar*, 66, 69. Each kilogram was sold for 40 piasters, whereas Armenian letters were sold for 25–30 piasters. It is reported that from the 1760s each printing house in Istanbul had its own foundry, but the competition inhibited the sales of types, to prevent the establishment of other printing offices.

26. This was a sign of merit for innovation and service provided to the Ottoman Empire. Arapian was also awarded a 'cockade' symbolising a printing press. A summarised translation of the decree, including the granted privileges to Arapian and his sons see Teodik, *Tip u Tar*, 67–68. See also Genocide-Museum.Am and *Les Arméniens Et L'Imprimerie*, 58.

27. Otherwise spelt Ohannes Mühendisyan.

28. *Les Arméniens Et L'Imprimerie*, 58.

29. Intended as printing in Turkish with Arabic characters.

30. Turkish intended as Arabic. *Les Arméniens Et L'Imprimerie*, 58.

31. I am indebted to fellow doctoral researcher Onur Yazicigil for sharing the image in Figure 9.1 from his personal collection.

32. It was the third Ottoman newspaper to be published but the first to appear in a purely Turcophone edition, Neumann, 'Book and Newspaper Printing in Turkish', 234. The newspaper was distributed for free to the leaders and administrators of all districts. The newspaper and its Armenian translation were printed in 500 copies each, Teodik, *Tip u Tar*, 69.

33. Teodik, *Tip u Tar*, 70.

Naval Ministry purchased Arapian's punches and matrices for the sum of 1600 Turkish liras.³⁴

Model and type

According to the Turkish historian Uğur Derman, Arapian's new Arabic typeface was based on the calligraphic models of Seyyid Osman Efendi (d. 1220/1805) (Appendix 138).³⁵ The latter was a renowned Turkish master calligrapher who earned the name Deli Osman (Crazy Osman) because of his occasionally erratic behaviour. Known for his predilection for small letters, Deli Osman Efendi was commissioned by Selim III to write a *sanack mushafi* (emblem Qur'ān) approximately two inches high, executed in a fine version of the *nash* style called *gubârî* (like dust³⁶) (Appendix 139). Deli Osman's calligraphic style originated in the school of Hâfiz Osman, whose calligraphy had developed 'a greater refinement in the letter shapes and, in general, a less cramped, livelier line';³⁷ in a further development, Hâfiz Osman had reduced the size of his *nash*.³⁸

Establishing the relationship between Deli Osman Efendi's calligraphy and Poghos Arapian's *nash* typeface requires an in-depth analysis and comparison to be undertaken (Figure 9.3). Arapian made only one *nash* typeface (PA),³⁹ reported in the sources as being 16pt size.⁴⁰ Regardless of the veracity of this statement,⁴¹ the type appears to be smaller than Müteferrika's IM type. Arapian's Arabic type production has rarely been the subject of discussion in typographic literature; however, the few sources seem to agree that Arapian's typeforms produced better results than previous attempts (i.e. Müteferrika). On the other hand, they still lacked the grace of the handwritten letterforms⁴² and certain characteristics that would make Arapian's be described as 'the breakthrough for the acceptance of Arabic type throughout the Ottoman domains', as the type of successor Ohannes Mühendisyan was described.⁴³

34. *Les Arméniens Et L'Imprimerie*, 58. This type material was sold by Boghos' nephew Khatchig Arapian, who was granted a position of leader of employees-letter founder in the Admiralty during the administration of Eyoub Pasha. However, nine months later he left his position and was succeeded by Sd Damadian, Teodik, *Tip u Tar*, 69.

35. It appears that the Sultan was concerned with the low quality of Arabic types produced until then and identified in Poghos Arapian the best typographer and punch-cutter available. Thomas Milo, from a personal conversation with the author, 28 March 2015, Amsterdam. The claim that the models were those of Hâfiz Osman (see 'Araboğlu (Ohannes)', in *İstanbul Ansiklopedisi*, 957) is discarded by historian Uğur Derman due to the incompatibility of the dates, see Derman, 'Yazi San'atının Eski Matbaacılığımıza Aksileri', 98, note 1.

36. Derman, *The Sultan's Signature*, 104.

37. Ibid., 72.

38. Ibid. See also § 1.4.

39. It is reported in the *İstanbul Ansiklopedisi* that some Turkish sources attributed the preparation and casting of 16pt printing letters (metal types) to the father of Poghos Arapian, see Pamukcuyan, 'Araboğlu (Boğos)', 956. The layout of the entry suggests that this comment was added by the author of the encyclopedia Reşad Ekrem Koçu, not Pamukcuyan.

40. Reşad Ekrem Koçu, 'Arab Asılı Türk Harfleri (İstanbul Maatbaacılığında)', in *İstanbul Ansiklopedisi* (İstanbul, 1959), 928.

41. It is worth recalling that the type size of Arabic types reported in the sources is not necessarily accurate; and that a more accurate and scientific measurement of the Arabic foundry types has yet to be conducted.

42. Derman, 'Yazi San'atının Eski Matbaacılığımıza Aksileri', 97.

43. By Thomas Milo. See Typophile, 'Why Roman Typography is the Most Developed Typography Between Other Writing System?', *Typophile.com*, 2012, accessed 4 December 2017. <http://www.typophile.com/node/95141>. Mühendisyan is discussed in the following section.

A close analysis of the PA type highlights letterforms that adhere to the *nash* style (Figure 9.4) with a mostly upright design – especially in comparison to Deli Osman's calligraphic model – and overall a certain inconsistency in the slant of the ascenders that prevents a homogeneous pattern:⁴⁴ these characteristics were already found in Müteferrika's IM type. On the other hand, Arapian's type seems better proportioned than Müteferrika's, with letterforms overall more confidently shaped. Nonetheless, they lack the refinement and visual quality of calligraphic practice, particularly in their stroke modulation and weight distribution, which appears closer to that obtained with a pointed nib rather than a pen cut at an angle.⁴⁵ This is evident regardless of the poor printing quality that generally characterises the sources using the PA type. The size of the type – again possibly influenced by the calligraphic models of Deli Osman – should also be taken into consideration in terms of affecting the definition and appearance of some letterforms: the toothed characters, for instance, are particularly small but remain mostly legible.

Arapian's *nash* shows more features in common with Müteferrika's, such as the lack of vocalisation, the defective joins between characters, the unsuccessful attempt to reproduce the slant along the joining line in imitation of calligraphic practice (except for the design of a few characters in the initial position, e.g. *mīm*, *sīn/šīn*, 'ayn/ğayn)⁴⁶. Furthermore, the types show similarities in the treatment of multilevel connections – including the variants of the *ğīm* letter group (Figure 9.5) – and the efforts in implementing script rules (Figure 9.6). The PA type appears to be using more ligatures than the IM type and seems to overcome some of the issues with the dot positioning encountered in the latter, without resolving them entirely.⁴⁷ Worthy of mention is also the frequent use in Arapian's type of the curved *kašida* extensions to adjust the fitting, rather than relying on swashed characters (except for the long *kāf* and the long final *alif* that are regularly used). Finally, it is worth noting the evolution of the design of *kāf* compared to Müteferrika's: the shaping and lengthening of the letter's flag in initial and medial positions becomes a characteristic feature of the AP type as well as in the later typographic *nash* of Mühendisyan.

The Arabic type of Arapian effectively bridged the Ottoman development in Arabic typography between the two important figures of Müteferrika and Mühendisyan: whilst bearing some elements in common with the work of both, it improved some aspects of the first without quite reaching the accomplishments of the second. Mühendisyan's Arabic typeface is discussed in the following section: its analysis serves to evaluate one of the last (if not the last) significant evolutions of Arabic typography – at least in the context of foundry types for the *nash* style – in the reproduction of the script and its relation to the standards of Islamic calligraphic practice.

44. This is also influenced by the movement of the individual sorts during printing.

45. The shaping of the dots, accordingly, is round.

46. For Müteferrika's examples see Figure 8.27.

47. See Figure 8.32.

9.1.2 Ohannes Mühendisyan

Ohannes Mühendisyan¹ has been described as the dean of Armenian printers in the Ottoman capital.² He was born in 1810 in the Samatya quarter of Fatih, Istanbul, and died in 1891 in the district of Beyoğlu.³ After finishing the local school at the age of fifteen, Mühendisyan pursued an apprenticeship in jewellery; for a short period of time, he obtained a position at the mint, which he left to work on his own. Due to 'the unrivalled finesse of his handicrafts',⁴ Mühendisyan mastered the art gaining the name of 'chief goldsmith', and his later successful work as punch-cutter and type-founder is often attributed to his advanced skills in jewellery.⁵

Mühendisyan's printing activity started in 1839, after his good friend Kh. Misakian advised him to quit jewellery to open a printing house. By his own admission, Mühendisyan had no knowledge of the art of typography but became soon fascinated by it to the extent of undertaking type-making.⁶ His first metal types were for a lowercase Armenian, used in an almanac published in 1840. This was printed at the new printing house that he had opened in a seminary in the Üsküdar district of Istanbul.⁷ Mühendisyan continued the activity here until 1843 using a plain wooden press passed down to him from Tadeos Tivitchian's printing house. In the same year, he was invited by the inspection board of the Imperial Printing House (Takvim-hane-i 'Āmire) to create and cast Turkish typefaces in the *nasta'līq* style;⁸ as a consequence, he moved his printing equipment to the district of Çukur Çeşme Han.⁹ The project lasted for many years due to the complexity of the script and to him being occupied with other work, amongst which the printing of banknotes in 1844. At the peak of his fame, Mühendisyan was almost the only printer in the trade; the printing house was equipped with modern presses imported from America and Paris, which enabled him to fulfil a high volume of printing orders.¹⁰ In 1856 he launched the construction of a new building for a printing house in Karaköy, but from the 1860s he suffered huge material losses due to a series of misfortunes. He reportedly had to temporarily abandon his occupation of printing and type-making to work for

1. Also spelt Hovhannes, see Kreiser, *The Beginnings of Printing in the Near and Middle East*, 64. The surname is spelt Mühendisoğlu in Turkish and Mühendiszade in Ottoman-Persian. The literal meaning is 'the son of the land surveyor (or civil engineer)', see Milo, 'Arabic Script and Typography', 127, note 12.
2. Kreiser, *The Beginnings of Printing in the Near and Middle East*, 64.
3. Teodik, *Tip u Tar*, 73 and Derman, 'Yazi San'atinin Eski Matbaacılığımıza Akışları', 106, note 17. His father, Muhentis Gevorg, was the assistant of Grigor Balyan, the chief architect during the reign of Sultan Mahmud.
4. Teodik, *Tip u Tar*, 75. The section of the *Tip u Tar* regarding Mühendisyan was translated for the author by Anna Talalyan.
5. Ibid., 75–76.
6. Ibid., 75. It is reported that Mühendisyan introduced a tool to 'easily and smoothly engrave Armenian letters on steel (a great success and technological advancement for those times), with which he would mix copper and steel to easily extract matrices from moulds under high pressure and to then cast lead letters with those. The innovation largely facilitated the processes of engraving and casting of typefaces, given that never in his life had Mühendisyan studied or imitated the subtleties of European craft'.
7. The almanac bore the inscription 'Seminary after H. Jerusalem of Uskudar' on its title-page.
8. Referred to in different sources with various spellings such as *ta'līq*, *talik* or *ta'līyāk*.
9. The competition of Mühendisyan's printing house created conflicts with the Arapians, who at the time had the exclusive right to run an Armenian printing house. For more information on their dispute, see Teodik, *Tip u Tar*, 76.
10. Ibid., 76–77. It is known that Mühendisyan also cast and sold letters to Armenian printing presses outside Istanbul (e.g. in Izmir and Tiflis).

the government in order to settle his financial affairs.¹¹ Nevertheless, he went back to type-making to produce a new Arabic typeface in the *nash* style, modelled on handwritten samples by the late master calligrapher Mustafa İzzet Efendi (Figure 9.7).¹² This is stated by Mühendisyan himself in an *arzual* (petition) to the Sultan of the Ottoman Empire dated 1283/1866, in which he announced his new typeface:

I have cut punches in steel, without making any errors in shape or composition, from letters, written with zeal, by Your Majesty's well-wisher, His Excellency Mustafa İzzet Efendi, dean of the calligrapher's guild and foremost amongst the benevolent scholars of Your Majesty's sublime Empire and printed these my two respectful and humble petitions with the new typeface fount from the aforementioned punches, and present them now in all audacity to the Loftiness-filled Dust of the Sole of the Feet of the Serene Shadow of God.¹³

Receiving new funds from the government for his latest work, Mühendisyan opened a printing house in his home garden in Kadıköy.¹⁴ His complete *nash* type-family (in different point sizes) was enclosed in a small luxurious album presented to Sultan Abdulhamid II in 1305/1888¹⁵ – through the Minister of Finance Mahmud Jelalettin Pasha – that earned him a rank D in the Order of the Medjidie¹⁶ and a medal of Arts.¹⁷ This was a six-page document similar to a type specimen or catalogue, displaying in the first two pages two sizes of *nasta'lîq* (18pt and 24pt, Appendix 140), followed by three sizes of *nash*, 24pt (OH1), 16pt (OH2) and 6pt (OH3) (Appendix 141); and the last page shows extracts of vocalised *nash* in two sizes, 24pt and 16pt (Appendix 142).¹⁸ By putting an example of a fully functional vocalised *nash* in two point sizes in the album he intended to prove that the Qur'an could also be set using his types,

11. Ibid., 78.

12. The nature of their relationship and collaboration is not clear as yet, but in Milo's words 'this lofty man certainly was not the type to be involved in anything so plebeian as type design, and it can be ruled out that the craftsman and the calligrapher ever met', see 'Arabic Script and Typography', 123.

13. Translated from Mühendisyan's petition by Thomas Milo and presented in 'How a Chance Discovery Inspired the Development of Arabic Technology', *ISType* conference 2012, accessed 10 January 2018, <https://vimeo.com/60313670>. The document came into the possession of Thomas Milo in 1983 and is now in his personal collection. Another document stating the same information is a *manzûme* set and printed with Mühendisyan's 24pt *nash* type, see Derman, 'Yazi San'atının Eski Matbaacılığımıza Akışları', 102–04, 112.

14. Teodik, *Tip u Tar*, 78–79. In 1882–3 Mühendisyan also had a foundry in his apartment in Bera, in cooperation with Grigor Rafaelian: 'because the place was not fitted for this purpose, he moved the foundry to Constantinople and passed it to St. Tamatian, who ran it for several years until the death of the master. Then his sons continued the activity of the foundry, in cooperation with Khachik Gevorgian'.

15. According to Derman, this date can be established from the binding of the album and the interior explanation. Three different dates appear in each of the texts set with the *nash* types; the content of the album is about the history of printing. Derman, 'Yazi San'atının Eski Matbaacılığımıza Akışları', 104.

16. A military and knightly order of the Ottoman Empire.

17. Teodik, *Tip u Tar*, 79.

18. Derman, 'Yazi San'atının Eski Matbaacılığımıza Akışları'. This information and these images refer to the copy at the İstanbul Üniversitesi Kutuphane, İÜK [M 090025]. Another copy available at the İBB Atatürk Kitaplığı, İBB [Bel_Osm_0.2645] presents different samples of the *nasta'lîq* types and is dated 1300/1883 (Appendix 143). The *İstanbul Ansiklopedisi* lists in a table the following Mühendisyan's types: '6pt, 16pt, 24pt *nesh*; 24pt *rik'a*; 18pt, 24pt *talik*, and a 24pt *harekeli* (i.e. vocalised); see Koçu, 'Arab Asılı Türk Harfleri', 928. In Teodik's book, a table of Mühendisyan's types also includes a 12pt *nash*, which he never produced: this belongs to Haçık Kevorkyan, see *Tip u Tar*, 79 and 88.

although he did not accomplish this in his lifetime, neither was the printing of the Qur'an pursued by the Sultan at the time, apart from lithographically.¹⁹

Mühendisyan dates the different point sizes of the *nash* typeface at the end of each sample text in the album: 1283/1866 the 24pt, 1300/1883 the 16pt; and 1305/1888 the 6pt.²⁰ According to the *İstanbul Ansiklopedisi*, with the appearance of Mühendisyan's 16pt *nash*, the Arabic type of Arapian (also 16pt) appeared oversized; this might explain its replacement in the Ottoman gazette *Takvim-i Vekayi*, at least from 1889 (Appendix 144).²¹ A new 12pt *nash* was made by the typographer Istavraki, under the direction of Arapian's son Artin. Nevertheless, being inferior in quality to Mühendisyan's 16pt *nash*, it was soon replaced by a 12pt cut and cast by Haçık (Efendi) Kevorkyan (1856–1932), which was then widely used.²² For the need of darker types than Mühendisyan's 24pt and especially 16pt *nash*²³ – as suggested by Ahmed Cevdet Beydir, owner of the *İkdam* newspaper – Kevorkyan also made new 16pt and 24pt *nash* types.²⁴ Furthermore, he 'simplified' Mühendisyan's 18pt and 24pt *nasta'lîq*, which due to the difficulty of typesetting were reportedly left unused in a corner of the Matba'a-i 'Âmire.²⁵ Mühendisyan's last accomplishment – and, according to Teodik, his greatest masterpiece – was the *ruq'ah* style typeface (a 24pt), which he started in 1890 at 80 years old and completed a few days before his death in 1891.²⁶ It is not clear if the dating is correct: a book with what appears to be the first known *ruq'ah* type, possibly designed by Mühendisyan, was already published in 1306/1888 in Istanbul, the *Esfâr Bahriye-i Osmaniye* (Appendix 145).²⁷ An 18pt *ruq'ah* type was

19. Derman, 'Yazi San'atinin Eski Matbaacılığımıza Aksileri', 107. The Ottoman printer and calligrapher Osman Zeki Bey, received the first legal permission from the Ottoman palace to print a lithographic Qur'an: this was at the Matbaa-i Osmaniye in 1871–72, on the model of Hâfiz Osman's handwritten version, see Nedret Kur'an-Burçoglu, 'Osman Zeki Bey and His Printing Office the Matbaa-i Osmaniye', in *History of Printing and Publishing in the Languages and Countries of the Middle East*, edited by Philip Sadgrove (Oxford: Oxford University Press, 2004), 35–57. In 1884 the state press Matba'a-i 'Âmire printed a lithographic Qur'an written by calligrapher Hasan Riza.

20. Therefore, he was respectively 56, 73 and 78 years of age when he made the three types. However, Teodik's book on Armenian printers reports that Mühendisyan was already 76 years of age (i.e. in 1886) when he made the 16pt *nash* and that he managed to complete the 6pt at the age of 79 (i.e. in 1889), *Tip u Tar*, 79. See also Koçu, 'Arab Asilli Türk Harfleri', 928. Derman suggests that the making of the *nash* 24pt is datable between 1861 and 1866, 'Yazi San'atinin Eski Matbaacılığımıza Aksileri', 104.

21. This was the oldest issue that the author could trace using the new type, although it is possible that Arapian's type was replaced up to three years before (from 1883, when Mühendisyan's 16pt was made).

22. Koçu, 'Arab Asilli Türk Harfleri', 928 and Derman, 'Yazi San'atinin Eski Matbaacılığımıza Aksileri', 106.

23. The source addresses Mühendisyan's types with the Turkish term 'ince' (translated with the term light by the author).

24. In the *İstanbul Ansiklopedisi* these are designated with the term 'Siyah' (dark) in Turkish. The source lists also Haçık's other types, see Koçu, 'Arab Asilli Türk Harfleri', 928. More information about Kevorkyan (and an illustration of his types) is in *Tip u Tar*, 87–90.

25. Following the order of Ahmed Midhat Efendi, head of this printing house, to revise/repair Mühendisyan's *nasta'lîq* types, Haçık reduced the size from 2,200 pieces to 600 pieces, which made it easier to use compared to the old version. Being pleased with his work, Midhat Efendi gave him an award. From Koçu, 'Arab Asilli Türk Harfleri', 929.

26. Teodik, *Tip u Tar*, 79. See also Derman, 'Yazi San'atinin Eski Matbaacılığımıza Aksileri', 106, note 17 and Koçu, 'Arab Asilli Türk Harfleri', 928.

27. The type was possibly based on the hand of Mehmed İzzet (Hamdi) Efendi (1257/1841–1302/1903), a calligrapher of the time known for this style, see Gunnar Vilhjalmsson, 'The *Ruq'ah* Style and Its Role in Arabic Typography', MA thesis, University of Reading, 2010. For more information on this calligrapher see Derman, *Eternal letters*, 260.

also designed by Kevorkyan: this is shown in Teodik's book, not dated, and appears to be different from that used in 1888.²⁸

About the typographic contribution

Thomas Milo identified Mühendisyan as the last key figure in the 1860s – after Müteferrika in the 1730s and Arapian in the 1790s – of a 'three-stage development of Arabic typography with the required script architecture, each of them the result of interaction by a typographer using Western technology with direct access to Islamic script expertise'.²⁹

The typographic analysis that follows is based mainly on Mühendisyan's largest size of *nash* type as it shows the design of the letterforms with most clarity: moreover, it is also used as the main text type in his books, such as the *Yeni Hurufat*, 1870 (Figure 9.8) and the *Hülasat'ül İtibar*, 1869 (Figure 9.9). The first observation regarding the OM1 type highlights the high adherence to the calligraphic practice of the *nash* style. This is evident in the shaping and proportions of the letterforms, individually and in relation to each other (Figure 9.10), and in the consistency of the calligraphic style (Figure 9.11). Compared to the rather monoline appearance of Müteferrika and Arapian's Arabic types, OM1 displays a notable improvement in the stroke treatment. This proves not only the skills of the type-maker but reflects an understanding of how the tool (i.e. the angled pen) gives letterforms a particular calligraphic style, to be translated into the typeforms.³⁰ The refined forms of Mühendisyan's types are enhanced by the sharp impression and the overall printing quality of his books, which enables appreciation of the subtleties of the design even at the smallest point size. Furthermore, all these characteristics grant an even colour to the type.

The Arabic types of Mühendisyan show remarkable improvement to the quality of the joins between characters. The gaps between sorts and the misalignments are reduced to a minimum, creating an almost seamless and continuous joining line (Figure 9.12). It is also worth noting the undulation of the joining line, which does not present straight strokes even in the occurrence of elongations (Figure 9.13).³¹ This aspect, together with the implementation of the gentle slant of the joining line typical of calligraphic practice, contributes to a less constructed and overall more cursive appearance of the text on the printed page. A definite slant in the vertical ascenders adds to the already dynamic letterforms, recreating the pleasant movement of handwritten text (Figure 9.14).

Another aspect that distinguishes Mühendisyan's OM1 type is the accurate representation of the behavioural rules that govern the Arabic writing system and that serve as text enhancements for both aesthetic and legibility purposes (Figure 9.15). The multilevel setting to represent the cascading feature of the script is also well handled through ligatures and characters that join over two or three levels of alignment, maintaining the stacking of letterforms according to manuscript practice (Figure 9.16). Two sets of variants for the *ğim* letter group in medial and final positions (as individual sorts, not in a ligature) enable the correct representation

28. Teodik, *Tip u Tar*, 88. Mühendisyan's 24pt *ruq'ah* type is also shown in Teodik, *Tip u Tar*, 79.

29. Typophile, 'Why Roman Typography is the Most Developed Typography Between Other Writing Systems?'.

30. This happens also in Mühendisyan's other Arabic types in the *nasta'līq* and *ruq'ah* styles.

31. Straight *kaşida* sorts are added in a second version of the OM1 type, where the *ğim* letter group was also redesigned to reduce the stacking sorts into a linear arrangement (explained in greater depth later in this section); this applies to the 24pt as well as the other two sizes of Mühendisyan's *nash* typeface. This use of the 24pt is visible in the book *Girit Tarihi* printed in 1871, referenced below.

of the required vertical connections with preceding characters. It is worth noting that the variants of the ġīm letter group in final positions join either on the notional baseline or above it by simply shifting their position. This method (also used for ya' in final position) enables the fount to maintain two levels of alignment for cascading connections of up to five characters (Figure 9.17). Technically, this is likely to have been achieved by providing sorts with characters cast at different alignments (Figure 9.18).

Mühendisyan's OM1 fount is the most accomplished of the nash type-family. The two smaller sized OM2 (16pt) and OM3 (6pt) as appeared in the album of 1888, show a less confident design – especially in the 6pt due to evident technical limitations – and a more inconsistent implementation of script rules. However, it seems more significant to highlight the fact that in both founts Mühendisyan revisited the design of characters. These adjustments might be identified as optical or technical to accommodate the point size (e.g. stroke modulation, increase of the counters' size relative to the height, redesign of some toothed characters and elimination of some multilevel connections) (Figure 9.19).

The most significant change is the re-design of the ġīm letter group in medial and final positions (as individual sorts, not in a ligature) which has a joining stroke originating under the head of the character: these 'linear variants' enable the elimination of the second level of alignment by lowering preceding characters to join on the notional baseline. Cascading connections (on two or three level alignments, with or without the ġīm letter group) in the OM2 and OM3 types are achieved in combination with ligatures (Figure 9.20). It is worth noting that the new 'linear method' of joining the ġīm letter group with preceding characters appeared also in Mühendisyan's 24pt type as early as 1288/1871 – in the book by Hüseyin Kâmi Hanyavî, *Girit Tarihi*³² (The History of Crete) – printed at his own press.³³ This proves firstly that it originated from the 24pt rather than being introduced in the smaller sizes; secondly, that the 24pt included both approaches in the same fount or that it had two separate versions. On the other hand, it appears that the 16pt and the 6pt only had the linear version.³⁴ As far as it was possible to verify, it appears that the two versions of the OM1 type, with the cascading or linear joining of the ġīm letter group, were not used at the same time in the same book.³⁵

The new method functionally served the same purpose of eliminating multilevel connections by bringing them on the notional baseline in a linear arrangement (see Figure 3.65), as already seen in several previous Arabic types (i.e. from Granjon onwards). Nonetheless, from the formal point of view it introduced a peculiar design,

32. 'Girit Tarihi (1288/1871)', *HathiTrust*, accessed 28 January 2018, <https://babel.hathitrust.org/cgi/pt?id=njp.32101074933928;view=1up;seq=5>.

33. The author owes this information to Onur Yazıcıgil, e-mail message to author, 24 January 2018. Yazıcıgil's study on Ottoman naskh typefaces is part of his ongoing PhD research (currently entitled *The Typographic Evolution of the Naskh Typefaces created between the 18th and 20th centuries in the Ottoman Empire*) at Mimar Sinan Fine Arts University, Istanbul.

34. See the use of the linear 16pt as the main text type in the *Takvim-i Vekayi* in Appendix 144.

35. Mühendisyan's books *Yeni Hurufat* and *Hülasat'ül İtibar* use exclusively the first method whereas the *Girit Tarihi* uses the second. It is possible that Mühendisyan sold the two versions of the type separately. To confirm this hypothesis, more books of other printers in the Ottoman Empire that used Mühendisyan's types should be checked, like those of Ebuzziya Tevfik and Mahmud Bey Matbaasi. It has already been mentioned in the previous chapter that Mühendisyan's Arabic nash typeface was adopted by the Imprimerie Catholique of Beirut from 1875 to print the Bible, *Al-Kitāb Al-Muqaddas*: this appears to use exclusively the cascading connection (see Figure 8.78). Later books (published in 1891–2 and 1902) show a mixture of both methods (Appendix 148).

with the connecting stroke starting under the head of the ȝim letter group: this was bound to influence many subsequent Arabic types to the extent of becoming an established – and most widespread – convention for the representation of the ȝim letter group in medial and final positions, from literature to current Arabic type design practice (Figure 9.21, Appendix 146 and Appendix 147).

A marked linear arrangement had appeared few years before Mühendisyan's 24pt *nash* in the book *An Arabic-English Lexicon* of the British Orientalist Edward William Lane, published in 1863 (Appendix 149); however, the Arabic typeface of the *Lexicon* significantly differs in the design of the connecting stroke (Figure 9.22). The causal relationship between Lane's and Mühendisyan's types using a linear arrangement appears less likely in view of another observation that highlights a closer visual relationship – and thus more pertinent – to Mühendisyan's design: this is traced in Arabic calligraphic practice, mainly in the *tulut* style, but also in *nash* (Figure 9.23).

It should be pointed out that the common visual feature evidenced in calligraphy and in Mühendisyan's typeforms draws on the same graphic language rather than serving the same function. In calligraphy, the stroke that appears under the head of the ȝim letter group in medial and final positions is effectively the termination of the preceding character, to which it belongs. This implies that the preceding character is always in final or isolated position; moreover, that it connects to the ȝim letter group only visually, whereas it is orthographically independent (i.e. they belong to different words): the join is solely enabled by the composition of the calligraphic piece of text.³⁶ In typography, this calligraphic behaviour seems to have been visually replicated but given a different function. In other words, the type-maker adopted the visual feature but applied it to serve a different purpose. This is proved from the formal point of view by the treatment of the connecting stroke (i.e. the position and weight distribution), and from the functional point of view by the fact that it is used to join with preceding characters in medial position. As already mentioned, this enables the lowering of the multilevel vertical connections required by the ȝim letter group in medial and final positions according to manuscript practice, and to align them on the same level as the other characters, joining on the notional baseline.³⁷

It is worth noting that in this typographic use of the ȝim letter group's linear connection (i.e. joining to preceding characters that are in medial position), has been observed also in calligraphy: however, this practice appears to be mainly used by calligraphers of the 20th century in *jali tulut* compositions (and *jali diwani* as well) but not in *nash* (Figure 9.24).³⁸ It remains to be established if this contemporary calligraphic practice was influenced by the typographic usage of the linear method³⁹ (that, in turn, established a new convention departing from the traditional calligraphic use), or if it is a manifestation of the natural evolution of the Arabic script's system in the writing domain. It is safe to say that, either way, the use of both methods for joining for the ȝim letter group – cascading and linear – has now become common practice not only in Arabic type design but also in teaching calligraphy (Figure 9.25).

36. The issue of calligraphic visual ligatures was already discussed in § 6.1.3.

37. It seems evident that the linear arrangement served mainly to simplify the composition. However, it can be suggested that if the cascading and the linear method were used at the same time in a printed page, the choice of one or the other to compose a certain word could be explained by justification purposes. Further analysis of the primary sources is required to find evidence of this hypothesis.

38. The author owes this information to Iraqi calligrapher Wissam Shawkat, who also supplied the visual examples, e-mail message to author 25 July 2016.

39. What could be designated as a 'typographism' (i.e. a typographic approach) applied to calligraphy.

The features discussed up to this point clearly show that a combination of craft skills, script expertise and calligraphic manuscript models contributed to shaping a highly regarded typeface in the history of Arabic foundry types for hand composition. Nevertheless, Mühendisyan's typeface was not perfect (Figure 9.26)⁴⁰ and, as hitherto illustrated, incorporated a solution where the punch-cutter possibly interpreted the manuscript models – using the same visual vocabulary – while providing a better fit for the technology at hand. Thomas Milo argues that although Mühendisyan 'cut all the necessary sorts for a perfect rendering of Islamic script structure, his mastery of the system was imperfect. He frequently uses correct forms in positions where they do not belong. Clearly it took an Islamic upbringing to master this writing system'.⁴¹

It is evident, however, that this did not dismiss his key contribution to the improvement of Arabic typography, and having produced the most convincing representation of the script in movable metal types. Milo indeed highlights that Mühendisyan 'finally succeeded in reproducing the script in a way that met the demanding standards of the Islamic calligraphic traditions. His sublime approach to typography was clearly based on a sophisticated understanding of the Arabic script and calligraphy'.⁴² Mühendisyan had the merit to showcase the potential of the technology to achieve a close – and thus more authentic – rendering of the script according to manuscript practice; his vocalised Arabic is, in this regard, a further validation (Figure 9.27). In hindsight, this also proved that certain shortcuts taken by previous type-makers were not necessarily dictated by the technology's limitations but rather by other factors, such as the lack of manual mastery, script competence, need of simplification, etc. In this sense, Milo's reasoning that, despite the faults, Mühendisyan's types 'honoured the spirit of Arabic script and were the first to mobilise its full power and richness' seems a fitting conclusion.⁴³

Having discussed the key Armenian contributors for the development of Arabic typography in the Middle East, it remains to review and assess the work of one further printing house, the Egyptian Būlāq Press, and focus on the contribution of a typeface that received, for the first time, a Muslim authority's approval to print a typographically composed Qur'ān.

40. Some flaws of the type are highlighted by Thomas Milo in Mulder, 'Keyboard Calligraphy': 36–37 and Milo, 'Authentic Arabic: A Case Study': 56–57.
41. Typophile, 'Why Roman Typography is the Most Developed Typography Between Other Writing System?'. The correlation between Muslim upbringing and script-education has been touched upon in § 2.1, as well as that between shortcomings in the type and lack of script knowledge has been discussed in previous chapters. Nevertheless, it is necessary to identify the nature of shortcomings to establish an exclusive causal relationship. For instance, correct typeforms in wrong positions can be attributable to the compositors, not necessarily to the knowledge of the type-maker. Only a systematic analysis of the mistakes can provide further evidence in support of this hypothesis, which needs to be verified case by case. The issue is also discussed in the Chapter 10.
42. Milo, 'Arabic Script and Typography', 122.
43. Mulder, 'Keyboard Calligraphy': 37.

9.2 The first Muslim authorised typographic reproduction of the Qur'an

9.2.1 The Egyptian Būlāq Press

The Būlāq Press was established by the Governor of Egypt Muhammad 'Alī, possibly in 1237/1821,¹ about two decades after printing with movable types had been introduced to Egypt by Napoleon Bonaparte during the French occupation in 1798.² Named after the quarter of Cairo where it was built, the Būlāq Press represented the first, and most important, indigenous Muslim Arabic press set up in Egypt, as well as in the Arab world. Initially designated as *Dār Al-Tibā'ah* (The Printing House) on the building's founding memorial plaque, the Press took various names over the years such as *Maṭba'at Ṣāḥib Al-Sā'ādah* (His Grace's Printing House) on its first published work; today it is known as *Maṭba'at Būlāq* (The Būlāq Printing House).³

The essential role of this Press for the modernisation of Egypt and the dissemination of knowledge – including the development of Modern Arabic literature and language in the cultural context of nineteenth-century Egypt and in relation to Ottoman printing – has been the subject of various studies and is beyond the scope of this thesis.⁴ It suffices here to highlight a few significant events that contextualise the establishment and development of the printing office, particularly in relation to its contribution to Arabic typography.

The Būlāq Press was part of 'Alī's reform programme that focused on using education as the key to the strengthening and independence of Egypt against foreign rule, whether Ottoman or European. For this reason, he established free education and opened several schools and colleges, one of which with the purpose of training people that could translate European works into Arabic and Turkish.⁵ The need for a large number of printed books to sustain education was a direct consequence; to complement the production at Būlāq, 'Alī furnished some of the more impor-

1. Johann Strauss, *The Egyptian Connection in Nineteenth Century Ottoman Literary and Intellectual History* (Beirut: Orient-Institut der Dutchmen Morgenländischen Gesellschaft, 2000), 2. The foundation date is reported as 8 Safer 1237/4 November 1821 in J. Deny, *Sommaire Des Archives Turques Du Caire* (Caire: Inst. Français d'Archéologie du Caire, 1930). Other sources report that the printing machines were installed between September 1821 and January 1822, see Hsu Cheng-Hsiang, 'The First Thirty Years of Arabic Printing in Egypt, 1238–1267 (1822–1851): A Bibliographical Study with a Checklist by Title of Arabic Printed Works', PhD Thesis (University of Edinburgh, 1985), 25. On the other hand, the Italian naturalist Brocchi, who visited the Press on 11 December 1822, stated that it had been in full activity for four months, see Giovanni Battista Brocchi, *Giornale Delle Osservazioni Fatte Ne' Viaggi in Egitto, Nella Siria E Nella Nubia Da G.B. Brocchi*, Vol. 1 (Bassano: Presso A. Roberti Tip. Editore, 1841), 172. A green marble plaque originally hung on the entrance of the Press bears the date 1235/1820: however, this could only indicate the date of completion of the building. Fawzi M. Tadrus argues that there is no definite proof as to when it was established, see 'Printing in the Arab World with Emphasis on the Būlāq Press in Egypt': 65.
2. § 6.2.
3. Tadrus, 'Printing in the Arab World': 66.
4. Amongst others, J. Heyworth-Dunne, 'Printing and Translations under Muhammad 'Alī of Egypt: The Foundation of Modern Arabic', *Journal of the Royal Asiatic Society* (1940): 325–49; Hsu Cheng-Hsiang, 'The First Thirty Years of Arabic Printing in Egypt'; Strauss, *The Egyptian Connection*; Atiyeh, 'The Book in the Modern Arab World'; and Tadrus, 'Printing in the Arab World'.
5. Tadrus, 'Printing in the Arab World': 64. This source also discusses the various reasons attributed by scholars to the opening of the Būlāq Press.

tant schools with lithographic presses on which they could print their own works.⁶ Concurrently, he sent people to Europe to acquire specialist knowledge and learning, and acquired a large number of books from Europe and Turkey that could be used 'for his translation departments and schools' and 'from which information and learning could be derived for the enlightenment, education, and guidance of his officials and for the advancement of his many schemes'.⁷

Being government-owned, the output of the Būlāq Press included state-related works such as annual reports and the official gazette, *Al-Waqā'i' Al-Misriyah*. Nevertheless, its book production covered various fields, including military sciences, scientific, linguistic, religious and literary works.⁸ In the first twenty years of its establishment, the Būlāq Press reportedly published 243 titles in Arabic, Turkish and Persian: the highest number was on military and naval subjects (48), followed by poetry (26).⁹ It has been observed that the Būlāq Press' printed books maintained some features in common with manuscript production; nonetheless, they 'were clear and easy to read, and they had hardly any typographical errors'.¹⁰ Furthermore, they showed the influence of the book production of the Istanbul printing houses – established almost a century before – with which they were in direct competition. This is apparent in elements such as the decorations, dimensions, information contained in the colophon and the Arabic types used.¹¹

On 11 December 1822, following a visit to the Būlāq Press, the Italian naturalist Giovanni Battista Brocchi wrote an important account of its people and activity.¹² Firstly, he reported that the young Maronite Niqūlā al- Masābkī¹³ was sent for four years to Milan to learn the art of typography and type-making (i.e. to cut punches and cast type) and that, upon returning to Egypt, he was occupied 'setting-up an assortment of Arabic and Turkish characters, and instructing people to compose them for printing'.¹⁴ Secondly, that Masābkī had brought to Cairo Arabic types cast in Milan,

6. See Tadrus, 'Printing in the Arab World': 69 and Heyworth-Dunne, 'Printing and Translations under Muḥammad 'Alī of Egypt': 340.
7. Heyworth-Dunne, 'Printing and Translations under Muḥammad 'Alī of Egypt': 328.
8. Strauss, *The Egyptian Connection*, 10. It is also known that the Būlāq Press accepted the printing of books by private authors at their own expenses, see Perron, 'Lettre Sur Les Écoles', 16–18.
9. A list of works is given in Perron, 'Lettre Sur Les Écoles'. See also Heyworth-Dunne, 'Printing and Translations under Muḥammad 'Alī of Egypt': 333–34 and Richard N. Verdery, 'The Publications of the Bulaq Press under Muḥammad 'Alī of Egypt', *Journal of the American Oriental Society* 91, no. 1 (1971): 129–32.
10. Atiyeh, 'The Book in the Modern Arab World', 245.
11. A comparison between the books printed in Istanbul and in Cairo at Būlāq has been conducted by Turkish scholars İhsanoğlu and Aynur, 'The Birth of the Tradition of Printed Books in the Ottoman Empire'. It has also been pointed out that the Būlāq publications of the first half of the 19th century make an interesting comparison with the Arabic books produced by the CMS press in Malta during the same period, see Glass, *Malta, Beirut, Leipzig and Beirut Again*, 13.
12. Brocchi, *Giornale Delle Osservazioni*, 172–73. Other important accounts come from the visits of the French travellers La Contemporaine – pseudonym of Maria Versfelt (Ida Saint-Elme) – Joseph François Michaud and Baptiste Poujoulat, also in 1831, and Perron in 1843. These accounts are reported in Heyworth-Dunne's work.
13. Designated as 'Mesabichi' in Brocchi's work, the name of this Syrian immigrant is variously spelt in other sources. He went to Milan in 1815, see Heyworth-Dunne, 'Printing and Translations under Muḥammad 'Alī of Egypt': 331.
14. Approximate translation by the author from the original 'Egli fu occupato ad allestire un assortimento di caratteri Arabi e Turchi, ed ad istruire persone nell'artifizio di combinarli ad uso della stampa', Brocchi, *Giornale Delle Osservazioni*, 172.

but that these were not liked;¹⁵ for this reason, new matrices were made, resulting in the types in use at the time of his visit.¹⁶ Brocchi adds that besides the Arabic and Turkish characters (of three 'qualities', most likely meaning sizes), the Press had also types for Italian (sizes *Silvio* and *Filosofia*, both with Italics) and Greek made in Milan.¹⁷ Furthermore, that 'Alī brought three presses from Milan, on the model of those of the Stamperia Reale; that the paper came from Italy via Livorno, while the ink, also supplied from Italy, was at that time beginning to be manufactured in Cairo.¹⁸ According to historian Heyworth-Dunne, the Būlāq Press was under the nominal directorship or inspectorship of 'Uthmān Nūr-addīn, whereas Masābkī appears to have been a kind of sub-manager.¹⁹ Several Azharīs²⁰ were attached to the press in order to learn the art of printing: amongst them, Shaikh 'Abdal-Bākī became head of the foundry, Sheikh Muḥammad Abū 'Abdallah became chief printer, Shaikhs Yūsuf aṣ-Ṣanfī and Muḥammad Shāhātah became chief compositors.²¹ At the date of the visit, Brocchi records that the printing house employed twelve compositors for Turkish and one each for Italian and Greek;²² and that the *proto*²³ was German.

After the death of Muḥammad 'Alī in 1849, the flourishing Press began to deteriorate, at first under 'Alī's grandson and successor, 'Abbās Ḥilmī I, and later under Sa'īd Pāshā, who closed it in 1861. The following year, the Press passed into private hands when Sa'īd donated it to his friend 'Abd al-Rahmān Ruṣdī, who renamed it after himself (*'Abd al-Rahmān Rushdī Press*). After twenty years, in 1865, the Press reverted to the government. Under Sa'īd's successor, Khedive Ismā'īl, it took the name *Maṭba'at Būlāq Al-Sanīyah* (Royal Būlāq Press); and under Ismā'īl's son, Khedive Tawfīq, was named *Maṭba'at Būlāq Al-Amīrīyah* (Governmental Būlāq Press).²⁴ During this time, 'several enhancements were introduced in equipment and typefaces to make it one of the best in Egypt':²⁵ in 1867, the Press converted from manual to mechanised operation.²⁶ After another period of deterioration between 1881 and 1896, the Press was revitalised after the Revolution in 1952 under the President Gamal Abdel Nasser.

15. Reportedly, because they 'did not suit the local readers' predisposition towards calligraphy', İhsanoğlu and Aynur, 'The Birth of the Tradition of Printed Books in the Ottoman Empire': 192.

16. Brocchi, *Giornale Delle Osservazioni*, 174.

17. Ibid., 173.

18. Ibid. Another source reports that material came also from the Italian city of Trieste and that, at a later period, types and presses were also imported from Paris. By 1831, the Būlāq printing house used eight presses, see Heyworth-Dunne, 'Printing and Translations under Muḥammad 'Alī of Egypt': 329–30.

19. Heyworth-Dunne, 'Printing and Translations under Muḥammad 'Alī of Egypt': 331. Brocchi designates Masābkī as the director, see *Giornale Delle Osservazioni*, 173.

20. People that had been educated at al-Azhar mosque-university of Cairo, 'the pre-eminent seat of traditional learning in Islam', Roper, 'The History of the Book in the Muslim World', 549.

21. Heyworth-Dunne, 'Printing and Translations under Muḥammad 'Alī of Egypt': 331.

22. He reports that a certain number of Muslims had been educated for six years to read and write correctly both Arabic and Turkish languages, and subsequently became compositors of the printing office, Brocchi, *Giornale Delle Osservazioni*, 172.

23. The person running the composition department, see § 3.2.3, note 99.

24. The name *Maṭba'a-i Āmire-i Misriyye* (the Egyptian State Press) has also been used, Strauss, *The Egyptian Connection*, 27.

25. Atiyeh, 'The Book in the Modern Arab World', 246 and Tadrus, 'Printing in the Arab World': 68–69. In 1866 new type-founding equipment and machines were imported from Paris, Roper and Glass, 'The Printing of Arabic books in the Arab World', 184. The Press also participated in two international exhibitions, in Paris in 1867 and in Vienna in 1873.

26. Roper and Glass, 'The Printing of Arabic books in the Arab World', 184.

Relocated to a new building in Embaba in Cairo, and supplied with the most advanced machines, the Būlāq Press continues its activity until today.²⁷

About the types

According to Heyworth-Dunne, the European-made Arabic type that was first in use at the Būlāq Press 'is easy to recognise on account of its round shape and total disregard of the Oriental idea of beautiful calligraphy. The need for type more in keeping with the rules of calligraphy and the taste of the Turks was soon felt, for they used to pay more attention to calligraphy than the Egyptians'.²⁸

Two different sizes of these European nash̄ types were used in the first book printed at Būlāq in 1822, the *Dizionario Italiano E Arabo*, an Italian-Arabic dictionary by Father Raphael Rahib (Figure 9.28): the larger size (BP1) is similar to the SDB2 type, whereas the smaller size (BP2) is a different typeface but still along the lines of the European typographic production. They are described as 'serviceable but aesthetically unappealing'.²⁹

These Arabic types were soon replaced 'with new ones cut in Egypt according to originals from the Ottoman Imperial Press of Istanbul'. This is confirmed by the nash̄ type (BP3, Figure 9.29), which closely resembles that of Arapian (see Figure 9.1) both from the design and structure point of view (e.g. multilevel connections, variants of the ȝim letter group, and the implementation of script rules).³⁰ In 1843, indeed, the Director of the Cairo School of Medicine, M.A. Perron, stated regarding the Arabic types of the Būlāq Press:

Les caractères employés pour l'impression sont de deux espèces seulement, le *neskhy* simple et le *fārsy* or caractère persan. Vous les avez vus dans les livres sortis de Boulac. Le premier, ou caractère ordinaire, sert pour le text courant, et est absolument le même que celui qui est en usage à Constantinople.³¹

Heyworth-Dunne attributed the new Būlāq's Arabic types to Senglākh Efendī al-Fārisī, which he describes as the creator of a new school of calligraphy in Egypt, but whose name is hardly ever mentioned.³² Although the historian reports that Senglākh 'was charged with the task of engraving the matrices which were to be used in the press instead of those made in Europe' by Muḥammad 'Alī, it seems more likely

27. Original material from the Būlāq Press is housed and exhibited at the Bibliotheca Alexandrina in Cairo; see the catalogue by Ḥālid 'Azab and Ahmād Manṣūr, *Maṭba'at Būlāq, Iṣrāf Wa-Taqdīm Ismā'il Sirāq Al-Dīn* (Alexandria: Bibliotheca Alexandrina, 2005).

28. Heyworth-Dunne, 'Printing and Translations under Muḥammad 'Alī of Egypt': 330. According to him, the 'most of the best calligraphers, even in Egypt, have been of Turkish origin'.

29. Birnbaum, Aksan, McCaffrey, and Sadek, *From Manuscript to Printed Book in the Islamic World*, 13.

30. For this reason this type is not the object of further analysis.

31. 'The characters used for printing are of two kinds only, the simple *neskhy* and the *fārsy* or Persian character. You have seen them in the books out of Boulac. The first, or ordinary character, serves for the current text, and is absolutely the same as that used in Constantinople', approximate translation by the author from M.A. Perron, 'Lettre Sur Les Écoles Et L'imprimerie Du Pacha D'Égypte, Par M.A. Perron', *Journal Asiatique* 4, II (1843): 18–19.

32. Heyworth-Dunne, 'Printing and Translations under Muḥammad 'Alī of Egypt': 330. Strauss reports that the renowned Iranian calligrapher Mirzā Sanglākh from Khorāsān (d.1294/1877) spent more than a quarter of a century in the Ottoman Empire and in Egypt, see *The Egyptian Connection*, 22. On the other hand, he is designated as 'an Indian named Sanglakh' in Birnbaum, Aksan, McCaffrey, and Sadek, *From Manuscript to Printed Book in the Islamic World*, 13, and as Mirzā Senglākh Horāsānī from Cairo in İhsanoğlu and Aynur, 'The Birth of the Tradition of Printed Books in the Ottoman Empire', 192.

that he only supplied the handwritten models for them.³³ Senglākh created both *nash̄* and *nasta'liq* letters. The latter appeared for the first time in Sa‘dī-i Shirāzī's *Kitâb-i Gûlistân* in 1244/1828. On the other hand, the first book set with the new *nash̄* type was the *Lağım Risâlesi*, printed in 1239/1824;³⁴ this type appeared in the majority of the Bûlâq Press' books and remained in use for many years.³⁵

In 1872 the Bûlâq Press adopted new Arabic types, as reported by Roper: 'new – and to Egyptian eyes more elegant – types were cut for the press, which were oriented towards the latest French models'.³⁶ Nevertheless, it is not clear what this may refer to, as the source provides no further details. A publication from 1878 still shows the older type (BP3, Figure 9.30), whereas a new Arabic text type (BP4) appears in one of the Bûlâq's books from 1912³⁷ (Figure 9.31). The latter type shares similarities with BP3 although it is more upright and presents more confidently shaped letterforms (e.g. isolated ğîm letter group, dâl/dâl, nûn). It is worth noting that the BP4 type adopts the linear variants – introduced by Mühendisyan – for the ğîm letter group in medial and final positions (Figure 9.32). This enabled the elimination of the multilevel connections, which instead are represented by ligatures.

A new Arabic type (BPQ) was used at the Press in 1924 for the printing of a typographically composed Qur'ân, discussed in the following section.

33. Heyworth-Dunne, 'Printing and Translations under Muhammed 'Alî of Egypt': 330. Heyworth-Dunne reports that 'specimens of his engraving can be seen in many of the Bûlâq publications; all the headings chapters were printed in his *ta'lik*, called more popularly in Egypt *al-khat al-fârisî*, i.e. Persian calligraphy, but as the type was rather overworked, it is very difficult to appreciate his skills from some of the later editions'. The best sample Senglâkh's work is reportedly the *Dîwân Muhyî-addîn b. 'Arabi*, 'which is almost indistinguishable from a manuscript so well is it produced'.

34. İhsanoğlu and Aynur, 'The Birth of the Tradition of Printed Books in the Ottoman Empire': 192.

35. Birnbaum, Aksan, McCaffrey, and Sadek, *From Manuscript to Printed Book in the Islamic World*, 13–14.

36. Roper and Glass, 'The Printing of Arabic books in the Arab World', 184.

37. Further research is necessary to identify the first use of BP4.

9.2.2 The King Fu'ād Qur'ān

I asked again why the Koran is not printed, and I was told that the Priests are opposed, who say that a holy book should be rare, nor should it run in everyone's hands.¹

Brocchi's words from his visit to the Būlāq Press report that in the 1820s Egypt was not open to the printing of the Qur'ān by typographic means; it would indeed take just over another century to have the first typeset Muslim-approved Qur'ān of the Arab world, which was completed in Cairo on 7 Dhūl-Hiġga 1342/10 July 1924² (Figure 9.33). Outside the borders of the Ottoman Empire, the Qur'ān had been printed typographically in Europe since the sixteenth century, although these editions presented various problems, one of which not being 'in accordance with Orthodox Islamic practice'.³ The first Qur'ān to involve Muslims – a local scholar named Mullah Osman Ismail who was responsible for producing the type⁴ – was printed in Saint-Petersburg in 1787, but this edition also lacked religious authority.

As highlighted by Sabev, 'in the 1870s Ottoman print culture was sufficiently developed and the Muslim reading public accepted the first Ottoman printed versions of the Qur'ān more readily than the earlier Western printed Qur'āns'.⁵ While this is true, the use of lithography clearly played a part in this process of acceptance, like in the case of the Sultan-authorised edition of Osman Zeki Bey printed in Istanbul in 1871–72. The publication of the 1924 edition of the Qur'ān at the Būlāq Press reflected the need for an authoritative version 'that would do full justice to the demands of traditional Islamic scholarship, in respect of both the shape of the text [...] and the way it was presented'.⁶ Supported by the Egyptian King Fu'ād, and prepared under the supervision of the Al-Azhar's scholars, this edition came to be known both as the 'Azhar Qur'ān' or the 'Fu'ād Qur'ān'. The seventeen years required by Egyptian scholars for the preparation of the Fu'ād Qur'ān, from 1907 to 1924, were necessary to ensure the correctness of the text in adherence to 'the approved norms in terms of content and orthography', which was an indispensable precondition for accepting the duplication of the sacred text.⁷ Having the endorsement of a Muslim authority, the Azhar edition was recognised as the 'official' Qur'ān on which many subsequent printed editions in the Islamic world would be based.⁸

About the type

Milo suggested that the typeface used for the Cairo Qur'ān of 1924 was cut after the handwriting of the famous Ottoman calligrapher Abdülaziz Efendi.⁹ Nevertheless, Milo observed that 'nothing of Aziz Efendi's superb *naskh* ductus, the zenith of five

1. Brocchi, *Giornale Delle Osservazioni*, 173.

2. Bobzin, 'From Venice to Cairo', 170. Some Qur'āns were printed in Egypt in the second half of the nineteenth century, including at the Būlāq Press (e.g. the *Al-Muṣṭafā Al-Shārif*, 1882), but these were 'embedded in the texts of well known commentaries', see Roper, 'The History of the Book in the Muslim World', 549.

3. Roper, 'The History of the Book in the Muslim World', 549. This observation refers in particular to the Flügel Qur'ān that also circulated in the Muslim world.

4. Bobzin, 'From Venice to Cairo', 165.

5. Sabev, 'Waiting for Godot', 116.

6. Roper, 'The History of the Book in the Muslim World', 549.

7. Sabev, 'Waiting for Godot', 109.

8. Roper, 'The History of the Book in the Muslim World', 550. This continues to the present day.

9. Thomas Milo, 'Arabic Amphibious Characters. Phonetics, Phonology, Orthography, Calligraphy and Typography', in *Vom Koran zum Islam*, edited by Markus Groß and Ohlig (Berlin & Tübingen: Verlag Hans Schiler, 2009), 520.

centuries of Ottoman expertise, is reflected in the Fu'ād typography. What Aziz Efendi's role was in preparing the recension is not clear.¹⁰ On the other hand, other sources report that the Cairo typeface was originally designed by Muḥammad Ča'far Bey, 'who achieved a high degree of excellence in calligraphy, and in particular in the *tulut* and *nash* and *riqa*'.¹¹

His finest achievement was designing typefaces for the Būlāq Press, which reached higher standards than had ever been achieved before in the Arab world. These became the basis of King Fu'ād's Qur'ān, the first printed edition of the Holy Book to achieve wide acceptance in the Muslim world.¹²

Regardless of the model it was based on, the Arabic type used for the Fu'ād Qur'ān's edition printed at the Būlāq Press (BPQ) exhibits features that faithfully echoed calligraphic manuscript practice, particularly in the adherence to the *nash* style (Figure 9.34), in the shaping of characters individually and in their contextual variations when joined, and in the implementation of script rules. Worthy of mention is also the quality of joins between characters that overcomes the gaps, featured in most of the Arabic foundry types, with seamless joints and faultless alignment of characters. In evaluating the BPQ type, it is important to highlight two elements in particular: the multilevel connections and the vocalisation. With regard to the former, it can be observed that vertical connections are only obtained via ligatures whereas the typesetting of individual characters on a second level of alignment appears to be finally abandoned. Furthermore, the BPQ type adopted the linear variants for the joining of the ġīm letter group in medial and final positions; introduced by Mühendisyan, these variants had already been used at the Būlāq Press in the BP4 type. Besides giving further evidence of the link between the Būlāq type production and that of the Ottoman presses, the use of this peculiar makeshift contributed to reinforcing its establishment as a typographic convention (Figure 9.35).

With regard to the vowels positioning, the BPQ type adopts the standard configuration of sorts on three lines where vowels cast separately are aligned at the same height above or below the body of the type (Figure 9.36). This method appeared in the seventeenth-century European Arabic types of Erpenius and Roycroft (see Figure 7.18 and Figure 6.110), and in the eighteenth-century types used at the CMS Press in Malta (see Figure 8.65). Besides the typesetting disadvantage (i.e. the laborious, time-consuming and challenging handling small individual marks), a drawback of this approach was evidently the lack of control over the distance of the vowels relative to the letters, which in many cases resulted in them being too far from the desired positioning. The preference of this method over other technical solutions (e.g. kerned method, casting vowels together with the base-forms, insertion via means of grooves) meant favouring economical manufacture over ease of typesetting and, more importantly, over rendering the script as faithfully as possible to manuscript practice. Although the BPQ type overall aimed for it, at least in two instances (i.e. multilevel connections and vocalisation) it settled for compromises that were not strictly imposed by technology.

10. Ibid.

11. Ahmed Mansour, 'The Bulaq Press Museum at the Biblioteca Alexandrina', in *Historical Aspects of Printing and Publishing in Languages of the Middle East*, edited by Geoffrey Roper (Leiden: Brill, 2014), 293.

12. Ibid.

Hot-metal and digital adaptations of the Būlāq Press' Qur'ān typeface

When the Monotype Corporation initiated a programme for the development of Arabic typefaces, it looked for potential models amongst established foundry types that could be adapted for mechanical composition, sourcing samples from the Būlāq Press in Cairo and the Hyderabad Government Press in India.¹³ Monotype's first hot-metal fount, Series 507, was based on the Indian models: with the first proofs developed from 1938, it was primarily conceived for the Urdu language. Due to the styling of the typeface, 'tailored towards the specificities of the Indian market', Series 507 could not be used for Arabic language compositions.¹⁴ Therefore, it was necessary to develop a new design for the Middle Eastern market that conformed to the regional preferences. A first proof of the new typeface, Series 409, based on the BPQ type of the Fu'ād Qur'ān, was printed in January 1946.¹⁵ In a recent study, Monotype's Series 409 was designated as 'the unwitting mechanisation of Qur'ān typography': speaking about the source of the model for the new typeface, Nemeth points out that 'no evidence suggests that anyone involved with the type's adaptation knew about its previous historic role'.¹⁶

A source containing prints of the case-lays from the Būlāq Press¹⁷ provides evidence that the BPQ type included at least 470 sorts for non-vocalised typesetting. Two additional case-lays show reduced character sets for 'Arabic writing simplification'; one of them also shows additional sorts, including the vowel marks, that are not included in the main case (Appendix 150).

Besides being adapted for mechanical typesetting, the typeface of the Fu'ād Qur'ān was also digitised in the early 1990s by the Calligraphy Centre of the Bibliotheca Alexandrina.¹⁸ Redesigned by DecoType in 2001 – and released with the name Emiri – this historical revival typeface was developed following the principles of metal type (thus respecting the 'constraints that appeared to be conscious choices made by the punch-cutter of the original') while introducing discreet improvements 'where the original design showed obvious compromises against the model it tried to reproduce'¹⁹ (Figure 9.37, Figure 9.38). The design of the Emiri typeface draws on the original foundry types of BPQ, from a set of pictures of the metal sorts arranged purposely for the printing of the case-lays used at the Būlāq Press mentioned above²⁰ (Appendix 151). These images are also important for providing further evidence regarding the BPQ type and Arabic type-making features, such as overhanging characters, recurring letter-vowel combinations cast together, composed characters, etc. (Figure 9.39).

The making of the Emiri typeface exposed some unexpected clashes between the Cairo orthography (i.e. the 1924 spelling of the Qur'ān recension²¹) with the

13. Nemeth, 'Arabic Type-Making in the Machine Age', 156–57.

14. Ibid., 157–71.

15. Ibid., 175.

16. Ibid., 175. On the other hand, Monotype's staff and its representative in Egypt, Joseph Lindell, were aware of it.

17. The case-lays are contained in the booklet by Omar Muhammad Al-Fatih, تيسير الكتبة العربية (Tayseer Al-Kitābah Al-‘Arabiyyah, Arabic Writing Simplification) (Cairo: Academy of the Arabic language in Cairo, 1961). This document is available at MTS [Correspondence folder Arabic (Egyptian2)].

18. Mansour, 'The Bulaq Press Museum at the Biblioteca Alexandrina', 293.

19. WinSoft-DecoType, *Tasmeem Type Specimen Book*.

20. The author is indebted to Thomas Milo and Mirjam Somers for sharing the images used for the development of the DTP Emiri font.

21. It is referred to as Contemporary Qur'ānic orthography (CQO) in Milo, 'Arabic Amphibious Characters', 492.

calligraphic rules of *nash*, the style of choice for rendering the Ottoman Qur'ān; for this reason, a thorough analysis of both systems was conducted.²² In highlighting the difference between orthography and calligraphy, Milo concluded:

The Cairo typeface clearly follows Ottoman naskh shapes and structures as much as possible. But it is also obvious that in last instance orthography and not calligraphy was the decisive criteria. One can only guess what it must have meant for the greatest Ottoman calligrapher of his time to be overruled by orthographic and typographic *Systemzwang*.²³

As a consequence, the image of some typographic letter compounds (extracted from the Cairo Qur'ān text, typeset with BPQ) did not match that of their handwritten counterparts (extracted from *nash* calligraphic manuscripts). The appearance of words according to manuscript practice was thus dropped in favour of orthographic precision, as highlighted by Milo's analysis (Figure 9.40). In his study, Nemeth notes that the appearance of the new spellings introduced by the Fu'ād Qur'ān 'was shaped by the inherent characteristics of the medium'.²⁴ While this is true, features affecting the new rendering of words – such as the positioning of vowels relative to the letter and the elongations between characters – cannot be solely attributed to the fact that 'the physical properties of the metal type did not allow such flexibility'.²⁵ Previous Arabic types from the nineteenth century (e.g. by the ABCFM and Mühendisyan) as well as the sixteenth (by Granjon²⁶) proved that greater flexibility in the vocalisation could be achieved also with metal types. Thus while in the BPQ type 'vowels, cast on separate sorts all had to align along the same horizontal line above and below the characters, directly reflecting the type's body',²⁷ this was the consequence of a type-making decision that was not entirely dependent on the constraints of technology. A more accurate vocalisation was not impossible to obtain otherwise with foundry types, although it may have implied more elaborate solutions. On the other hand, the elongations introduced between letters to accommodate marks could perhaps be solved, at least in certain cases, resorting to ligatures carrying the letter compounds and the stacked marks, similar to how it was often done with the word *Allah* (Figure 9.41).

The Cairo edition of the Qur'ān marked a milestone for the development of Arabic typography by introducing the first Muslim- authorised use of foundry type for the sacred text. For this reason, it could be arguably considered the highpoint of handset technology for composing Arabic. This may carry the misconception that the typeface, deemed suitable in this edition for printing the most guarded religious text, is the best representation of what could be achieved with movable type technology. While this is true for several reasons (e.g. adherence to the *nash* calligraphic tradition, the quality of design, alignment and joins of characters), the BPQ type did not fully showcase the flexibility of foundry types (even at the expense of manufacturing or composing convenience) particularly with regard to the vocalisation – a critical feature for the printing of the Qur'ān – as previous Arabic types had done.

22. Ibid., 520. 'Ottoman calligraphy and Cairo orthography were developed from different perspectives as precision mechanisms to preserve the text of the Qur'ān with respect and integrity. Each of these systems consists of a subtle internal balance of rules, executed with total dedication and consistency'.

23. Milo, 'Arabic Amphibious Characters', 520.

24. Nemeth, 'Arabic Type-Making in the Machine Age', 177. The medium is intended as the movable metal type technology.

25. Ibid.

26. With his first Arabic type, see Figure 6.1.

27. Nemeth, 'Arabic Type-Making in the Machine Age', 177.

This observation raises two issues worth noting. Firstly, the relationship between the image of printed Arabic texts and the technology behind printing and type-making should always be questioned to understand whether the first was the result of technical constraints or decisions in the manufacturing process. Secondly, the acceptance of printing the Qur'ān with movable metal types was not strictly hindered by the Muslims' inflexibility of having the most faithful typographic reproduction of the script according to manuscript practice. This means that the readiness to print the Qur'ān typographically was not hindered by the lack of a suitable Arabic type: Mühendisyan had proved that it was possible a few decades before, but his work was ahead of its time. The printing of the Cairo edition proves that when times were ripe for such an enterprise, a compromised rendering of the script was acceptable for the sake of orthographic precision, which in this instance was considered the most important feature.

However, it should also be borne in mind that the BPQ type also critically reduced the cascading connections of Arabic characters by using the linear variants of the ġim letter group; this was a typographic convention but, at the same time, represented a type-making choice that was independent from the decisive criterion of orthographic precision. In conclusion, the Cairo edition introduced an authoritative text whose image was indeed influenced by technology, as argued by Nemeth,²⁸ but whose standard of acceptance was ultimately not solely dictated by technical limitations.

28. Ibid.

10 CONCLUSION

The aim of this thesis is to study the Arabic script in the transition from written to printed form, and assess its adaptation to the technology of printing books. Because this happened at different times in Europe and in the Middle East, both occurrences are evaluated in their historical contexts. This is essential to understand Arabic typographic production in these regions, and to critically assess it in light of the factors that influenced the design and manufacturing processes of the type-makers, and also the expectations and reception by the readership.

Type-making and printing Arabic outside the Middle East entailed the involvement of non-Muslims with limited or even no direct knowledge of the language. This, in combination with the scarcity of resources – Arabic manuscripts or native speakers – precluded the development of script expertise. The challenges of translating the Arabic script into printing originated from the need to maintain a degree of fidelity to the models, whilst adapting the script to the typographic environment, and thereby into a modular system based on the repetition of independent letter-forms that ran counter to the nature of the Arabic script. The lack of typographic standards for the script forced type-makers to resort to a trial and error process in order to find solutions that could best accommodate the task at hand. At the same time, they had to combine the requirements of type-making with those of the intended purpose, and establish what should be prioritised according to the context in which they operated. This situation is exemplified by the diverse approaches of type-makers who were faced with the challenge of making Arabic types for book printing.

The development of Arabic typeforms resulted in a divergence from the Islamic calligraphic tradition and established a typographic image of the script that discontinued that of manuscript practice. This research was motivated by the lack of studies that trace the origin and understand the reason for this discrepancy, and it was initiated by the following research questions: what are the factors that determined the progress towards a *satisfactory* mechanical reproduction of the Arabic script? To what extent, and to whom, is the departure from calligraphic manuscript models to facilitate typographical composition *acceptable*?

The answers to these questions could be provided only through a critical assessment of the Arabic types, which constitutes the focus of this thesis. The detailed analysis was conducted through a thematic approach, which provided different lines of enquiry. These are valuable to establish connections between issues that might look unrelated and to draw observations towards a cohesive narrative. Similarly, the evaluation of Arabic types through common criteria is instrumental for the comparison and qualitative appraisal according to specific and common parameters. Observations about the technical aspects of printing and type-making are also essential to understand the working methods of people involved in the design and manufacturing processes and to discuss how decisions taken at different stages can affect the visual appearance of the Arabic characters on the printed page. On the other hand, observations regarding manuscript practices based on calligraphic models provide a benchmark for the representation of written Arabic script and, therefore, for the evaluation of Arabic types from an aesthetic and functional point of view.

Assessment of the quality of Arabic foundry types

As noted in Chapter 1, the underlying thread throughout the assessment of the Arabic types in this thesis is their qualitative appraisal and the understanding of how to

gauge it. The detailed analysis enabled a demonstration of the correlation between the concept of *quality* and that of *authenticity*. In other words, the inclusion of features that replicate the richness of the script according to manuscript practice contributes to a more faithful typographic representation, and consequently to increase the quality of an Arabic type. As shown, maintaining the integrity of the chosen calligraphic style in the typeforms is crucial for preserving the integrity of the Arabic script in typography as much as it is in writing; this applies equally to the shaping of characters, their proportions, the observance of essential features such as contextual variations and cascading connections, and the implementation of the script's rule-based system that serves to enhance it aesthetically and to provide reading aids. Conversely, the quality of an Arabic type is compromised if the integrity of the chosen style is not respected. Additionally, the typographic tendency towards simplification – such as restricting the size of the character set by re-using shared components and limiting contextual variations, or using makeshifts to reduce or eliminate the cascading connections to a linear arrangement – was not conducive to a faithful representation of the script, although it might have facilitated one or more phases of the type-making process.

Because Arabic foundry types presented, in different measure, features that contributed to decreasing their overall quality (i.e. their appearance on the printed page), these were considered as substandard representations of the script. Nevertheless, it is worth noting that the inclusion or lack of such features in the Arabic typeforms provides implicit evidence that is critical to reveal relationships between the visual forms of letters and the type-making process, and to support informed hypotheses when there are no extant primary sources providing historical records. This concerns the technical aspects of type-making as well as the script-related visual sensibility of the people involved in the process, which is essential for the creation of high-quality designs for vernacular typography, as stated by Ross with regard to the design of non-Latin scripts.¹

The reason to gauge the quality of an Arabic typeface is to evaluate it in the wider context of the type's designated use and intended readership, not only from the perspective of its makers. This is where issues relative to what might be considered satisfactory or acceptable to fit a certain purpose can be raised. As highlighted in the thesis, the relationship between the acceptance of typography for the reproduction of the Arabic script, especially in the Middle East, was strictly dependent on the closeness to the established manuscript practice or, as described by Roper, the calligraphic norm. This also finds confirmation in the fact that other printing methods like lithography – that preserved the appearance of the script as intended in the written tradition and that met the reader's expectations – found less hostile ground in this region for the transmission of texts. It should, therefore, be stressed that acceptability is determined by contextual factors and that culture and script-education influence sensitivity in people's reception of new forms. There is less inclination and motivation to accept what is recognised as a substandard representation of a script, especially if there is an alternative medium that is a better fit for the purpose. On the other hand, there is greater predisposition towards acceptance if the shortcomings are not recognised as such, and if there is a lack of knowledge or sensibility in understanding the requirements for a script to remain authentic.

Satisfactory typographic representation of the Arabic script

Similarly, the definition of what might be a satisfactory typographic representation of the Arabic script relates to the context and to the understanding of what is 'good

1. Ross, 'The Type Design Process for Non-Latin Scripts', 151.

enough' to fit a certain purpose or a certain expectation, and from whose perspective is this evaluated. It seems evident that in sixteenth-century Europe there were lower expectations for Arabic type-making, given that there was no preceding typographic standards to meet or improve on, and no established manuscript tradition to compare the printed works with. The first Arabic types were 'good enough' simply because they enabled the printing of Arabic books and, regardless of the quality, they fulfilled the main purpose of supporting the spread of religious texts via missionary routes amongst the non-Roman Christians and Muslims of the Middle East, and provided text for the restricted European readership of Orientalists who were interested in developing Arabic studies.

The first attempt at a closer representation of the script came from Robert Granjon, a skilled and experienced punch-cutter, supported by the investment of Pope Gregory XIII and as part of the ambitious project of the *Typographia Medicea*. In trying to capture the essence of the script and achieve a more rich and faithful representation of it already with his first Arabic type of 1580, Granjon succeeded in finding technical solutions that contributed to the advancement of Arabic typography. More importantly, he set standards that, together with the efforts of Savary de Brèves, reached the peak of Arabic type production in Europe, and had a long-lasting influence on subsequent Arabic typography, also in the Middle East. Nevertheless, Granjon's types (as well as, in different measure, those of other European type-makers) exposed the lack of script-education that was necessary to correct those shortcomings in the representation of the script that did not result from the constraints of technology, such as style adherence or proportions. On the other hand, the analysis also revealed a level of script-competence in his Arabic types, which could be attributed to the availability of Arabic manuscripts and Arabic speakers at the service of the *Typographia Medicea*. However, the presence of faults in his types suggests that the background and level of expertise of the advisors should also be questioned, as well as the quality of the manuscript models that might have been used as reference. Granjon's Arabic types also provided important evidence of his type-making process and of different technical solutions. Some of these, adopted in an attempt of simplification, deviated from the accuracy and adherence to calligraphic practices that he had shown in his first Arabic type proving that, at different times, he made decisions based on changing priorities.

The first Arabic types created by the Middle Eastern presses of Aleppo and Khenchara in the eighteenth century, revealed a strong influence of the European models without contributing to the development of Arabic typography. Mainly due to the context in which they were produced and to the background of their type-makers, they did not benefit from their local production. On the other hand, the first typographic venture founded by the Muslim convert Ibrahim Müteferrika produced a much improved and accurate Arabic typeface especially in terms of style consistency, whereas it lacked refinement in the shaping of letterforms. Müteferrika's type also showed an impressive effort, although not without faults, to implement various features of the Arabic script belonging to nash calligraphic practice and the rules that govern the Arabic writing system.

Further developments for Arabic typography came from the nineteenth-century English and American missionary presses operating in Malta and Beirut. Producing Arabic books for the Middle East, the English CMS² and the American ABCFM³ became increasingly concerned with appealing to Arab readers. Initially using the same Arabic types of European manufacture, both presses replaced them to accom-

2. Church Missionary Society.
3. American Board of Commissioners for Foreign Missions.

moderate the Arab taste. Preoccupied with gaining acceptance, they intended to give their books a 'native aspect', mainly through a typography that could be visually closer to what their readership was accustomed to. This sensibility to satisfy the readership's expectation also manifested itself through the involvement and supervision of leading Arab figures, like Fāris aš-Šidŷāq, and with new and more calligraphic Arabic types that could be visually more familiar and appealing to the readers. The ABCFM Press further contributed to the advancement of Arabic typography with the introduction of an important technical innovation for the vocalisation of texts, which was developed in collaboration with a renowned European foundry.

The subsequent development of Arabic types in Turkey, which formally led to the acceptance of Arabic typography in the Middle East, came from the efforts of two Armenians, Poghos Arapian and Ohannes Mühendisyan. They both reportedly based their Arabic types on the models of master Turkish calligraphers, producing types that were overall faithful representations of the Arabic script in their chosen style, reducing the gap between typography and the standards of the script according to Islamic calligraphy. The work of Mühendisyan, described in Milo's studies as the real breakthrough, proved that a combination of crafting skills and script expertise produced a high-quality Arabic typeface, which also showcased the potential of the technology to provide a fully functional type to compose the vocalised text of the Qur'ān. Nevertheless, Mühendisyan's typeface was not perfect and includes errors and design solutions that partially deviated from the aesthetic and functional script requirements, and that were not strictly imposed by technological limitations.

Similarly, the Arabic type employed by the Būlāq Press to print the Cairo edition of the Qur'ān in 1924, while proving the merits of a high-quality reproduction of the Arabic script by typographic means, introduced new spellings of words and a method of vocalisation that sacrificed the rendering of the script according to manuscript practice: in the first instance for the sake of orthographic precision, in the second instance to facilitate typographical composition. The use of linear variants for the connections of the ȝim letter group, also reduced script-required multilevel connections that could be achieved within the constraints of the technology, contributing further to establishing a typographic convention. The use of the Būlāq type for the printing of the first typographic edition of the Qur'ān to receive the endorsement of a Muslim authority, validated this typeface as a satisfactory representation of the Arabic script but, at the same time, proved that deviations from the established calligraphic norm to fit specific purposes were acceptable compromises for the typographic image of the script. As discussed, the Būlāq type could arguably represent the pinnacle of the development of Arabic typography with foundry types because it was deemed good enough to print the most revered Muslim text; in fact, it did not fully showcase the flexibility of the technology, as previous Arabic typefaces had done to various degrees and with regard to different features. The printing of the Cairo edition of the Qur'ān in the twentieth century proved two further important points: firstly, that the readiness of Muslim authorities to print a typographic Qur'ān at an earlier time was not constrained by the lack of a suitable Arabic type, but was dependent on other factors; secondly, that what was ultimately accepted as the satisfactory typographic image of the Qur'ān carried shortcomings that were influenced by technology but ultimately not dictated by technical limitations.

In each instance, the type-makers' decisions re-set the boundaries of what was satisfactory in their own contexts, responding to what they considered essential, desirable or achievable for the reproduction of the script, giving in the process a different interpretation and order to what should be prioritised.

Factors affecting the quality of Arabic foundry types

As has been demonstrated in the thesis, the impact of contextual factors on the appearance of Arabic typeforms should be questioned as much as that of technology. In order to do so, it is paramount to identify the nature of shortcomings before establishing an exclusive causal relationship, which needs to be verified case by case with a systematic detailed comparative analysis. Shortcomings affecting the quality of the type can be variously ascribed as dependant on the limitation of the medium; resulting from the type-makers' choices and approaches in dealing with technology; introduced in one of the phases of type-making or typesetting; or caused by the lack of script knowledge or other external determining factors (e.g. economic investment and time constraints). While evidence can be found in the primary sources, this has to be assessed in light of considerations deriving from an insightful understanding of the Arabic script and of type-making technologies, and awareness of the context that determined the making of the type. For instance, depending on their nature, defects in the appearance and shaping of typeforms can be caused by poor craftsmanship, as well as lack of visual sensibility for the script, poor models, substandard printing conditions, worn-out metal sorts, etc. A mistake found in the text, such as a correctly shaped Arabic typeform used in the wrong position in a word, could have been introduced at the typesetting stage, and not reveal the type-maker's lack of script knowledge. Similarly, the incorrect position of a dot in relation to the character (e.g. too far from the letter) might suggest the type-makers' choice to cast dots independently from the base-forms to economise on punch-cutting, without necessarily implying that he was unaware of what should have been its correct positioning. In other words, it is evidence that he prioritised/valued the convenience of type-making over accurate representation of the script, regardless of his knowledge of it.

On the other hand, it is evident that movable type technology had limitations that were bound to affect the printing of Arabic with technical issues, but margins of improvement within the constraints were possible. While the breaks between metal sorts are evidently imposed by technology, the visible gap between them could be disguised by the high-quality casting of sorts and well-aligned characters, as demonstrated by the seamless connecting characters of the Büläq Arabic type used in the Fu'ad Qur'an. Similarly, a vocalisation more conformant to manuscript practice could be achieved in typography other than aligning individually cast vowels at the same height above and below the body of the type, although different solutions might have been more elaborate, costly or time-consuming at one of the stages of type-making or composition. While this can be considered a limitation of the technology itself, the concurrence of other factors that led to certain decisions for the manufacturing of the type should be equally acknowledged.

Muslim-education and script knowledge

Typographic shortcomings ascribed to the lack of script knowledge are often associated with the non-Muslim identity of the type-makers. This attribution requires further consideration, especially with regard to the wider discourse concerning the correlation between Muslim upbringing and script education and, consequently, script expertise.

Drawing on Milo's studies regarding this matter, this thesis has highlighted the connection between writing systems and religion, and has touched upon the fact that Arabic script-education is part of the schooling system for Muslim-educated people. Nevertheless, the implementation or break down of the rule-based system that governs the shaping of Arabic in calligraphic tradition might escape in its entirety the everyday use but still be visually recognised by a native/Muslim reader as the generator of authentic script representation. In other words, if one or more aesthetic or functional rules are not implemented, whether in written or printed Arabic, the script

might appear unbalanced (or less visually rich, less legible, etc.) to the reader, due to the loss of essential characteristic features, even if he might not be able to identify the nature of each shortcoming in the text or establish its contribution to the resulting compromised appearance of the script.

While it is reasonable to claim that a Muslim upbringing entails a degree of script-education, this does not entail the same level of script expertise for everyone, especially compared to the few that, for instance, further their education as calligraphers. On the other hand, while it is reasonable to assume that non-Muslims have little knowledge of the script, or, at least, less knowledge than a Muslim-educated person, it cannot be excluded that a non-Muslim can achieve equal or further script knowledge by undertaking the necessary studies to do so.

With regard to Arabic type-making, the discourse of script knowledge has to be considered in the context of a manufacturing process that added a whole set of factors that, as discussed, might have influenced the decisions of the type-makers or affected the appearance of the types regardless of the script knowledge with which the type-makers set out to realise them. The insightful knowledge of the Arabic script by the pre-eminent Muslim authority of al-Azhar did not impede compromises in its typographic representation in the *Fu'ād Qur'ān*; similarly, the lack of Islamic upbringing did not impede the production of high-quality typographic representations of the script. In both cases, other factors have to be acknowledged.

Original Contribution

Although printed books are the main, and often only, source available for the examination, this study draws, where possible, on a variety of primary sources. These include manuscripts, printing houses records, and other extant typographic material such as punches, matrices and cast type, which are gathered from different archives and cross-referenced to enrich the narrative and provide reliable information and visual documentation that supports the analysis. This work stresses the importance of the study and observation of primary sources as an essential contribution to understanding and in uncovering the history of processes. Although it is important to acknowledge that covering uncharted ground this research leaves unanswered questions until further research is carried out, it also provides evidence that informed hypotheses, based on observation and cross-referencing, find confirmation in surviving typographic material. Findings drawn from the detailed comparative analysis of primary sources that have not previously been examined as a set are amongst the original contribution of this thesis, as well as advancing a methodology for researching type history. Furthermore, archive-based research and cross-referencing have enabled the author to establish connections between aspects of Arabic typography and previously unrelated sources. For instance, the author has identified cases of Arabic punches conserved in the Medicean Archives in Florence and in the Imprimerie Nationale as matching known Arabic typefaces: this applies to Granjon's RG2, RG4 and the Jesuits' TCR1 types, in addition to the identification of a second set of punches (TCR2), clearly belonging to a larger size of the same typeface, which does not appear to feature in known Arabic printed books by the Tipografia del Collegio Romano. Moreover, the author found new evidence for the attribution of the *Arabe d'Alde* – a Medicean Arabic type in the French Archives of the Imprimerie Nationale – to Jean Cavaillon, the apprentice of Granjon. It is also worth pointing out that the comparison of Arabic manuscripts with the corresponding Arabic printed books constitutes another original contribution of the thesis, which also presents the first detailed comparison of Granjon's Arabic types (RG3 in particular) with the handwriting of Giovanni Battista Raimondi, supplying evidence that the Orientalist's works served as model/source of inspiration for the French punch-cutter.

This thesis also provides an original contribution to the understanding of Arabic type-making and typesetting technologies not discussed in previous studies, raising critical issues with regard to the technical challenges of printing Arabic. This required addressing and defining other important aspects in the wider discourse of Arabic type-making – such as script-requirements and script-education/knowledge and observations regarding the notion of *variation* in the domains of writing and printing – that are nonetheless of paramount importance because they provide the tools for an accurate typographic evaluation.

The analysis of Arabic foundry types presented in this thesis was conducted from the perspective of a practitioner. Besides benefitting from experience in working with letterforms in high detail to isolate the elements supplying critical information for the assessment of types, it provides the typographic knowledge to identify and interpret evidence found in the primary sources from a point of view that is not purely historical or bibliographical, contributing to filling a substantial gap in historical research by effectively defining Arabic type history. In conclusion, this thesis aspires to evaluate the legacy of Arabic foundry metal types on the structure of the script as observable in current typographic practice, and to highlight pertinently issues that question the appearance and execution of Arabic typeforms in relation to the requirements of the script and the changing boundaries of technological possibilities. Particularly important, in this regard, is tracing typographic conventions for the Arabic script that either originated or departed from manuscript practice – which can only be established by looking at the transition of the script from manuscript to printed form – and establish how these standards gained acceptability and formed an integral part of contemporary Arabic typography. Assessing the development of Arabic foundry types also serves to re-evaluate these conventions in the light of current practice. This draws a parallel between Arabic type-makers that in different historical times are faced with the same challenges of translating the Arabic script into type, and stresses the importance of using script knowledge to adapt the script for a designated purpose with the available technology, while respecting its identity in the process.

Arabic Glossary

Transliteration: translation (additional notes) and [definition or intended meaning]

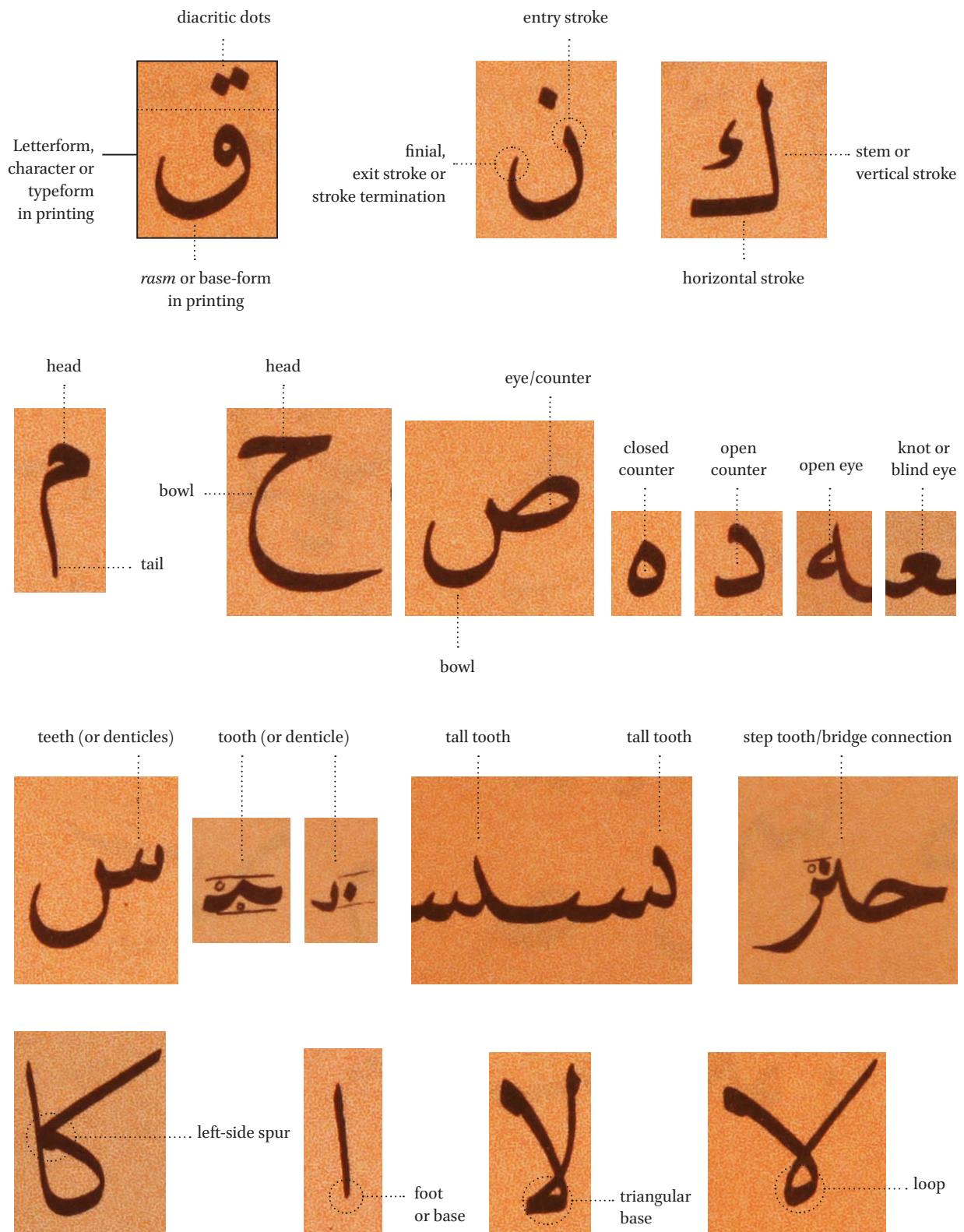
آية	<i>Āyah</i> : verse (plural, آيات <i>āyāt</i>) [verse of the Qur'ān]
الأقلام السِّتَّةُ	<i>Al-aqlām al-sittah</i> : the Six Pens [calligraphic styles]
الخط المنسوب	<i>Al-hatt al-mansūb</i> : proportioned writing
بِسْمَةٌ	<i>Basmalah</i> [collective noun used to indicate the Islamic phrase below]
بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ	<i>Bism Allah Arraḥman Arraḥīm</i> : In the name of God, Most Gracious, Most Merciful
ضمة	<i>Dammah</i> [short vowel u]
صَبْطٌ	<i>Dabt</i> : accuracy
فتحة	<i>Fathah</i> : opening [short vowel a]
فِنْجَانِي	<i>Fingāni</i> : cup-like [variant of 'ayn and ḡayn in initial position followed by ascending stroke]
غباري	<i>Ghubārī</i> : dust (<i>gubārī</i> in Ottoman/Turkish) [calligraphic style, small version of nash]
حديث	<i>Hadīt</i> : collection of traditions containing sayings and deeds of the Prophet
هَمْزَةٌ	<i>Hamzah</i> [glottal stop]
حَرَكَاتٌ	<i>Harakāt</i> [vowel diacritics]
خط	<i>Hatt</i> [Islamic calligraphy, script]
خطاط	<i>Hattāt</i> : calligrapher [plural, <i>hattātūn</i>]
إِجَارَةٌ	<i>Iğāzah</i> : permission [licence, certificate of transmission, diploma]
كَسْرَةٌ	<i>Kasrah</i> : breaking [short vowel i]
كَشِيدَةٌ	<i>Kaṣidah</i> : elongation (or تَطْوِيل <i>tatwīl</i>)
كَاتِبٌ	<i>Kātib</i> : scribe
كُوفِيٌّ	<i>Kufi</i> : kufic [calligraphic style]
قطعةٌ	<i>Qit'a</i> (<i>kut'a</i> in Ottoman/Turkish) [a single calligraphic work, generally using two styles]
لوحةٌ	<i>Lawḥa</i> (<i>levha</i> in Ottoman/Turkish) [calligraphic panel]
لَوْزِيٌّ	<i>Lawzy</i> : almond-like [referring to the counter's shape of some letters]
مَبْسُوطَةٌ	<i>Mabsūtah</i> : stretched, extended [referring to an extending character – similar to <i>mursal</i>]
مَدَارِسٌ	<i>Madāris</i> (singular <i>madrasah</i>) [educational institution, secular or religious]
مَدَدَةٌ	<i>Maddah</i> [vowel prolongation]
مَعْرِيٌّ	<i>Mağribi</i> [calligraphic style]
مَجْمُوعٌ	<i>Mağmoo'</i> : collected together [referring to a returning ending stroke of a letter – similar to <i>malfouf</i>]
مَلْفُوفٌ	<i>Malfouf</i> : rolled together [referring to a returning ending stroke of a letter]
مَصَاحِفٌ	<i>Maṣāḥif</i> (singular, <i>muṣḥaf</i>) [early Qur'ān manuscripts]
مَشْقٌ	<i>Maṣq</i> : teaching exercise, (<i>meşk</i> in Ottoman/Turkish) lesson [practise work or sample for study]

مُحَقَّق	<i>Muhaqqaq</i> [calligraphic style]
مُرَقَّع	<i>Muraqqā</i> : calligraphic album (<i>murakka</i> in Ottoman/Turkish)
مُفَرَّدَات	<i>Mufradāt</i> (<i>müfredât</i> in Ottoman/Turkish) [basic calligraphic exercises - single and double letters]
مُرَكَّبَات	<i>Murakkabāt</i> (<i>mürekkebât</i> in Ottoman/Turkish) [advanced calligraphic exercises - combined letters]
مُرْسَل	<i>Mursal</i> : extending out [referring to an extending ending stroke of a letter]
نَسْخ	<i>Nash</i> : copying [calligraphic style]
نَاسِخ	<i>Nāsīh</i> : copyists (also نَسَّاخ <i>nassāh</i> or وَرَاق <i>warrāq</i>)
نَسْعَلِيق	<i>Nasta'līq</i> : hanging nash
نُقْطَة	<i>Nuqṭa</i> : dot (plural, نُقَط <i>nuqāṭ</i> or نِقَاط <i>niqāṭ</i>)
قَلْم	<i>Qalam</i> : pen
قِرَاءَة	<i>Qirā'ah</i> [plural, قِرَاءَات <i>qīrā'āt</i>], [way of reading of the Qur'ān or recitation]
رَحْمَانِيَّة	<i>Rahmaniah</i> : graceful [referring to the rā'/zā' variant with curly ending]
رَقْنَاء	<i>Ratqā</i> : stitched [referring to the closed-head variant of the ġīm group]
رَسْم	<i>Rasm</i> : drawing/sketch [refers to the outline of the letter]
رَحْبَانِي	<i>Rayḥānī</i> [calligraphic style]
رِقَاع	<i>Riqā'</i> [calligraphic style]
رُقْعَة	<i>Ruq'ah</i> [calligraphic style]
شَدَّة	<i>Šaddah</i> [consonant doubling]
صَادِي	<i>Sadi</i> : sad-like [variant of 'ayn and ġayn in initial and isolated positions]
سَيْفِي	<i>Saifi</i> : sword-like [variant of the letter kāf]
سَرْلَوْح	<i>Sarlawh</i> : head panel, headpiece [in manuscripts]
سُكُون	<i>Sukūn</i> [vowelless letter]
سُورَة	<i>Sūrah</i> : chapter of the Qur'ān (plural سُور <i>suwar</i>)
مَجْوِيد	<i>Taḡwid</i> [rules for pronunciation in Qur'ān recitation]
تَوْيِن	<i>Tanwīn</i> : nunation [addition of nūn with preceding vowel to the ends of nouns and adjectives]
طَرِيقَة	<i>Tarīqah</i> : method
تَرْوِيس	<i>Tarwīs</i> : heading [referring to the barbs in some Arabic letters]
تَشْكِيل	<i>Taškīl</i> : vocalisation
تَسْوِيد	<i>Taswīd</i> : blackening (<i>karalama</i> in Ottoman/Turkish) [calligrapher's practice piece]
تَقْيِع	<i>Tawqī'</i> [calligraphic styles -add]
تُلُّث	<i>Tulut</i> [calligraphic style]
وَصْلَة	<i>Waṣlah</i> : joining [indicates silent letter]
زِنَادِي	<i>Zinādi</i> : trigger-like [variant of kāf]

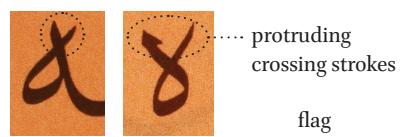
Arabic nomenclature

The calligraphic images in the next pages are extracted and adapted from Al-Bağdadi, *Qawa'id Al-ḥaṭ Al-‘Arabi*. The digital examples are set in dtp Nask font and use the Arabic pangram *Naşşun ḥakymun lahu sirrun qāṭi'un wa du šānīn 'azymun maktubun 'ala tawbin aḥḍarin wa muğalafun biğildin azraq* (A wise text which has an absolute secret and great importance, written on a green tissue and covered with blue leather).

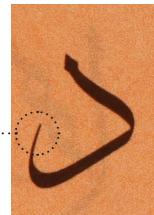
nashh letterforms



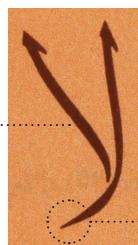
tulut letterforms



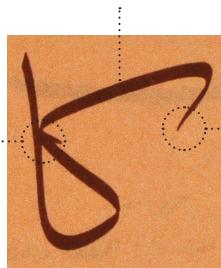
upward tail/
stroke termination



slanted alif

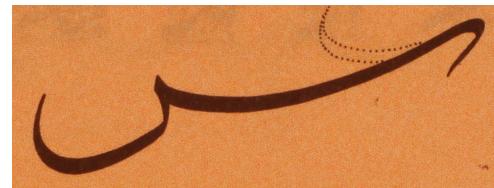
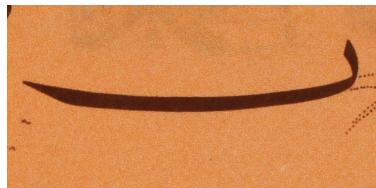
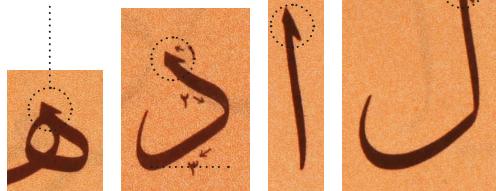


right-side
spur

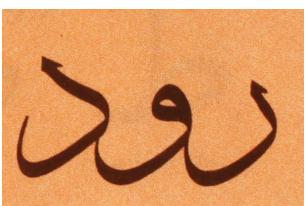
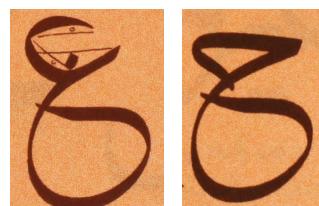


downward stroke
termination

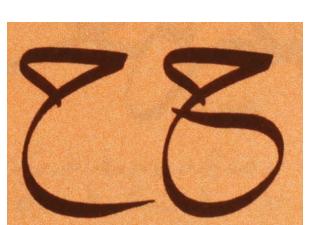
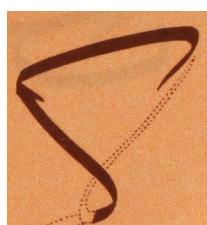
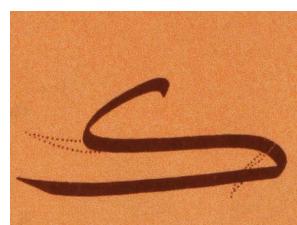
tarwīs (or barb)



mursal (or *mabsūtah*) letters



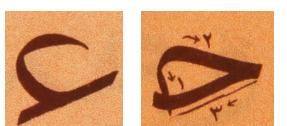
maflouf (or *mağmoo'*) letters



zinādi kāf

saifi kāf

ratqā' hā'

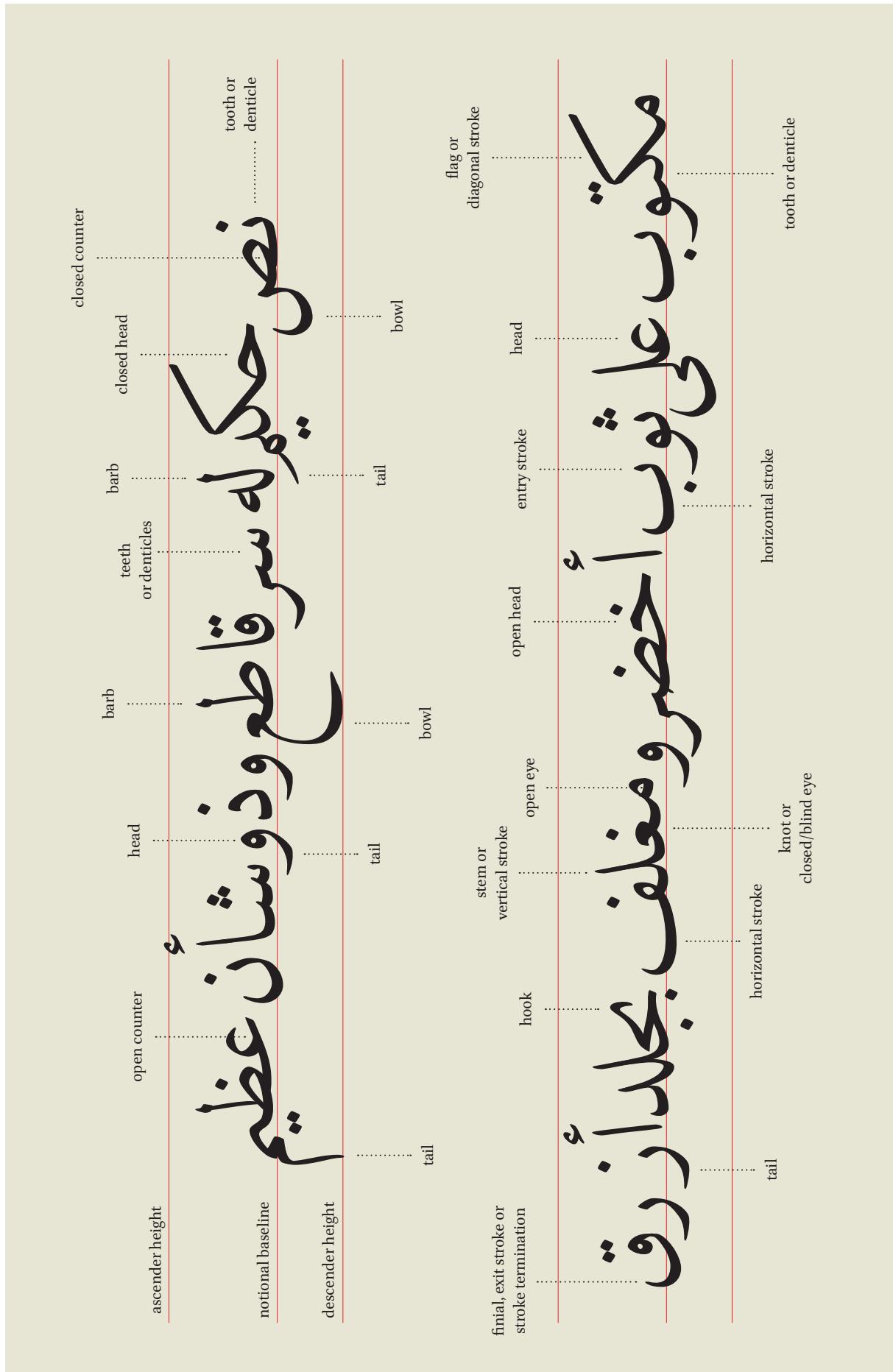


şadi 'ayn

finğani 'ayn

rā' raḥmaniah

lawzy counters



Primary sources of images: list and location

[Manuscripts]

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Al-Qānūn Fī Al-Tibb, copied by Abū Bakr 'Alī b. 'Alī b. Aḥmad al-Nādī, concluded in the year 584/1188–9, BML [Orientale 44]

'DELI' SEYYİD OSMAN EFENDİ

- *Murakka*, end of 18th century, SSM [120-0218]
- *Kasîde-i-Bürde*, end of 18th century, SSM [190-0329]

DOMENICO SIRLETO

Kitāb Al-Taṣrīf Al-İzzī, by 'Izz al-Dīn 'Abd al-Wahhāb al-Zanğānī, copied by Domenico Sirleto, Rome, 1584, BML [Orientale 96c]

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Ianua Linguæ Persicæ, Rome, 1614, BAV [Vat.pers.24]

GIOVANNI BATTISTA RAIMONDI

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- *Frammenta Arabica*, BML [Or. 460]
- 'Glossary Coptic-Arabic, part of a codex containing fragments of Christian texts in various languages', copied by G.B. Raimondi, Rome, XVI-XVII cent., BML [Orientale 461]
- *Kitāb Al-Taṣrīf Al-İzzī*, by 'Izz al-Dīn 'Abd al-Wahhāb al-Zanğānī, copied by G.B. Raimondi, Rome, 1574, BML [Orientale 34b]
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- *Taḥrīr Uṣūl Li-Uqlīdīs*, Rome, XVI-XVII cent., BML [Orientale 20]
- *Thaalebi Vel Physicæ Tractatus, Arabice, Cum Principio Latinæ Versionis Jo. Baptistæ Raimundi. Cod. 6.*, copied by G.B. Raimondi, XVI cent., BNCF [Naz.II.I.6]

HAFIZ OSMAN EFENDİ

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- *Kuran-ı Kerim*, 1093/1682, SSM [100-0348]

HASAN RIZA

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İBRAHİM MÜTEFERRİKA

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- *Usulü'l Hikem Fi Nizamü'l Ümem*, Istanbul, 1143/1730–1, SYEK [Hüsrev Paşa 292]

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MEHMED ŞEVKİ EFENDİ*Kuran-ı Kerim*, 1279/1862–3, SSM [100-0057]**MUSTAFA İZZET EFENDİ**

- *Kit'a*, 1288/1871, SSM [110-0115]
- *İki Kit'a*, 1264/1847–8, SSM [110-0116]

SALĀMIŞ B. KUNDUĞDĪ AŞ-ŞĀLIH*Al-Bustān Fī 'Ağā'ib Al-Ard Wa-L-Buldān*, 1539, BNF [MS Arabe 2212]**UNKNOWN AUTHORS**

- Manuscript on parchment, ff. 40, fully vocalized mağribi script, one copyist. Provenance: Collection Franciscus Raphelengius, UL [Or. 228]
- Manuscript on parchment, ff. 57, mağribi script, two hands. Provenance: Collection Franciscus Raphelengius, UL [Or. 251]
- Manuscript on parchment, ff. 146, ca. 1175 A.D., probably copied in Toledo. Provenance: acquired by Guillaume Postel in 1532, used by Raphelengius, UL [Or. 231]
- *Psalmorūn Liber, Introductione Praemissa Et Precibus Quotidianis Adiectis*, 1201–1400, BAV [Vat.ar.584]
- *Taḥrīr Uṣūl Li-Uqlīdīs*, completed in 698/1298, BML [Orientale 50]

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- *Kitāb Faṣl Al-Khitāb Fī Uṣūl Lughat Al-Ārāb*, Beirut, 1836, by Nāṣīf al-Yāzīgī, CUL [Moh.315.d.15]
- *Kitāb Rawdat 'Al-Adab Fī Tabaqāt Shu'arā' Al-Ārab*, Beirut, 1858, by Iskandar ibn Ya'qub Abkāriyūs, CUL [Moh.350.d.22]
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- 'Eli Smith to Hallock, Leipzig, 1 April 1839', HLHU
- 'Eli Smith to Thomson, Leipzig, 20 March 1839', HLHU
- 'Hallock to Smith, 25 July 1839', HLHU

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- *Kitāb An Nabū' Āt Al Kanāsi* ('Livre des Prophéties'), aš-Šuwayr, 1883, 3rd edition, MSJK
- *Kitāb Muršed Al Masiḥy* ('Livre du Guide du Chrétien'), aš-Šuwayr, 1738, MSJK
- *Kitāb Tafsīr Sab'at Mazmūrāt At Tawbat* ('Livre du Commentaire des sept Psaumes du Prophète David', entitled 'Psaumes de la Pénitence') aš-Šuwayr, 1753, MSJK
- *Mīzān Az-Zamān Wa-Qisṭās Abadīyat Al-Insān* ('La Balance du Temps'), aš-Šuwayr, 1734, MSJK and UE [Theol 4° 00799/06]

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Qur'ān, Venezia, 1537–8, SFDV [RARI A-V-22]

AMBROSIANI COLLEGII TYPOGRAPHIA (TYPOGRAPHIA AMBROSIANA)

– *Thesaurus Linguæ Arabicæ*, Mediolani, MDCXXXII (1632), by Antonius Giggeius, BL [1505/228.]

ANTOINE-ISAAC SILVESTRE DE SACY

– *Grammaire Arabe*, Paris, MDCCCX (1810), SOAS [CWML D.7/10]

ANTOINE VITRÉ

– *Biblia. 1. Hebraica, 2. Samaritana, 3. Chaldaica, 4. Græca, 5. Syriaca, 6. Latina, 7. Arabicæ*, by Guy Michel Le Jay, Paris, 1645, BL [1.h.1-8; 2.h.1-2.]
– *Dictionarium Latino-Arabicum Davidis Regis*, by Jean-Baptiste Duval, Paris 1632, SOAS [EB63.35/11752/2]
– *Linguarum Orientalium Hebraicæ, Rabbinicæ, Samaritanæ, Syricæ, Arabicæ, Turcicæ, Armenicæ Alphabeta*, Paris, 1636, CUL [Adams.6.63.2]

ATHANASIUS DABBĀS [A'MAL SURIYA]

– *Kitāb Az-Zabūr Ash-Sharīf* [...] *Wayatlūh Ashar Tasābīh* (Psalter), Alep, 1706, CUL [7828.C.5]
– *Paracleticum Secundum Ritum Melchitarum*, Alep, 1711, BAV [Liturgia.B.Folio.16.cons.]

BERNHARD VON BREYDENBACH

Peregrinatio In Terram Sanctam, Mainz, 1486, BSB [2 Inc.c.a. 1725]

CAMBRIDGE UNIVERSITY PRESS

Oriental Founts Available for Book Composition at the University Press, Cambridge, England, 1933, UORL [FOLIO--655.24-CAM]

CMS PRESS [CHURCH MISSIONARY SOCIETY]

– *Al-Lafīf Fī Kull Ma'nā' Tarīf: Li-Ta'līm Al-Qirā'ah Fī Al-Makātib*, Malta, 1839, by Fāris aš-Šidyāq, BL [306.47.E.32]
– *Kitāb Bahth Al-Maṭālib Fī I'lām Al-'Arabīyah*, Malta, 1836, by Jibra'il Farḥāt al-Ḥalabī al-Mārūnī, BL [306.47.C.3]

EDMUND FRY

A Specimen of Printing Types, by Joseph Fry and Sons, Letter-Founders [...], London, 1785, CUL [Broxbourne.bb.21]

EDWARD WILLIAM LANE

An Arabic-English Lexicon, London: Williams and Norgate, 1863, BL [ORB.40/762]

E.J. BRILL

– *Catalogue Des Caractères Non-Latins Employées À L'imprimerie E.J. Brill*, Leide, 1883, UL [HOTZ 270]
– *Catalogue Des Caractères Étrangers De L'imprimerie E.J. Brill*. Leyde: Brill, 1931, UL [785 B 31]
– *Catalogue Des Caractères Étrangers De L'imprimerie E.J. Brill*: [1683-1938]. Leiden: Brill, 1938, UL [Z250 B85 1938]

ENSCHEDÉ

– *Letterproef Van Oostersche Schriften Uit De Lettergieterij Van Joh. Enschedé En Zonen Te Haarlem*, Haarlem: Joh. Enschedé & Zonen, 1907, UVA [OTM: KVB LPM 22]

FRANCESCO COLONNA

Hypnerotomachia Poliphili, Venice, 1499, FGC [inc 171]

FRANCESCO ZANETTI

Brevis Orthodoxæ Fidei Professio, Romæ, 1580, CUL [F158.c.2.3]

FRANCISCUS RAPHELENGIUS [OFFICINÆ PLANTINIANÆ AND RAPHELENGIANA]

– *Lexicon Arabicum*, Leidæ, 1613, BL [V 4217]

– *Specimen Characterum Arabicorum Officinæ Plantinianæ Franc. Raphelengij*,
Lugduni Batavorum, 1595, UL [21521 F 11]

GEOFROY TORY

Champ Fleury, Paris 1529, BL [60.e.14.]

GIAMBATTISTA BODONI [REGIO TYPOGRAPHEO, PARMÆ]

– *Epithalamia Exoticis Linguis Reddita*, Parmæ, MDCCCLXXV (1775), BL [37/826.l.18.]

– *Manuale Tipografico Del Cavaliere Giambattista Bodoni*, Presso La Vedova, Parma, MDCCCXVIII (1818), BL [59.c.19-20.]

– *Pel Solenne Battesimo Di S. A. R. Ludovico Principe Primogenito Di Parma* [...]

Iscrizioni Esotiche, A Caratteri Novellamente Incisi E Fusi, Parma, 1774, BL [Digital Store J/10631.h.30]

GIOVANNI BATTISTA PALATINO

Compendio Del Gran Volume De L'arte Del Bene Et Leggiadramente Scrivere, Etc., Roma, 1566, BL [1267.c.30.]

GIOVANNI ANTONIO TAGLIENTE

Lo Presente Libro Insegna La Vera Arte De La Excellēte Scrivere, Etc., Venice, MDXXIII (1524), BL [C.31.f.7.]

GREGORIO DE GREGORI

Kitāb Ṣalāt As-Sawā'ī, Fano, 1514, BEM [α.u.2.1]

GUILLAUME POSTEL

– *Grammatica Arabica*, Paris, 1538, UL [876 C 8:1]

– *Linguarum Duodecim Characteribus Differentium Alphabetum*, Paris, 1538, SOAS [EB.53.12/7293]

GUILLAUME II LE BÉ

Characteres Arabici, In Gallia Nunc Primūm Incisi, Lutetiae, 1599, PMM [Arch. 153, f.20]

GUSTAV LEBERECHT FLÜGEL

Corani Textus Arabicus, Lipsiae: Typis Et Sumtibus Caroli Tauchnitii, 1834, UL [BP100 .F55 1834]

IBRĀHĪM AL-YĀZIĞI

Al-Ḍiyā', Cairo, Vol.1, 1898–99, SOAS [Dagenham Store]

İBRAHİM MÜTEFERRIKA [DĀR-I TİBĀ‘A-YI ‘ĀMIRA]

- *Grammaire Turque*, Istanbul, 1730, by Jean-Baptiste Holderman, BNM [Or. 175 (=56)]
- *Lugat-i Vankulu*, Istanbul, 1141 Rajab/February 1729, by Mustafa Mehmed el-Vani, İBB [Bel_Osm_B.0031/01]
- *Tuhfetü'l-Kibar Fi Esfari'l Bihar*, Istanbul, 1141 Dhul-Qa'dah/May 1729, BNM [Or. 167 (=48)]
- *Usulü'l Hikem Fi Nizamü'l Ümem*, Istanbul, Sha'bān 1144/February 1732, SYEK [Haci Mahmud Efendi 4937]
- *Tarih-i Raşid*, Istanbul, 1153 Dhul-Hijjah/February 1741, by Mehmed Raşid, İBB [Bel_Osm_B.00009-01]

IMPRIMERIE CATHOLIQUE

- *Specimen Des Caractères Fondus À L'imprimerie Catholique Des Missionnaires De La Compagnie De Jésus À Beyrouth*, Beirut, c. 1877, BL [11899.g.6.(3.)]
- *Al-Kitāb Al-Muqaddas*, Beirut, 1864–5, BL [14500.e.8.]
- *Al-Kitāb Al-Muqaddas*, Beirut, 1882, BL [14500.e.8.]
- *Grammaire Arabe*, Beyrouth, 1891–2, CUL [Aa.10.105]
- *Course Pratique De Langue Arabe*, Beyrouth, 1902, CUL [Moh.315.c.115]

IMPRIMERIE ORIENTALE ET FRANÇAISE

- *Alphabet Arabe, Turk Et Persan*, Alexandria, 1798, BL [66.b.11.]

JACOB GOLIUS

- *Lexicon Arabico-Latinum*, Lugduni Batavorum, 1653, BL [105/225.]

JAKOB CHRISTMANN

- *Alphabetum Arabicum* [...], Neustadt, 1582, BL [306.40.A.7/2]

JOHN HAYES

- *Illustrissimi Principis Ducis Cornubiae Et Comitis Palatini, &c, Genethliacon, Cantabrigiae*, 1688, by John Luke, BL [C.128.d.8.]

JOSEPH JUSTUS SCALIGER

- *Opus De Emendatione Temporum*, Lugduni Batavorum, 1598, UL [420 B 1]

JOHN RICHARDSON

- *A Dictionary, Persian, Arabic, and English* [...], Oxford, MDCCCLXXVII (1777), BL [X.131.]
- *A Grammar of the Arabick Language*, London, MDCCCLXXVI (1776), BL [X.981/1173] facsimile

JOHN SELDEN

- *Mare Clausum*, Londini, MDCXXXV (1635), BL [C.77.h.11.]

JULES FERRETTE

- *Méthode Simplifiée Pour Imprimer L'arabe Avec Les Points Voyelles, Par Le Révérend Jules Ferrette, Missionnaire À Damas*. Extrait du *Journal Asiatique*, N°11, 1859. Paris, Imprimerie Nationale, 1860, CDP
- *The Gospel of Matthew in Arabic printed with all the vowels, according to the simplified method of the reverend Jules Ferrette, missionary of the Irish Presbyterian Church at Damascus. With an Introductory explanation of the method both in its mechanical and philological part*. London, W. M. Watts, 1863, BL [14500.aa.34.]

KING FAHD HOLY QUR'ĀN

Muṣḥaf Al Madīna, King Fahd Holy Qur'ān Printing Complex, 1405/1985, Medina, FR.
Written by Syrian calligrapher Uṭman Ṭaha

LETTERGIETERIJ "AMSTERDAM"/N. TETTERODE

Proeven Van Oostersche Schriften Der Lettergieterij "Amsterdam" Voorheen N. Tetterode,
1910, TM

MATBA'AT BŪLĀQ [AL-AMĪRĪYA]

- *Al-Qur'ān Al-Karīm*, Cairo, 1342/1924, SOL [M149890]
- *Dizionario Italiano E Arabo*, Bolacco [Būlāq], Stamperia Reale [Maṭba'at Ṣāḥib Al-Sā'ādah], MDCCXXII [1238], BL [825.h.9.]
- *Alf Layla Wa-Laylam*, Cairo, 1251/1836, BL [306.42.C.10]
- *ĀThār 'Al-'Uwal Fī Tartīb 'Al-Duwal*, Cairo [Maṭba'at Būlāq Al-Amīriyah], 1295/1878, CUL [Moh.172.d.7]
- *Qurrat 'Uyūn 'Al-'Akhyār Li-Takmilat Radd 'Al-Muhtār 'Ala 'Al-Durr 'Al-Mukhtār: Sharḥ Tanwīr 'Al-'Abṣār*, Cairo [Maṭba'at Būlāq], 1912, CUL [Moh.115.b.151]

OHANNES MÜHENDISYAN

- Album, Istanbul, 1305/1888, İÜK [M 090025]
- *Esfarī Bahriye-i Osmaniye*, Istanbul, 1306/1888, by Mehmet Şükrü, TM
- *Hülasat'il İtibar*, Istanbul, 1286/1869, by Ahmed Resmî Efendi, IRCICA [956.101532 AH.H]
- *Yeni Hurufat*, Istanbul, 1870, TM

PEDRO DE ALCALÁ

Arte Para Ligeramente Saber La Lingua Arauiga, Granada, 1505, CUL [Norton.d.213]

PETER KIRSTEN

- *Schema Chacterum Arabicorum*, Breslæ, 1609, ULB [De 520.2°]
- *Tria Specimina Characterum Arabicorum*, Breslæ, 1608, SOAS [ED60.7/11755/2]

PIETRO PAOLO PORRO

Psalterium, Hebraeum, Graecum, Arabicum, & Chaldaeum, Cum Tribus Latinis Interpretationibus & Glossis, Genoa, 1516, BEM [92 L 26]

POGOS ARAPIAN

- *Hamse-i Ṣanizade*, Dar't-Tibāatü'l-'Amire, Istanbul, 1820, by Ṣanizade Mehmet Ataullah Efendi, OY
- *Takvim-i Vekayi*, Takvimhane, Istanbul, 1247/1831, AU [Gazeteler Veritabani]

REGIO TYPOGRAPHEO, PANORMI

Rerum Arabicarum Quæ Ad Historiam Siculam Spectant Ampla Collectio, Panormi, MDCCXC (1790), by Gregorio Rosario, BL [14554.f.1.]

ROBERT GRANJON [TIPOGRAFIA POLIGLOTTA «PONTIFICIA»]

- 'Arabici Characteres. GREGORII XIII. PONT. OPT. MAX. IVSSV. Nunc Primum Romæ Incisi. Rob. Granjon Parisien. Typographus Incidebat', Romæ, 1580, BNCR [MISC. Val.1827.3]
- 'Arabici Characteres. GREGORII XIII. PONT. OPT. MAX. IVSSV. Nunc Primum Romæ Incisi. Rob. Granjon Parisien. Typographus & Characterum Incisor. Incidebat Romæ, 1583. ÆTATIS SUÆ. LXX.', ASFI [Misc.Med.720 (6) n.10, f.13r]

RUGHTER SPEY

Epistola Pauli Ad Galatas, Item Sex Primaria Capita Christianæ Religionis Arabice: [...] Adjunctum Est Compendium Grammatices Arabicæ, Heidelberg, 1583, SOAS [EB.53.17/11907/2]

SACRA CONGREGATIO DE PROPAGANDA FIDE

- *Alphabetum Arabicum*, Romæ, 1633, CUL [Broxbourne.a.15]
- *Alphabetum Arabicum, Unà Cum Oratione Dominicale, Salutatione Angelica, & Simbolo Apostolico*, Romæ, 1715, BL [T 39809 (b)]
- *Alphabeta Varia Typographiae Sacrae Congregations De Propaganda Fide*, Romæ, ca. 1776, HLHU [TypTS 525 95.749]
- *Biblia Sacra Arabicæ Sacrae Congregationis De Propaganda Fide Iussu Edita*, Romæ, MDCLXXI (1671), BL [306.44.D.3]
- *Grammatica Arabicæ Agrumia Appellata*, Romæ, MDCXXI (1631), BL [621.c.19.]
- *Regi Gustavo [...] Præsides Et Alumni Collegii Christiano Nomini Propagando [...]*, Romæ, 1784, BL [1871.e.29.]
- *Specimen Characterum Typographiæ S. Concilii Christiano Nomini Propagando [...]*, Romæ, 1843, BL [Digital Store 819.m.12]

STEFANO PAOLINI

- *Institutiones Linguæ Arabicæ*, Romæ, 1624, by Petrus Metoscita, BL [236.c.27.]
- *Totum Arabicum Alphabetum*, Romæ, MDCXXIII (1624), by Vittorio Scialac, BMP [8° 20334-12 [Res]]

SCHRIFTGIESSEEREI D. STEMPPEL

‘Turkisch-Arabischer Kasten’, *Arabisch-Turkisch Und Andere Islamitische Sprachen. Geschnitten Und Herausgegeben Von Der Schriftgiesserei Und Messinglinien-Fabrik D. Stempel-Aktienges.* Frankfurt am Main, Leipzig, Vien, Budapest, 1922, NLTC

TAKVIMHANE

- *Takvim-i Vekayi*, Istanbul, 1247/1831, AU [Gazeteler Veritabani]
- *Takvim-i Vekayi*, Istanbul, 1307/1889, AU [Gazeteler Veritabani]

TESEO AMBROGIO DEGLI ALBONESI

Introductio In Chaldaicam Linguam, Syriacam, Atque Armenicam, & Decem Alias Linguas, Pavia, 1539, BNB [M10185]

THOMAS ERPENIUS

- *Arabicæ Lingue Tyrocinium*, Lugduni Batavorum, 1656, (J. Golius ed., printed by J. Maire), CUL [Bensly.7.e.17]
- *Elementa Lingue Arabicæ*, Londini, MDCCXXX (1730), SOAS [EB77.83/11551]
- *Grammatica Arabicæ*, Leidæ, 1613, (printed by Officina Raphelengiana), SOAS [EB61.27/11052]
- *Grammatica Arabicæ Cum Fabulis Locmanni*, Lugduni Batavorum, 1748 (by A. Schultens, printed by S. Luchtmans), UL [899 F 13-14]
- *Historia Josephi Patriarchæ, Ex Alcorano, Arabicæ*, Leidæ, 1617, BL [483.a.18.]
- *Locmani Sapientis Fabulæ Et Selecta Quaedam Arabum Adagia Cum Interpretatione Latina Et Notis*, Amesthrodami, 1636, BL [621.c.22.]
- *Novum D.N. Jesu Christi Testamentum Arabicæ*, Leidæ, 1616, UL [842 D 36]
- *Proverbiorum Arabicorum*, Leidæ, 1614, (printed by Officina Raphelengiana), UL [842 C 26]
- *Vita Et Res Gestæ*, Lugduni Batavorum, 1732 (by A. Schultens, printed by S. Luchtmans), UL [855 A 8]

THOMAS ROYCROFT

Biblia Sacra Polyglotta, by Brian Walton, London, 1657, BL [2.h.3-10.; 3.h.1-6.]

TIPOGRAFIA DEL COLLEGIO ROMANO [COLLEGIO SOCIETATIS JESU]

- Anonymous proof, n.d. (1583–4?), BV [Ms. Val. K 17, f.178]
- *Fidei Orthodoxæ Brevis*, (Arabic) printing proof, BNCR [34.6.E.23/2]
- *Fidei Orthodoxæ Brevis Et Explicata Confessio*, (Latin) Roma, 1556 (but 1566), BNCR [34.6.E.23/3]
- *Muṣāḥaba Rūḥāniyya*, Roma, n.d., BNF [Rés.D 14786 (8)]

TYPOGRAPHIA DOMINICI BASAE [TIPOGRAFIA POLIGLOTTA «PONTIFICIA»]

- *Kitāb Al-Bustān Fī Ḥaḍā’ib Al-Arḍ Wa-L-Buldān/Hortus Mirabilium Terræ Et Cittatum*, by Salāmiš b. Kunduğdī aş-Şāliḥ, Romæ, 1584–5, BNM [Cod. XCVIII(70)] and BML [Orientale 92]

TIPOGRAFIA POLIGLOTTA VATICANA

Catalogo Dei Punzoni E Delle Matrici Orientali E Latini Esistenti Nella Tipografia Poliglotta Vaticana, Rome, 1919. Copy: SBL [43120]

TYPOGRAPHIA MEDICEA

- *Āğurrūmiyya*, by Ibn al-Āğurrūm, Romæ, 1592, BNCR [34.6.E.23/7]
- *Alphabetum Arabicum*, Romæ, 1592, BL [622.h.2.(2.)]
- *Al-Qānūn Fī Al-Ṭibb/Libri Quinque Canonis Medicinæ Abu Ali Principis Filii Sīnā Alias Corrupte Avicennæ. Quibus Additi Sunt In Fine Eiusdem Libri Logicæ, Physicæ Et Metaphysicæ. Arabice Nunc Primum Impressi*, (or Avicenna), by Abu ‘Alī Ibn Sīnā, Romæ, 1593, BNCF [Magl. 5.1.266]
- Anonymous proof (Qazwīnī), n.d., ASFI [Misc.Med.720 (6), n.18, f.16r]
- Anonymous proof, n.d. (1584?), BV [Ms. Val. K 17, f.177]
- *Brevis Orthodoxæ Fidei Professio, Quæ Ex Præscripto Sanctæ Sedis Apostolice Ab Orientalibus Ad Sacrosanctæ Romanæ Ecclesiæ Unitatem Venientibus Facienda Proponitur. Iussu Sanctissimi Domini Nostri D. Clementis Papæ VIII. Excussum Romæ in Typographia Medicea Anno Ā Natiuitate Domini M.D.X.CV. (or Professio Fidei)*, Romæ, 1595, BNCR [34.6.E.23/5]
- *Evangelium Sanctum Domini Nostri Iesu Christi*, Romæ, 1590 (but 1591), BML [Stamp.22.2.158]
- *Evangelium Sanctum Domini Nostri Iesu Christi* (Arabic/Latin), Romæ, 1591, BML [Stamp.22.2.159]
- *Kāfṭya*, by Ibn al-Ḥāḡib, Romæ, 1592, BNCR [34.6.E.23/7]; SOAS [EB59.23/12256]
- *Kitāb Al-Taṣrīf Ta ‘Līf Al-Šayḥ Al-Imām/Liber Tasriphi, Compositio Est Senis Alemani*, by Izz al-Dīn ‘Abd al-Wahhāb al-Zangānī, Romæ, 1610, BNCF [Magl.1.7.5]
- *Kitāb Nuzhat Al-Mušṭāq Fī Dikr Al-Amṣār Wal-Aqṭār Wal-budan Wal-Ğuzur Wal-Madā’iñ Wāl-Āfāq*, (or *Geographia*), by Ṣarīf al-Idrīsī, Romæ, 1592, BL [G.14868.]
- *Kitāb Taḥrīr Usūl Li-Ūqlīdis*, (or *Euclid*), by Nāṣīr al-Dīn al-Tūsī, Romæ, 1594, BMF [1.L.IV.11]

TYPOGRAPHIA SAVARIANA

- *Doctrina Christiana* by Cardinal Roberto Bellarmino, Romæ, 1613, BL [14501.a.1]
- *Grammatica Arabica Maronitarum*, by Gabriel Sionita, Paris, 1616, CUL [C.10.54]
- *Liber Psalmorum Davidis Regis Et Prophetæ. Ex Arabico Idiomate In Latinum Translatus*, Romæ, MDCXIV (1614), SOAS [EB63.35/11752/1]

TYPOGRAPHIA SEMINARII

Alcorani Textus Universus Ex Correctioribus Arabum Exemplaribus Summa Fide, Atque Puncherrimis Characteribus Descriptus [...], Patavii, MDCXCVIII (1698), by Ludovico Marraccio, BL [14507.e.23.]

WEYERS HENRICUS ENGELINUS

Specimen Criticum, Exhibens Locos Ibn Khacanis De Ibn Zeidouno, Ex MSS. Codicibus Bibliothecae Lugd. Bat. Et Gothanæ Editos, Lugduni Batavorum: S. Et J. Luchtmans, 1831, UL [843 C 11]

WILLIAM CASLON

Specimens of the Ancient Caslon Printing Types Engraved in the Early Part of Last Century by William Caslon. 1716, London [1860?], CUL [Morison.86.814(2)]

WILLIAM JONES

A Grammar of the Persian Language, London, 1804, BL [V 3881]

WYNKYN DE WORDE

Oratio De Laudibus & Utilitate Trium Linguarum Arabicæ Chaldaicæ & Hebraicæ, London, 1524, by Robert Wakefield, BL [C.33.b.17.]

[Other typographic material]**‘ABDALLĀH AZ-ZĀHIR [KHENCHARA PRESS]**

[MSJK]

- Arabic characters for titles titles in a different style on thin plates attached to wooden blocks
- Cases of punches
- Cases of matrices
- Cast movable metal type of AK1
- Engraved wooden and metal blocks of the larger Arabic characters
- Letterpress plates mounted on wooden blocks

ARABIC PUNCHES, BML

Identified by the author

- Granjon's second Arabic type (RG2), 108 punches stamped 21 on shank (except 2 punches stamped 12 (Arabe N.5 in Charles Whitehouse's work)
- Granjon's fourth Arabic type (RG4), 73 punches stamped 29 on shank (Arabe N.10 in Charles Whitehouse's work)
- Tipografia del Collegio Romano (TCR1), 122 punches stamped 10 on shank (Arabe N4 in Charles Whitehouse's work)
- Tipografia del Collegio Romano (TCR2), 72 punches stamped 13 on shank (Arabe N6 in Charles Whitehouse's work)

Unknown

- Arabe N.1 in Charles Whitehouse work, 121 punches stamped 28 on shank
- Arabe N.2 in Charles Whitehouse work, 86 punches stamped 26 on shank
- Arabe-Persian N.2 in Charles Whitehouse work, 212 punches, 210 stamped 22 on shank and 2 without number but same shape

HEBREW MATRICES

- Hebrew matrices, fs, The Hague

IMPRIMERIE NATIONALE

[CDP]

- *Caractères Etrangers. Cahiers D'empreintes Des Matrices À Reformer.*
- *Caractères Etrangers. Cahiers D'empreintes Des Poinçons À Reformer.*
- *Modèles De Casses Des Caractères Français Et Étrangers De L'imprimerie Nationale, 1885*
- *Recueil Des Empreintes Des Poinçons Et Des Matrices Des Caractères Français Et Exotiques, Classés Par Genres Et Par Points, Et Rangés Par Ordre Alphabétique; Et Des Signes Divers, Armes, Fleurons Et Vignettes, Existans a L'imprimerie Royale; Dressé Par Les Ordres Et Sous La Direction De M. Le Bon De Villebois, Administrateur De L'imprimerie Royale, Par Le Soins De M. Saint-Martin, Membre De L'académie Des Inscriptions Et Belles-Lettres, Pour La Partie Orientale; Et De M. Auguste Roussseau, Garde Du Cabinet Des Poinçons, Pour La Partie Française, En 1828.*
- *Typographie Orientale Des Médicis, I and II*

Folders

- ‘Arabe (corps 22). Méthode simplifiée pour imprimer l’arabe avec les points voyelles, par le Révérend Jules Ferrette, missionnaire à Damas’
- ‘Arabe Neskhy, corps 13 (6+3½+3½) ou Arabe de la Propagande’
- ‘Arabe Neskhy, corps 17 (7+5+5) ou Arabe d’Avicenne. [...] Caractère gravé à Rome, en 1586, par Robert Granjon, sur l’ordre et aux frais du Cardinal Ferdinand de Médicis, qui devient grand duc de Toscane. Expédié de Florence en 1811’
- ‘Arabe Neskhy, 17 points (9+4+4) ou Arabe d’Avicenne simplifié par A. P. Pihan, en 1863’
- ‘Arabe Neskhy, corps 22 (10+6+6) ou Arabe d’Euclide. Fonds des Medici. Expédié de Florence en 1811’
- ‘Arabe Neskhy, corps 24 (12+6+6) ou Arabe de la Collection Orientale’
- ‘Arabe Neskhy, corps 29 (9+10+10) ou Arabe Moyen. Gravé par le soins et aux frais de Savary de Brèves, ambassadeur à Constantinople (1591–1605) et à Rome (1608 – 1614). Acheté pour ordre de Louis XIII en 1632’
- ‘Arabe Neskhy, corps 30 (10+10+10) ou Arabe de l’Évangile. Fonds des Medici (1590). Expédié de Florence en 1811’
- ‘Arabe Neskhy, corps 64 (20+4 fois 11) ou Gros Arabe. Gravé par le soins et aux frais de Savary de Brèves, ambassadeur à Constantinople de 1591 à 1605), et à Rome, de 1608 à 1614’

Punches

- ‘Arabe d’Alde’
- ‘Arabe d’Avicenne, 17 points, 353 steel punches
- ‘Arabe d’Euclide’, 22 points, 283 steel punches
- ‘Arabe des Quatre Évangiles’, 30 points, 356 steel punches
- ‘Arabe de la Collection’, 24 points, 343 steel punches
- ‘Arabe de la Propagande’, 13 points, 256 steel punches
- ‘Arabe Moyen’, 29 points, 487 steel punches
- ‘Gros Arabe’, 64 points, 254 steel punches

Matrices

- ‘Arabe d’Alde’
- ‘Arabe d’Avicenne’
- ‘Arabe d’Euclide’
- ‘Arabe des Quatre Évangiles’
- ‘Arabe de la Collection’
- ‘Arabe de la Propagande’
- ‘Arabe Moyen’
- ‘Gros Arabe’

[BNF]

– Joseph de Guignes, *Inventaire De La Typographie Orientale De L'Imprimerie Royale Et YÉxistante Au Premier Janvier 1787*, BNF [RES G-Q-180 (1); RES G-Q-180 (2)]

OXFORD UNIVERSITY PRESS

- *List of Remaining OUP Type*, St Bride Library, London
- OUP Arabic type ‘3-line nonpareil’, one page of diss, NLTC
- OUP Arabic type ‘Berthold 14 point’, packets of diss undistributed and packet of OUP ‘stock’ consisting of rarer characters, NLTC

ROMAN SCHERER, LUCERN

Reconstruction of a wood type for the insertion of diacritic dots by mean of grooves, c. 1930, FR

MATBA'AT BŪLĀQ [AL-AMĪRĪYA]

Case-lays

- ‘Chart of non-vocalised Arabic typesetting case’, MTS [Correspondance folder Arabic (Egyptian 2)]
- ‘Chart of non-vocalised Arabic typesetting case (simplified)’, MTS [Correspondance folder Arabic (Egyptian 2)]
- ‘The case of Arabic writing simplification model’, MTS [Correspondance folder Arabic (Egyptian 2)]

TYPOGRAPHIA MEDICEA

[ASFI]

- ‘A 4 di Decembre 1587; ‘Copia del | Saldo fatto a ms Roberto della gitt[atu]ra dell'Ara[bi]ca picc[oli]na | delli punzoni dell'Ara[bi]ca picc[oli]na | delli punzoni della Chaldea grande | delli punzoni della Chaldea picc[o]la | delli ponzoni dell'Ara[-bi]ca grande et | menzana p[er] l'abreviatura | della gitt[atu]ra et f[onditu]ra? | delli ponzoni fatti p[er] ornamento della formetta | alli 16 di Decembre 87’, ASFI [Misc. Med.719 (12), ff.1–2]
- Calligraphic extracts from Raimondi’s papers:
 - ASFI [Misc. Med.720 (3) n.56, f.16r]
 - ASFI [Misc. Med.720 (3) n.57, f.17v]
 - ASFI [Misc. Med.720 (3) n.67, f.25r]
 - ASFI [Misc. Med.720 (3) n.68, f.25v]
 - ASFI [Misc. Med.720 (3) n.74, n.75, f.28r]
 - ASFI [Misc. Med.720 (3) n.89, f.67v]
 - ASFI [Misc. Med.720 (4) n.6–7, f.14v–15r]
- ‘Carattere Arabico commune | fatto da Mastro Giovanne Cavi | glione Francese, et incomincia | to alli 3 d’Ottobre 1592 sabbato’, 1592–1596, ASFI [Misc. Med.718 (17), ff.1–9]
- ‘Carattere Arabico grande fatto da Ms. | Giovanne Caviglioni francese et | In | cominciato à 20 di Marzo 1591’, 1591–1592, ASFI [Misc. Med.718 (13), ff.1–4]
- ‘Carattere Arabico mezano fatto da Ms. | Giovanne Caviglioni francese, et incomin | ciato à 16 di Settembre 1591’, 1591–1592, ASFI [Misc. Med.718 (14), ff.1–4]
- ‘Conto della gittatura dell'Ara[bi]ca grande ad un corpo | et del stagno, et danari dati p[er] essa et giust[atu]ra | di madre fatta dopo’, 1588–1590, ASFI [Misc. Med.717 (8), ff.78–84]
- ‘Ponsoni et madre dell'Arabica pic | colina incominciata à 6 di Settembre | 1586 et recevuti in piu partite, come | à 15 di Ottobre 1586’, 1586–1591, ASFI [Misc. Med.718 (2), ff.1–11]

- Raimondi's *nasta'līq* handwriting:
ASFI [Misc.Med.720 (3), n.4 and n.5 f.5r; n.6 f.5v]
- Some proofs of Medicean types, possibly attributable to Cavaillon:
ASFI [Misc.Med.720 (6), n.3 and n.4 f.10r]
ASFI [Misc.Med.720 (6), n.6 f.11r]
ASFI [Misc.Med.720 (6), ff.15v-16r]
ASFI [Misc.Med.720 (6), n.16 f.15v and n.17 f.16r]
ASFI [Misc.Med.720 (6), n.22 and n.23 f.25v]
ASFI [Misc.Med.720 (6), n.24 f.26r]

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