MUSICA IMPRESSA

History and investigation of the typographical achievements in Giambattista Bodoni's music typefaces

PhD Dissertation by
Emilio Grazzi
Registration No. 16-109-225
May 2025

Supervisors of the doctoral thesis
Prof. Doct. Cristina Urchugueia,
Institute of Musicology, University of Bern
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Typefaces: *Filosofia* by Zuzana Licko (via Adobe Fonts); *Proforma* by Petr van Blokland (via Adobe Fonts); *Archivo* by Héctor Gatti and Omnibus-Type Team (via Google Fonts)

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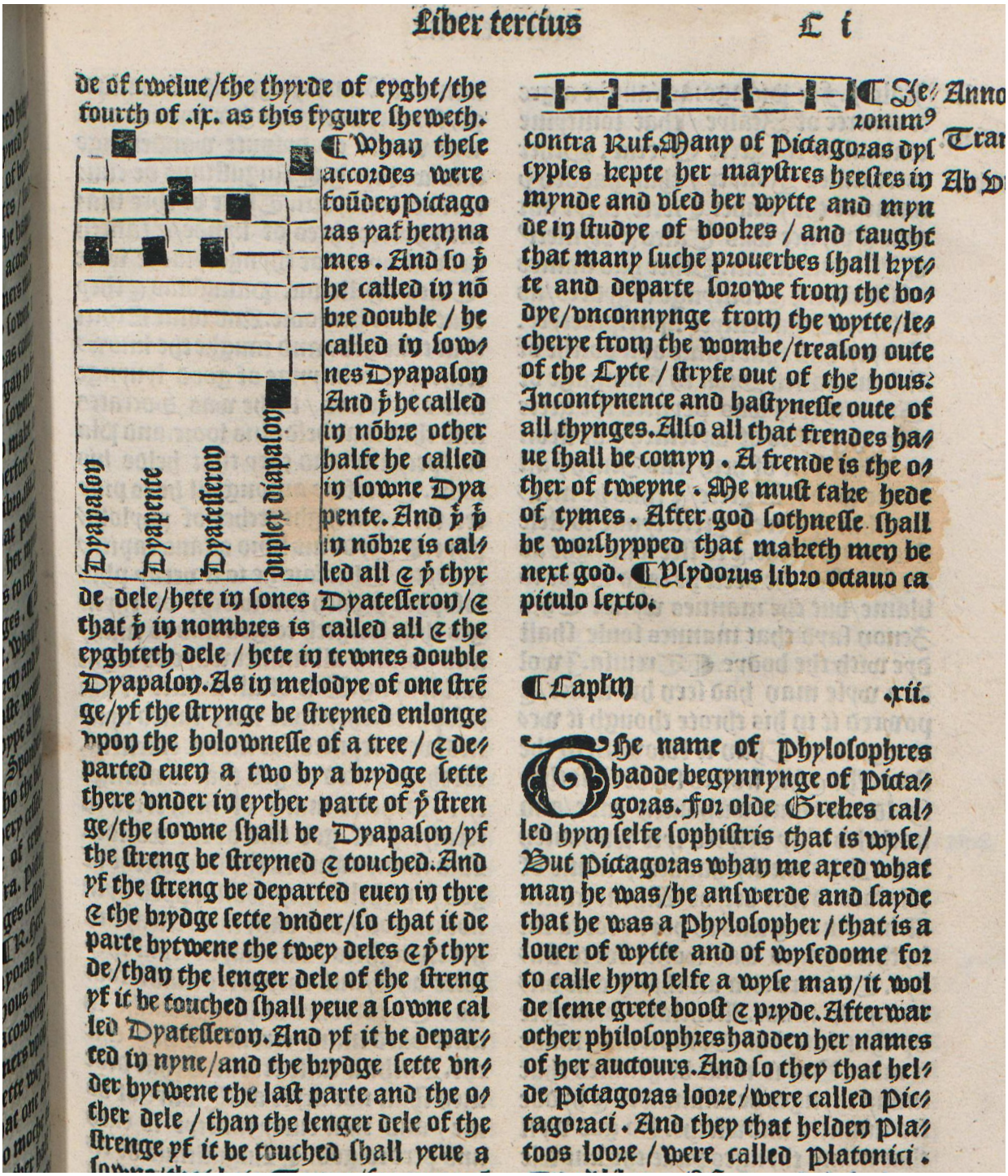
Abstract

In the late 1700s, as engraving on metal plates was about to become the primary technique for printing and distributing music scores, several European typographers dedicated their efforts to creating new, functional movable type sets specifically designed for music notation and score production. These efforts aimed to overcome the limitations of existing printing techniques, pushing the typographical process to its technical limits. This study examines Giambattista Bodoni's typographic experience in printing music during this pivotal moment in the history of music publishing. Bodoni's foray into music publishing featured many of the latest innovations in movable type for music from across Europe. Although Bodoni's music fonts played a minor role in producing actual music publications, his typefaces were among the finest of their time, well-suited for mass-producing clean and beautiful printed scores. The lasting influence of these fonts provides a new perspective on designing and producing solutions for music typesetting and engraving in today's music publishing industry.



Img. 1. Page from the *Polychronicon* by Ranulf Higden, printed by Wynkyn de Worde in Westminster in 1495.
This short excerpt of notation best exemplifies the possibilities the essential typographic grid could offer. This sample was produced using typographical rules and quads[1]. These characters were already available to typographers, representing a limited but functional proto-music typeface capable of achieving a simple music typesetting. This specimen also displays the first known music notation sample printed in England. Source: British Library.

1. Reed, T.B. (1887). *A history of the old English letter foundries with notes.* Cambridge University Press.

Introduction

Music printing and publishing: an overview of the key figures and technologies involved in its history, including a detailed description of music movable type technology, as well as its historical development and technical challenges.

Printing music

Throughout history, composers and musicians from various countries and cultures have developed many and diverse forms of notation to convey musical information and instructions to the performer. The resulting artefacts are known as music scores. Such documents (in the shape of manuscripts, printed or digital publications) serve multiple purposes: they act mainly as permanent records of music compositions, listening guides, and (perhaps most importantly) professional tools, especially for musicians and the people around music performances. Music publishing is the trade that allows the mass production and distribution of such artefacts. It is an essential industry for performing music, as musicians heavily relied on printed scores in the past and still rely on written music (in printed or digital form through a display) for training and performance. Since its introduction, music publishing has been fundamental to Western music's development, spread, and education. The passage from the music manuscript (or the musical idea) by the composer to the mass-distributed score required – and still needs – skilled experts in both music and printing/layout industries. This peculiar skill set is essential to ensure the production of high-quality scores and music publications. The quality inside a music score is not merely a matter of aesthetics but rather reflects the ability of the interpreter to read and play music effortlessly. It is possible to argue that a good music performance depends also, along with many other variables, on the quality of the score.

In the late xv century, the spread of movable type technology in Europe allowed for the first time the mass production of books and printed media. It was a matter of time before some printers tried to adapt movable type to publish and distribute volumes in part or entirely composed by music notation. During this period, music notation (the visual aspects and instruction to convey the mu-

sical idea) has not yet evolved into the Western modern music notation that is used today. Many contemporary compositions used mensural music notation. The gradual passage to Western modern music notation will have an important impact on the techniques and technologies used for score mass-production. At first, adapting movable types for music notation was not an effortless shift, but the technique and the production tools remained basically the same ones used in textual publications. Despite the technical similarities of the early printing activities for regular text and music publications, from a trading perspective, music publishing had its peculiarities compared to other publishing fields. It was – and still is – a very specialised and different market: reading a music score requires specific knowledge, hence a lower demand compared to other kinds of publications (in the XVII century, the market share for music scores was between 3 and 5% of total book consumption[2]). At the same time, music scores are less limited by language barriers, and publishers could potentially have a much larger client base if the commerce routes allowed so: this happened in Venice during the XVI century. The city was a thriving market, and the commercial routes established allowed the printed scores to be sold anywhere in Europe. This environment led to the rise of many music publishing firms in the city[3].

Despite its market potential, music publishing was still a risky trade for several reasons. It was more expensive production compared to regular publishing due to a more complex, time-consuming, specialised printing process. In Europe at the beginning of the XVI century, only a tiny proportion of printers were involved in this niche. Printing music was mainly accomplished by one prominent printing figure for each country[4]. This situation was also perpetrated by the presence of printing privileges that the printers earned at the time[5]. Printing privileges were protections granted by the monarchs and allowed the printers to have a full monopoly over certain kinds of publications. Moreover, in some instances (for example, if there was no need for a high print run and a scaled up production), printing music was expensive, time-consuming and complex; copying and distributing music scores by hand was instead a more convenient common practice, and it could be done relatively cheaply and quickly, especially when only a few copies of a particular composition were needed. This practice inevitably caused a sales reduction for music printers, as testified by Jacob Adlung (1699 – 1762), organist and music theorist active in Erfurt, Germany, in a letter[6] in 1758:

2. Guillo, L. (2018, September 17). *The price of music books (France vs. Netherlands, ca. 1675–1750)* [Conference presentation].
3. Bishop, S. (2017). *Music printing and publishing in Cinquecento Venice.* In K. Schiltz (Ed.), *A companion to music in sixteenth-century Venice.* Brill.
4. Boorman, S. (2000). *Early music printing: Working for a specialized market.* In K. van Orden (Ed.), *Music and the cultures of print.* Garland Publishing.
5. Guillo, L. (2018, September 17). *The price of music books (France vs. Netherlands, ca. 1675–1750)* [Conference presentation].
6. Adlung, *Anleitung zu der musikalischen Gelahrtheit*, 727–28, see Zohn, S. (2015). *Music for a Mixed Taste: Style, Genre, and Meaning in Telemann's Instrumental Works*, Oxford University Press.

> *When a publisher has sunk his fortune into [engraved music], he sometimes sells only one copy in a large city. Thirty or more amateurs make manuscript copies from it, and the publisher is stuck with his copies. Who can consent to this? That is why publishers do not want to pay for music, and artists either work for nothing or not at all, to the detriment of the entire realm of Jubal.*

Music copyists were well-renowned figures in the music industry, and sometimes, they were much more reliable than typographers. The renowned philosopher and writer Jean-Jacques Rousseau (1712 – 1778) was also a famous music copyist, and he was aware of the necessity of a good score quality. He himself wrote about it in his Music Dictionary[7], published in 1767, dedicating 13 pages to the entry "copyist".

> *It is more important for music to be copied neatly and correctly than it is for simple writing because he who reads and meditates in his chamber can easily recognise and correct errors in his book and because nothing prevents him from stopping or beginning again: but in a concert, where each player sees only his own part, and where the speed and flow of the execution leave no time for correction, mistakes are irreparable: often a sublime piece of music is crippled, the performance interrupted or even halted, everything goes wrong, the ensemble and effect are ruined, the listener is rebuffed, and the composer dishonoured, all because of the copyist.*

Another characteristic of music printing practice is that, since its very beginning, it needed skilled professionals, educated in musical knowledge and printmaking. Soon after the spread of music publishing practice, publishers realised that producing a high-quality score and avoiding printing mistakes required artisans with at least some background in music education. Needless to say, the availability of this kind of skillset was not high at the time and it is still low today. Sometimes, the lack of artisans prepared in music and printmaking forced some composers to learn and produce the printing matrices for their work by themselves. Telemann's activity is one of the leading examples of self-publishing practice in music history. He was able to engrave the plates[8] of his compositions but also establish a network for distributing the printed scores and gathering subscribers[9]. In many cases, the simultaneous presence of printmaking and musical knowledge becomes the basis for most of the evolutions in music printing technilogies and techniques.

In addition to the peculiarities mentioned above, the music score represents an exceptional kind of publication. Its role is quite different from other kinds of books: one of the primary purposes of a music score is to act as a working tool for musicians. To become a tool for performance, the score should allow the reading of the notes at a discrete distance, have a proper page size, high-quality paper, well-spaced notation, crips and clean layout and a formally correct music typesetting. Some space around the score for annotations by the performer was also needed. All these features are peculiar for this kind of object and ensure a

7. Rousseau, J.J. (1767). *Copiste* in *Dictionnaire de Musique*, Paris.
8. A technique invented after movable type, see following paragraphs in this chapter.
9. Zohn, S. (2015). *Music for a Mixed Taste: Style, Genre, and Meaning in Telemann's Instrumental Works*, Oxford University Press.

clear comprehension of the music information. With the advent of orchestral parts, the musician would also require instrumental and full orchestral scores. Orchestral scores display the parts of all the instruments in a composition and have a very high complexity but must at the same time be efficient, especially with regard to the page turns. The necessity of all these features dramatically affects the layout and the placement of the music symbols on the score. The editor/printer also had to keep the costs in mind: from one side, the score needed clarity and usability, but from the other, the printer needed to save paper and the overall publication costs. Finally, a well-thought-out final price was essential to achieve an advantage over competitors. These peculiarities will route the music publishing trade to a very intricate path, often separated from other kinds of publishing activities, making the production of music scores almost an independent subject in printmaking history. Certain notable personalities in the overall history of printing have made a significant impact in the realm of music publishing, forging sporadic and distinct connections between the industries.

The music publishing trade

To set the boundaries of this research, it is essential to provide an arbitrary but precise definition of the music publishing trade between the XVI and the XVIII centuries. This research defines music publishers as those editors and printers that issue books and printouts, including music notation for voice or instrument, for performance or theoretical study. This definition does not include the publishers that print and/or distribute publications that cover just a subject related to music or musical compositions and that comprises mainly verbal text, such as librettos or songbooks without notation[10]. Since this research primarily concerns music printing by movable type, the terms "publisher" and "typographer" could be used to describe the same character.
It is useful to bring up the definition by Joseph Moxon (1627 – 1691), describing the role of the typographer in his Mechanick Exercises[11].

> *By a Typographer, I do not mean a Printer, as he is vulgarly accounted, any more than ∗Dr. Dee∗ means a Carpenter or Mason to be an Architect: But by a Typographer, I mean such a one, who by his own Judgement, from solid reasoning with himself, can either perform, or direct others to perform from the beginning to the end, all the Handy-works and Physical Operations relating to Typography.*

Today, the music publishing means promoting and distributing the work of a music composer. Together with many other aspects of music performance and distribution, contemporary music publishers can also manage the production and distribution of the printed scores. The modern publisher or publishing house sells the scores to distributors (music shops) or directly to the public. The head of a modern publishing house decides all the visual and material aspects of the score, the music engravers design and produce the digital scores in every detail but usually printing production (especially for high print runs) is out-

10. This definition is also adopted in Thomson, J.M., & Wagstaff, J. (2011). *Printing and publishing of music.* In A. Latham (Ed.), *The Oxford companion to music.* Oxford University Press.

11. Moxon, J. (1683). *Mechanick exercises, or the doctrine of handy-works applied to the art of printing.* Joseph Moxon. The reference to *Dr. Dee* refers to John Dee (1527 – 1608), mathematician and astronomer.

sourced. Still, he ensures that the composers receive a payment when the composition is used commercially. Between the xv and the xviii centuries, the role of the music publisher was significantly different from the modern one described above. Back then, the publisher[12] would sell the score that he printed directly to the clients or the customers that asked for the music piece to the composer, and he would manage the printing production in-house. These traders did not refer to themselves as modern-day publishers but rather as booksellers or printers[13] meaning they were directing the printing process. They could also earn money from borroing the parts for specific events and even organize small concerts[14].
Every publisher had a different client and purchaser base. During the 1500s and 1600s, music score production was mainly supported by court patronage. Subsequently, patronage gradually declined, and music publishers started producing scores for a different, capillary distribution. In England, the publisher John Playford (1623 – 1686) famously began marketing and selling music to amateur musicians, distributing music scores and manuals, disseminating music culture to the middle class, and increasing his client base. By the early xvi century, some score sellers had started to outsource printing activities, thus acting more as middlemen between the composers and the score purchasers. Their fortune depended on the ability to choose the composers and the music they believed was more profitable. In this case, the publication's front page allows the reader to distinguish between the roles of the printers and the publishers, mentioning them in two different sentences[15]. By the second half of the xviii century, music publishing began to distance itself from acrivities related to the production, focusing more on the distribution of the musical composition. The trade then transitioned towards the publishing activity that it is known today, with the first modern publishers appearing in the last years of 1700[16].
For many years after their introduction, music publishing and distribution were necessarily linked with the production of the actual score: the production of the matrix for the score (by engraving, typesetting or other techniques) and the printing process. Before 1800, almost all music publishers owned the tools and the technology for their printing productions[17] including metal punches (for producing type matrices and casting metal types or for engraving in metal plates), matrices, types and printing presses. Almost all tools were produced and crafted from raw materials except metal punches. Producing and cutting metal punches was a very specialised process, and many publishers relied on external blacksmiths for this activity. Johann Gottlob Immanuel Breitkopf (1719 – 1794) constantly wrote to his blacksmith and punchcutter Johann Schmidt (who had no musical knowledge) about the design of the punches for his improved music font[18]. Pierre-Simon Fournier (1712 – 1768) and Giambattista Bodoni (1740 – 1813) represent notable exceptions to this practice, as they used to carve their

12. This word refers to the idiom used in other languages: editore, éditeur, Herausgeber.
13. Rasch, R. (2005). *Music publishing in Europe 1600–1900.* BWV Verlag.
14. Antolini, B.M. (2019). *L'organizzazione di concerti.* In B.M. Antolini (Ed.), *Dizionario degli editori musicali italiani 1750–1930* (pp. 30-32). Pisa: Edizioni ETS.
15. Rasch, R. (2005). *Music publishing in Europe 1600–1900.* BWV Verlag.
16. Ibid.
17. Thomson, J.M., & Wagstaff, J. (2011). *Printing and publishing of music.* In A. Latham (Ed.), *The Oxford companion to music.* Oxford University Press.
18. Reynolds, D. (2019). *Breitkopf on Punchcutting and Typefounding.* Berlin-Neukölln, Academia.edu.

punches by themselves. Beyond these peculiar cases, usually, the author of the design and style of the musical characters was not the printer himself but the blacksmith who cut the source punches, even if, for this task, he would require precise instructions about the appearance of the musical characters and about how they would work together.

Before printing and publishing trades became two different careers, the typical music printer/publisher might have had partial musical literacy. He would often rely on workers with some musical education to acquire better musical expertise. As earlier stated, skills in reading music notation were essential to produce a good publication and to avoid mistakes. The renowned publisher Ottaviano Petrucci worked with editors supervising his publications[19]. Good music reading skills helped avoid many typesetting errors, allowing for a smoother review and printing process and lower production costs. An excellent musical background was also necessary to create a good page layout and a good-looking music type. The design and formal aspect of music notation on the page is an issue of profound importance for every worker involved around the score: the composer needs to review and control the actual printout to deliver the right musical message, the editor/printer needs to consider the printing costs (best use of paper and ink) and the limitations imposed by the different printing techniques. Lastly, the musician also plays a role as he must obtain an affordable yet high-quality score to ensure a good performance. Within this scenario, the passage between the written composition and the final printed publication is much more complex than the one for generic verbal text. The position of every graphical element carries a subtle meaning that could radically change if the symbol falls just some millimetres away from its intended position. Sometimes, the printers misinterpreted the manuscript or needed to misplace the symbols because of the very nature of the printing technique in use, such as movable type. These defects often represented a struggle for the composer, who wanted a precise result that was faithful to the manuscript provided. For instance, the prominent composer Ludwig van Beethoven (1770 – 1827) was very convinced about the kind of printing technique in one of his letters[20]:

> *The edition would have to be engraved, not printed with type.*

This struggle is also behind some composers' choice to learn how to produce printing matrices independently and have total control over the printing output. With this background in mind, it is possible to understand the role that the music publisher had in music distribution before the age of recording. The efforts in printing musical scores allowed the notation to be standardised and consistent. The music printer/typographer was crucial in disseminating music and culture. Their work bridged the gap between composers and musicians, allowing for the widespread distribution of works by major music composers. As a result, typographers and music publishers became key intermediaries in the music community, fostering collaborations between composers, performers, and patrons.

19. Boorman, S. (2000). *One biography*. In K. van Orden (Ed.), *Music and the cultures of print* (pp. 95–123). Garland Publishing.

20. "Die Auflage müßte gestochen, und nicht etwa mit Typen gedruckt werden." Anfang August 1810 (BG 464).

Printing technologies

It would be impossible to describe the work of music publishers without talking about the history of printing technologies applied to music notation. In this field, technology affects not just the cost and possible diffusion of scores but also the shape of written music and its quality. The very aspect of the score can change widely, shifting from technique to technique. As in many industries, music publishing has undergone a long process of evolution and perfection. In this particular niche, printers and editors faced many design and technological challenges to represent the sometimes complex nature of written notation. Soon after the introduction of the press with movable type, publishers kept their technical knowledge secret to preserve an advantage over their competitors. The printing practice was generally referred to as "black art", not just because of the colour of the ink but also because of its secrecy[21]. This attitude, of course, impacted the evolution of the trade. By overcoming the technical challenges in printing music notation, printers often were rewarded with printing privileges that allowed them a firm monopoly on printing music with specific techniques. These privileges are also the leading cause of why many printers were forced to find new ways to print music to enter the music publishing market. This obstacle caused frequent changes in the printing processes and technologies and many legal arguments between printmakers. Many of these printing techniques coexisted during the same timespan: printers would rely on different methods to obtain the best cost/quality ratio for each production. Depending on the technique used, printers obtained very different visual results. Each technology implied advantages and flaws, and the opportunity to use one technique instead of the other was always due to many different contextual issues: ease of use, durability, and cost-effectiveness are just the main factors to evaluate. Each printer would evaluate the use of the tools he already has before acquiring new ones. Moreover, the kind and shape of publication to be published could lean toward one technology more than another. Finally, it was also important to evaluate the style and the complexity of the composition, which could limit the reproduction with certain technologies. Last but not least, the printing trade was subject to "privileges", meaning that printers could have exclusive rights over a certain kind of publication or printing technology. The following list summarises the main techniques for music printing used between the XV and XVIII centuries and describes the peculiarities of every technology.

Woodblock engraving

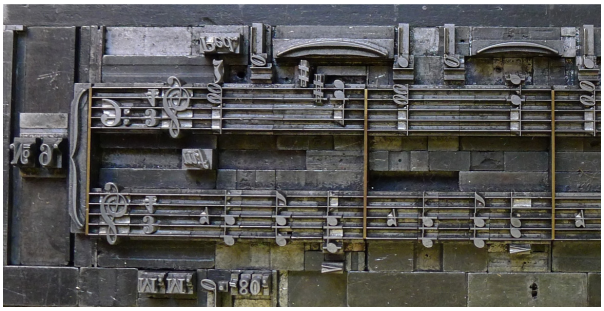
This technique was used during the late 1500s for various publications, including music notation. Woodblock printing had already been employed to produce and distribute printed illustrations, most notably playing cards[22]. Multiple lines of music notation were engraved on wood blocks (carving out the negative space in a mirrored drawing of the notation), producing the matrix for the musical page. The plate would inevitably damaged if the engraved cut away too much wood. The block was then inked and printed over the press. The woodblock could be used alongside metal types for typesetting text around the music sample. Woodblock engraving had substantial limitations. Producing the blocks was an uphill task, requiring significant effort for just one publication.

21. Kinross, R. (2019). *Modern typography: An essay in critical history* (2nd ed.). Hyphen Press.
22. Carter, H. (1955). *The invention of printing in China* (2nd ed.). Harvard University Press.

Moreover, the wood matrices could easily break inside the press, allowing for only a limited run of copies. This technique was less precise but somehow cost-effective compared to early movable type. This limited advantage lasted until the early 1600s.

Movable type

For centuries, movable type was the leading printing technology available. It required various metal pieces with raised letters or symbols. These pieces were stacked together in lines and rows to create the printing plate. Contrary to common knowledge in music theory, Petrucci did not invent music printing with movable type. He indeed perfected and authored a precise method for printing mensural music, and his publications are the first ones where music notation was the main body of content. The first known music book printed from movable type is a gradual, printed near Constance around 1473[23]. Movable type technology had multiple advantages and was very cost-effective. Typefounders could produce individual pieces of type in bulk through type matrices. The composition of the plate was complex but reasonably achievable by an experienced typesetter. After printing, the plate could be dismantled, and the pieces of type could be reused for another typesetting. Unlike woodblocks, metal types were very durable and resistant to the pressure of the printing press, allowing them to produce many copies.



Img. 2. Detail from a typeset plate showing the first few bar of *Ritter vom Steckenpferd* by R. Schumann (1838). It is possible to see how the notes are composed by different characters stacked toghether. The modularity of the system allowed to easily layout chords and other vertical compositions. Source: Museum für Druckkunst, Leipzig.

The typographic process was very efficient for a regular writing system with a limited set of signs, such as the Latin alphabet. However, it could also be adapted for music printing, especially for typesetting fairly simple music notation, as was the case in the late xv century[24]. In the late xv century, printers commissioned or started to create and cast type for music printing. At the end of 1600, there were 200 European music typefaces[25].

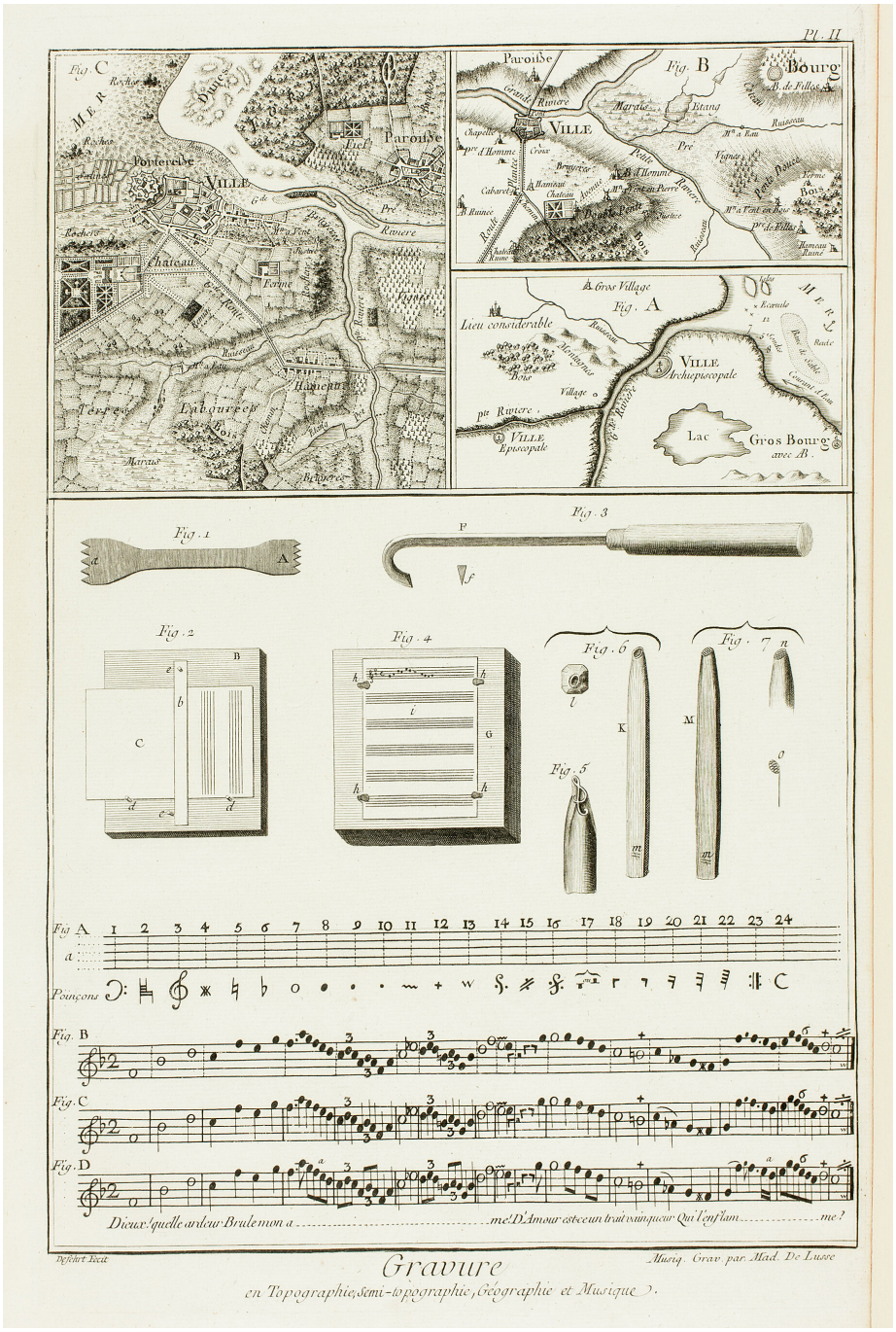
Despite its efficiency for general publishing, setting up a music score with movable type was still a technical challenge. The following chapter will detail the problems with movable type printing music notation. However, despite its limitations, many European printers have used and spread this technique, improving the system, the technology, and the outcomes over the years, despite the advent of different promising printing procedures. The ability to dismantle the printing plate also revealed a problem: if a reprint was needed, the composed

23. Lindmayr-Brandl, A. (Ed.). (2018). *Early music printing in German-speaking lands*. Taylor and Francis.

24. The issues about plainchant and mensural notation will be discussed in the following paragraphs.

25. Duggan, M.K. (1992). *Italian music incunabula: Printers and type.* University of California Press.

plates would have to be preserved (which was terrible for the printer as he could not reuse the characters on the plate). Alternatively, the pages would have to be typeset a second time, raising the costs of the work. Many composers required the printer to preserve the typesetting of the pages for some time after the publication in case of the need for a reprint.



Img. 3. Detail from an engraved plate representing tools used for music engraving. Taken from the Encyclopedia by Diderot and D'Alembert published between 1751 and 1772. These punches represent a technological bridge between movable type technology and metal engraving. Punches for metal engraving included the musical signs in their actual orientation to engrave the mirrored shape on the printing plate. Source: The Art Institute of Chicago, Chicago.

Metal engraving

The limitations of music typesetting with movable types pressed to find a different solution that could sustain the formal needs of Western music notation. Printing from engraved metal plates (initially from copper, later from pewter) was already used in the late XVI century, notably by mapmakers[26]. At the same

26. Gamble, W. (1923). *Music engraving and printing: Historical and technical treatise.* Pitman.

time, music publishers started to engrave metal plates by hand to produce music notation. Notation had to be engraved in a mirrored shape so the plate could work as a printing matrix. Differently from woodblock engraving, the engraver carved the positive shape of the notation. Next, the ink was poured over the surface, and the plate was polished of the excess ink, keeping it in the engraved part of the matrix. The plate was then ready to be printed. This method could overcome all the needs of the graphical representation, allowing the freedom to place the musical signs in every possible way. Historical sources vary about the effort needed to create the plate compared to the movable type technique. Some argue that it was easier to engrave a plate, while others testify that typesetting a score with movable type was a more convenient task[27]. Furthermore, compared to movable types, the metal plates were weak against the pressure of the press and, lastly, they did not allow corrections or reviews, if not for small details. Despite its limitations, this technology was sometimes preferred because of its graphical freedom. The most noticeable feature was that the quavers and the semiquavers were joined in a group as they were in the manuscript music of the same period. Movable type technology was still behind regarding this feature, and typographers tried to correct this lack by introducing the "tied note" in late 1600. More importantly, music engraving was preferable to movable type because it was a free trade. There was no privilege or patent involved. Thus, anyone could set up his engraving practice for printing music[28]. Metal engraving finally overcame other printing techniques after introducing tools that allowed it to mechanise the process rather than drawing the score by freehand (beginning of 1700). Among these tools, engravers used metal punches to carve identical shapes for recurring notation signs (noteheads, clefs, accidentals, etc...). The mechanisation of the engraving process is the crucial step for the diffusion of the notation ahestetic still in use today in digital music engraving. The engraving technique was so iconic that the industry adopted the term "engraving" to refer to the production of a music score with modern digital software. The material used for composing the metallic plates evolved over time: initially, the plates were made out of copper, but later, publishers started to use more resistant tin plates. With the introduction of lithography, these engraved plates worked in combination with lithography printing.

Lithography

Lithography was invented specifically for music printing in the late XVIII century to find a cheaper alternative to typography or metal engraving. The playwright Alois Senefelder discovered this technique and applied it to print music in 1796[29]. The same Senefelder declared[30]:

> *The application of lithography to music printing was among the earliest and most successful uses of the new art.*

27. Ibid.
28. Guillo, L. (2018, September 17). *The price of music books (France vs. Netherlands, ca. 1675–1750)* [Conference presentation].
29. Twyman, M. (1990). *Early Lithographed Books: A Study of the Design and Production of Improper Books in the Age of the Hand Press.* London: Farrand Press.
30. Senefelder, A. (1819). *A Complete Course of Lithography*.

The technique is similar to woodcutting because it uses a raised surface for the impression. The printer drew the score on the stone in reverse shape with greasy ink. The stone was then treated with an acid that ate away the clean stone but in the inked part. The engraving was then inked and printed with special presses. Acid was already used to etch metal plates. The main characteristic of this technique was its cost-effectiveness compared to metal engraving[31]. By the early to mid-XIX century, lithography largely replaced copperplate engraving for everyday sheet music, though engraving continued for high-end editions. With the advent of lithography, music scores have become cheap and popular. As with metal engraving, the score plates were first drawn by hand and gave a result similar to handwriting. In a second moment, the technique took advantage of the already in-use mechanisation of the metal engraving process to reproduce the quality of a modern score layout.

Stereotype

The stereotype is a metal plate generated by a form of movable type. The technique allowed the cast of a plate made from metal types to a single matrix. This would seem counterintuitive as one of the advantages of metal type was its modularity. Instead, producing a stereotype allowed the release and reuse of the metal type used in the form and the generated plate was less fragile and more usable than a form of type (it could be moved quickly and even sold). The technique was affordable and reliable and raised the overall quality of the print output with movable type. William Ged invented the stereotype in 1725[32], and many notable printmakers, such as Firmin Didot, perfected the technique. In the XVIII century many printers from England and France started to produce music score from stereotype plates[33]. From the perspective of music publishing, the stereotype technique allowed for cleaning all the imperfections of the typographic process. Using a stereotype, the printer would have a smooth and clean output, even in the most fragile joints from piece to piece, reducing the gaps and misalignments between the printed signs. The stereotype would also allow reprinting quickly without having to repeat the typesetting.

Movable type production and printing practices

The focus of this research is music printing through movable type. The interest in printing music via typesetting metal types into printing plates is attributed to several factors. Firstly, it represented the initial "mechanised" method for mass-producing a complete musical text. Additionally, it utilised the same tools and processes employed in regular text publishing. Moreover, it presented various design challenges in replicating the flexibility of music notation. Furthermore, it significantly influenced the aesthetic form of today's notation. Lastly, the technique influenced the development of other printing practices, such as metal engraving. The process of producing and setting up pieces of type for music is roughly the same as the one used for verbal text printing. It consisted of two activities: casting and printing with type.

31. Krummel, D.W., & Sadie, S. (1990). *Music Printing and Publishing.* New York: W.W. Norton.
32. Gaskell, P. (1972). *A New Introduction to Bibliography*. Oxford: Clarendon Press.
33. Krummel, D.W., & Sadie, S. (1990). *Music Printing and Publishing*. New York: W.W. Norton.

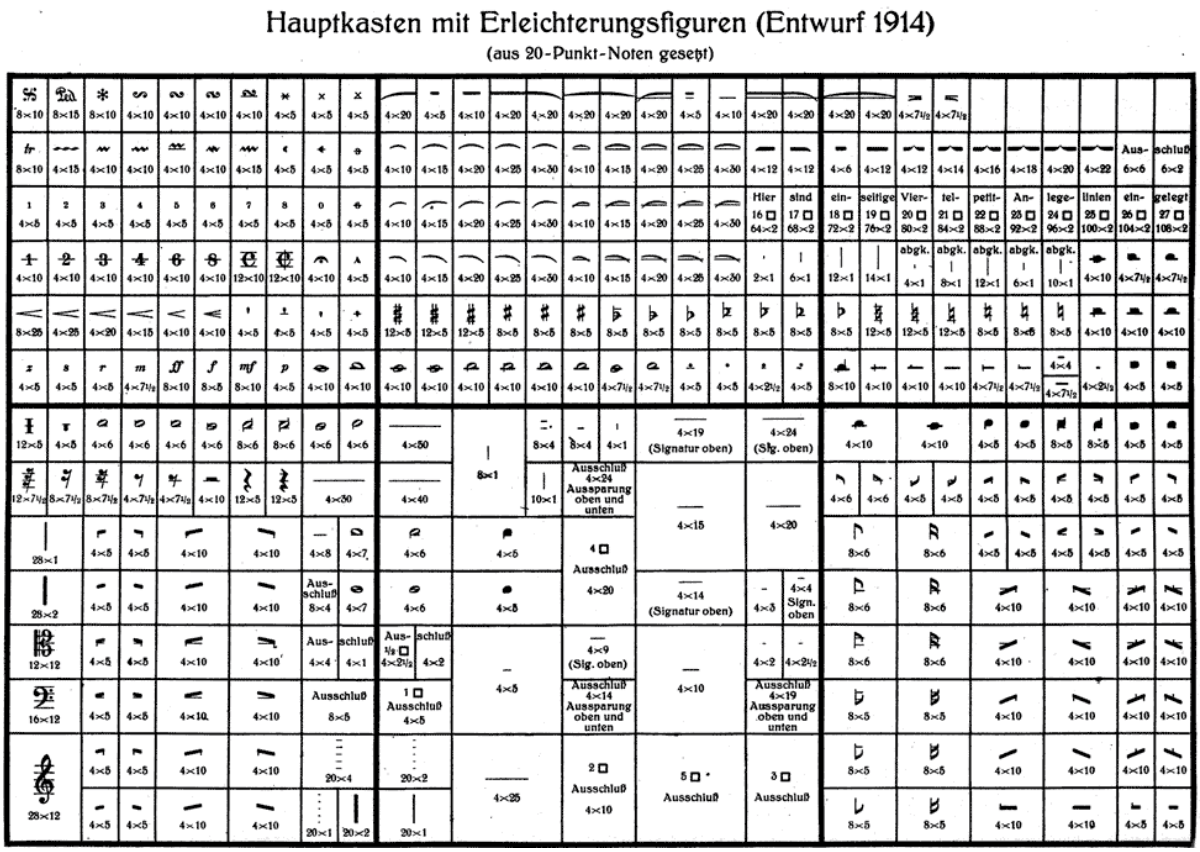
To cast movable types, the punchcutter carved the mirrored drawing of a musical sign at the top of a long metal piece. The fact that the musical sign is carved in its mirrored shape is the main detail that distinguishes the metal punches for movable type production from those for the metal engraving process described below. As mentioned earlier, the punches could be created inside the printing firm, but it was the norm to outsource their production[34]. The punch was then tempered and hammered to strike its negative form in a matrix made of soft metal. This matrix was then refined and inserted in a typographical mould of a defined size (each type size has a separate mould). A metal alloy was then poured into the mould to cast many individual pieces of type. This process will remain almost unchanged for many years after its first adoption.

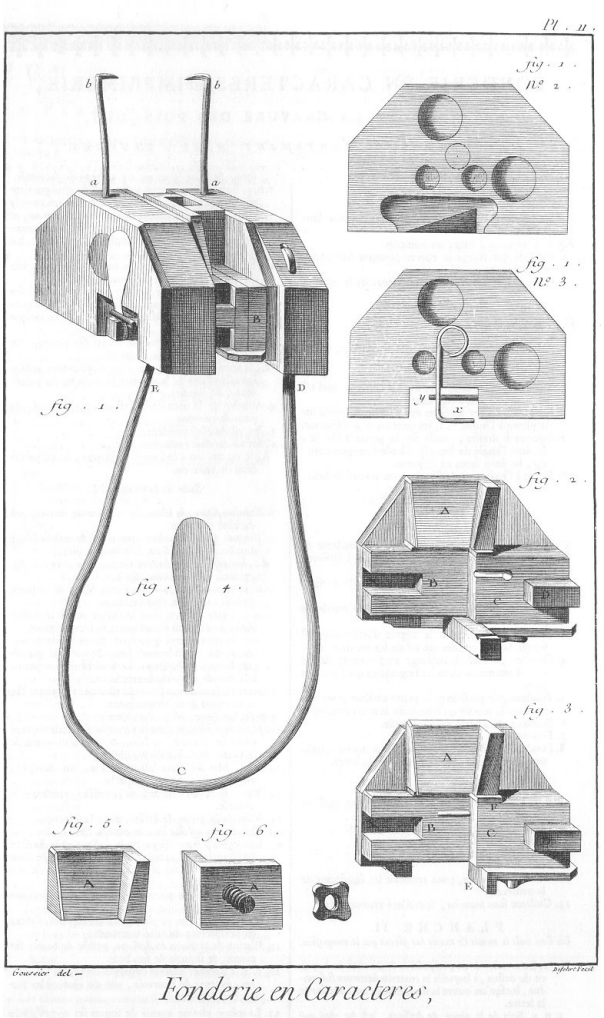
Once the printer collected all the pieces of type, he could use them to typeset the printing plate for a page. These final pieces of type, displaying all the necessary notes and music symbols, were arranged in a special type case designed for music fonts. The type composer[35] then arranged the individual pieces in a composing stick to produce the entire musical line. The resulting lines, stacked together in a frame, created the printing plate of the score. Once created, the plate was inked and used to produce the score on paper via the printing press. This process was then repeated for every page of the publication. Sometimes, the printers developed semi-permanent typesetting—pre-arranged type forms that were left assembled or partially assembled—to facilitate the setup of pages with similar layouts and musical structures, such as successive pages or different parts. The entire typographic workflow involved many specialised artisans cutting metal punches, registering the matrix, casting the type, typesetting the plate, and printing. Although necessary, the binding process is not detailed here as it is not specific to movable type and was often outsourced.

From these passages, it is possible to understand various peculiarities: despite being still more expensive and time-consuming than regular text printing, this printing technique was time- and cost-effective compared to other contemporary music printing techniques. Setting metal types was easier than engraving the notes on metal, and producing metal types was cheaper than working with a copper engraved plate, allowing for several setups and reorganisations for other works. The durable material used for the metal types allowed for a considerable number of print runs, unlike wood blocks that could easily break under the printing press or the ductile copper plate. The application of the same technology used in verbal text printing was efficient when notation was typeset alongside text or lyrics, making movable type the preferred printing technique for church music.

34. Barbieri, P. (1995). *Tecnologie di stampa e integrazioni biografiche (1583- 1833)* in *Recercare*, 7, 47–85.

35. Note the difference between the music composer, the author of the music, and the type composer, the person in charge of putting together the metal types in a compositing stick for the print.



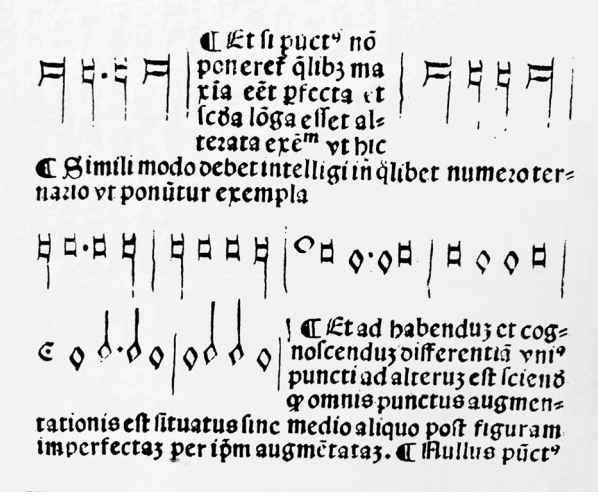


Img. 4. Layout of a typographic case for music font in 1914, from Witten, R., *Die Lehre vom Musiknotensatz*, Leipzig, 1925.
The casted characters fitted in peculiar typecases designed for this specific character set, placing the symbols from the most used (at the bottom centre) to the less used ones (going towards the edges). The size of the section depends on the quantity of the specific character necessary to build a complete score. The numbers on the boxes show the size of the pieces (horizontal and vertical modules.

Img. 5. Engraved plate from the Enciclopedie representing a typographical mould. This tool was used to cast the pieces of type was introduced in 1450 and remained unchanged for at least the next 200 years. Source: The Art Institute of Chicago, Chicago.

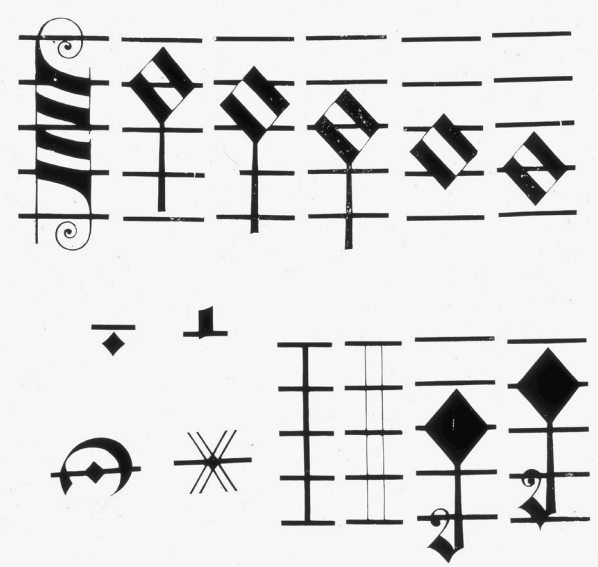
Peculiarities in music movable type

The set of type, specifically cast for printing music notation, will take the name of the music font. The passage from printing verbal text to music notation was not without effort, and printers were required to overcome some issues. This led to the introduction of unique features in printmaking with movable type: the possibility of multiple over impressions, vertical stacking of characters, modularity of the typographic system, and the possibility of using tilted characters and vertically kerned characters. In the late xv and early xvi centuries, the first music fonts did not allow the simultaneous printing of notes and staff lines. Initially, printers were forced to produce the complete score through multiple impressions for staves and notes. That implies having the impressions perfectly aligned so that every element falls in the right place (having the notes not aligned to the staff lines would inevitably alter the information related to the pitch, compromising the score). This process required a perfect alignment of the paper between the various impressions. The whole procedure took a lot of work to achieve and was time-consuming. To cut costs and time, some printers issued books printing only staff lines or notes, requiring them to complete the score with pen and ink.

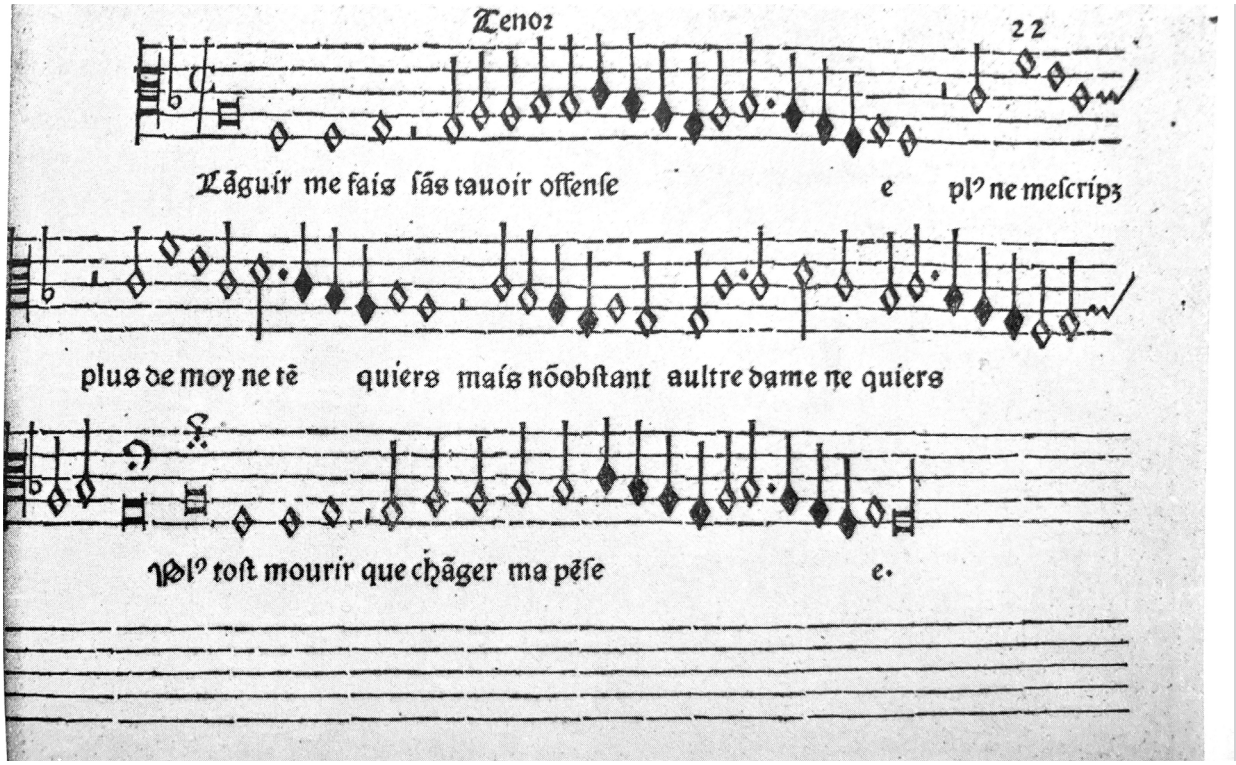

¶ Et si puct⁹ nō
ponerē qlibz ma
xia eēt pfecta et
scda lōga esset al=
terata exē^m vt hic
¶ Simili modo debet intelligi in qlibet numero ter=
nario vt ponūtur exempla
¶ Et ad habenduz et cog=
noscenduz differentiā vni⁹
puncti ad alteruz est sciendū
q̄ omnis punctus augmen=
tationis est situatus sine medio aliquo post figuram
imperfectaz per ipm augmētataz. ¶ Nullus pūct⁹

Img. 6. Page from *Ultimissime Musicales Regule* by Guillermus Guersoni, printed by Michel Tholoze in 1496c. In this sample, the notes are left without the staves. Supposedly, the staff lines had to be drawn by hand after the print, but some copies remained uncompleted. Reprinted from King, 1968.

During the xvi century, beginning in France with the work of Pierre Attaingnant (1494 – 1551/52), typecasters and printers developed a movable type system, enabling them to print with a unique impression. The new typographic system utilised type pieces that included both the note or musical sign and the staff lines. With this advancement, the printing process became more accessible and cost-effective; however, the printed results often lacked clarity, compromising the quality of the scores. For this reason, single-impression and double-impression techniques, along with their respective music fonts, coexisted for many years, as typefounders created mechanically distinct sets of types for these two production methods. The typographic systems developed by Giambattista Bodoni exemplify this duplication.



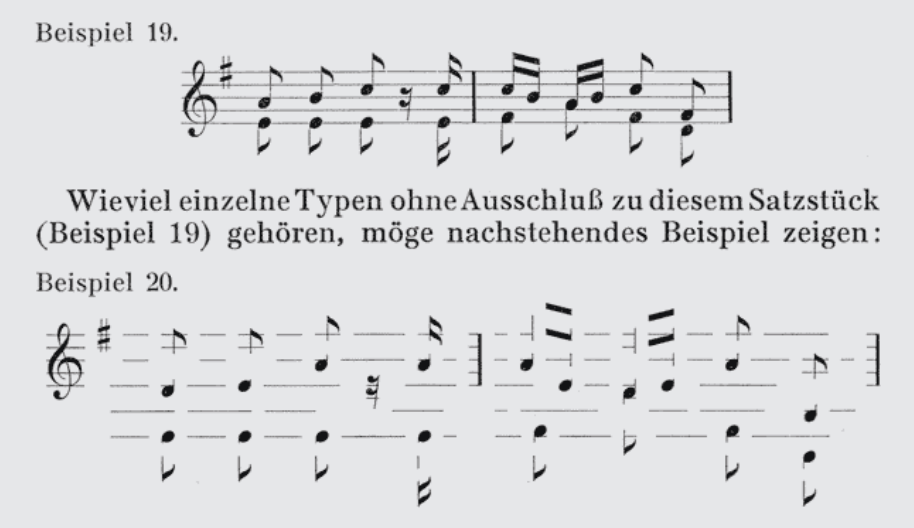
Img. 7. Printed specimen of movable types by Plantin Moretus, actual size. Single impression. Source: Plantin-Moretus Online



Img. 8. Printed specimen by Pierre Attaingnant, Paris, 1527, actual size. This sample represent one of the earliest dated mensural music with text and notes printed from type by one impression. Reprinted from King, 1968.

Movable types for music had another peculiarity compared to the ones for regular text. By printing staff lines with the notation, printers tried to achieve a typographic system (meaning a set of movable types) that could fit the need for score representation, being at the same time as straightforward as possible. This would mean producing and using the smallest amount of different metal types (the bulk production of the same single pieces was not a problem, but having many different pieces increased the production costs and the system's complexity). The note pitch was one of the pieces of information responsible for increasing the number of characters: having to cast a single piece of type for every note pitch was expensive and cumbersome. Printers managed to find a solution by shifting to a modular typographic system. Instead of casting the whole staff for every character, they produced smaller pieces with just a fraction of the staff. This would allow placing a note with a higher or lower pitch by simply put-

ting pieces with staff lines above or below the note. Multiple metal types were stacked vertically to create the group of notes with the staff lines. Then, the composer moved forward to the next group of music characters. The types were stacked vertically and then horizontally. Each type's height and width needed to be controlled to fit in this puzzle-like technique. Every piece would fit in a modular scheme, allowing the composers to typeset easily.


Beispiel 19.

Wieviel einzelne Typen ohne Ausschluß zu diesem Satzstück (Beispiel 19) gehören, möge nachstehendes Beispiel zeigen:

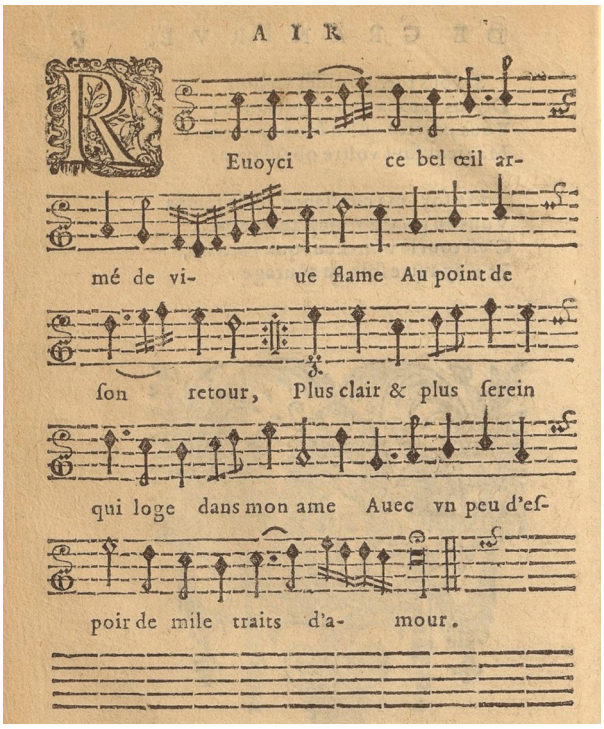
Beispiel 20.

Img. 9. Illustration from Witten, R., *Die Lehre vom Musiknotensatz*, Verlag des Bildungsverbandes der Deutschen Buchdrucker G.M.B.H., Leipzig 1925. The diagram shows a sample musical line and its separate characters needed for the typesetting.

Numerous characters within a music font were kerned[36]. Kerned types are pieces of type that have a part of the drawing that goes outside the rectangular body of the piece. Many italic characters in the latin script, are kerned on one or both sides; This would mean the shape outside the square would overlap with the next character. In music movable type the kerned character could overlap horizzontally or vertically with other character. This would often happen in the vertical stacking for the notes placed over a line of the staff (the head of the note would overlap the piece below used for completing the staff). This extension, however, made the type set more fragile, causing parts of the type to break off during printing[37]. This weakness will be eliminated by the introduction of the stereotype technique .

One of the latest improvements before 1700 was the "tied note"[38], introduced in the first half of 1600[39]. It consisted of the ability to join the beam of the notes as it was increasingly appearing in the manuscripts of that time and scores produced with metal engraving. The aesthetic of movable type notation also evolved to match that of the manuscripts of the time. Printers began to shift from the diamond-shaped notehead to a more roundish shape in the early 1600s.

36. For a sample diagram, see fig. 14.
37. Mayo, H.M. (1988). *Techniques of music printing in the United States, 1825–1850.* University of North Texas, Denton, TX.
38. Cummings, H. (1885). *Music printing.* Proceedings of the Musical Association, 11(1), 17–30. Taylor & Francis.
39. The *New Grove Dictionary of Music and Musicians* wrongly dates the introduction in the second half of 1600 with round-shaped notation (by John Heptinstall). Still, evidence shows that this feature was already used in the first half of 1600 with diamond-shaped notation by Pierre Ballard, as Nicholas Gando stated in 1765. See Poole, H.E., *Printing and Publishing of Music,* in *The New Grove Encyclopedia of Music and Musicians.* New York: Macmillan, 1980.



Img. 10. Page from Guédron, Pierre, Boesset, Antoine Bataille, Gabriel, *Livre d'Airs de cour et de differents autheurs,* printed by Pierre Ballard in 1621. The score uses diamond-shaped noteheads in the style of mensural notation. The beams are also very primitive, featuring broken slopes (as they were used in music manuscripts). Source: gallica.bnf.fr / BnF.

Formal evolution of notation aesthetic

Between the XVI and the XVIII century, the visual representation of music notation evolved in many aspects. Music notation went through the passage from early mensural music notation to one commonly used for Western music. By the half of 1700, music notation achieved the general characteristics of the notation in use today for Western music. It is a notation with a high level of detail, and its formal representation affected the choices made by printers and publishers to issue the printed scores. In the late XV century, as it happened for verbal text, the first samples of printed music tried to emulate the hand-drown music samples of the same age[40]. During the early attempts of music printing with woodblocks and movable type, the notation used the classical lozenge-shaped (sometimes called diamond-shaped) noteheads of early mensural music. This Shape was heavily influenced by the drawing tools used at the time (flat-tip goose quill). From now on, manuscripts and printed notation will affect each other, changing the handwriters' writing habits and the visual aesthetic of music notation.

Around 1600, composers started to shift from early mensural notation to a more fluid writing style: the shape of the noteheads, from square to round, and the position of the stem in relation to the notehead; the introduction of many values below the quaver; the introduction of the tied beaming; the introduction of the slur (legatura) between notes. During this shift, the printing process's mechanisation influenced some formal notation aspects. For instance, until ca. 1500, the stem direction in white mensural music functioned for displaying the note's value: maxima and longa always had their stems down, while minima and quicker values had their stem up[41]. However, printers and typesetters found it easier to use the same piece of type for both the upper and lower pitches. To

40. Cummings, H. (1885). *Music printing.* Proceedings of the Musical Association, 11(1), 17–30. Taylor & Francis.

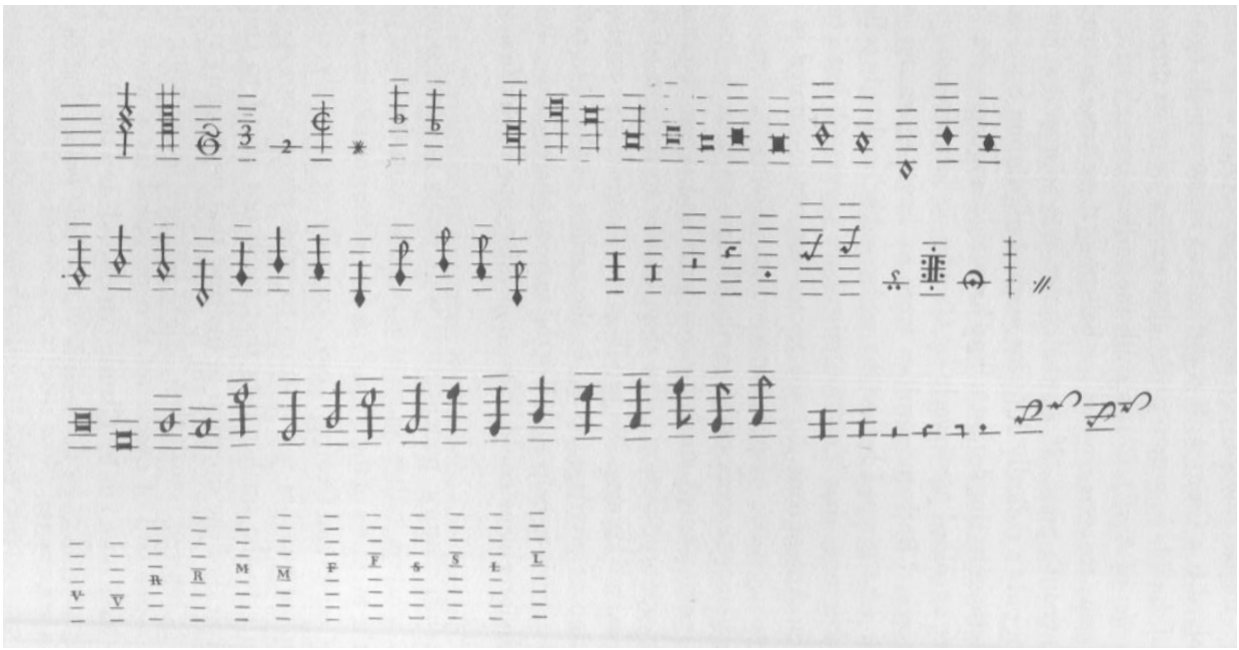
41. Apel, W. (1969). *The Notation of Medieval Music.* Cambridge, MA: Harvard University Press.

save space on the score, they decided to place the stem in a manner that would use less space, pointing it in the direction of the staff lines, depending on the height of the pitch. Printers achieved this by simply turning the metal piece upside-down and printing the stem upward or downward interchangeably. The capability to use a piece of type in two directions by reversing the metal piece is an almost unique feature in typesetting practice. It will influence the conception of the movable type system for music fonts. After around 1500, with the development of printing techniques and the transition to modern notation systems, the stem direction lost its value meaning[42], shifting to a more formal, layout-related role.

Between the XVI and the XVIII century, the visual representation of music notation evolved in many aspects. Music notation went through the passage from early mensural music notation to one commonly used for Western music. By the half of 1700, music notation achieved the general characteristics of the usual Western notation in use today. It is a system with a high level of detail, and its formal representation affected the choices made by printers and publishers willing to issue printed scores. In the late XV century, as it happened for verbal text[43], the first samples of printed music tried to emulate the hand-drown music samples of the same age. During the early attempts of music printing with woodblocks and movable type, the notation used the classical lozenge-shaped (sometimes called diamond-shaped) noteheads of early mensural music. This shape was heavily influenced by the drawing tools used at the time (flat-tip goose quill). From now on, manuscripts and printed notation will affect each other, changing the handwriters' writing habits and the visual aesthetic of music notation. Around 1600, composers started to shift from early mensural notation to a more fluid and flexible writing style that better reflected the evolving complexities of music during the Renaissance and early Baroque periods: the shape of the noteheads, from square to round, and the position and direction of the stem in relation to the notehead (which also facilitated the presentation of polyphonic music); the introduction of many values below the quaver and more intricate rythms; the introduction of the tied beaming; the introduction of the slur (legato) between notes. Music printing allowed the dissemination and standardization of many of these formal aspects and new conventions.

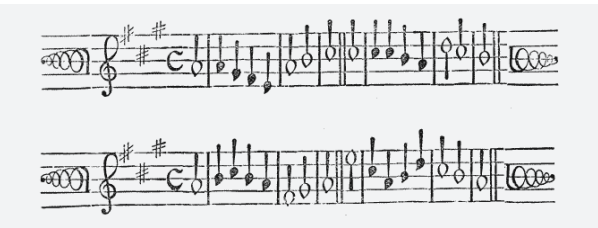
42. Ibid.

43. As it can be noted in the first publications printed by Gutenberg, or Sweynheym and Pannartz.



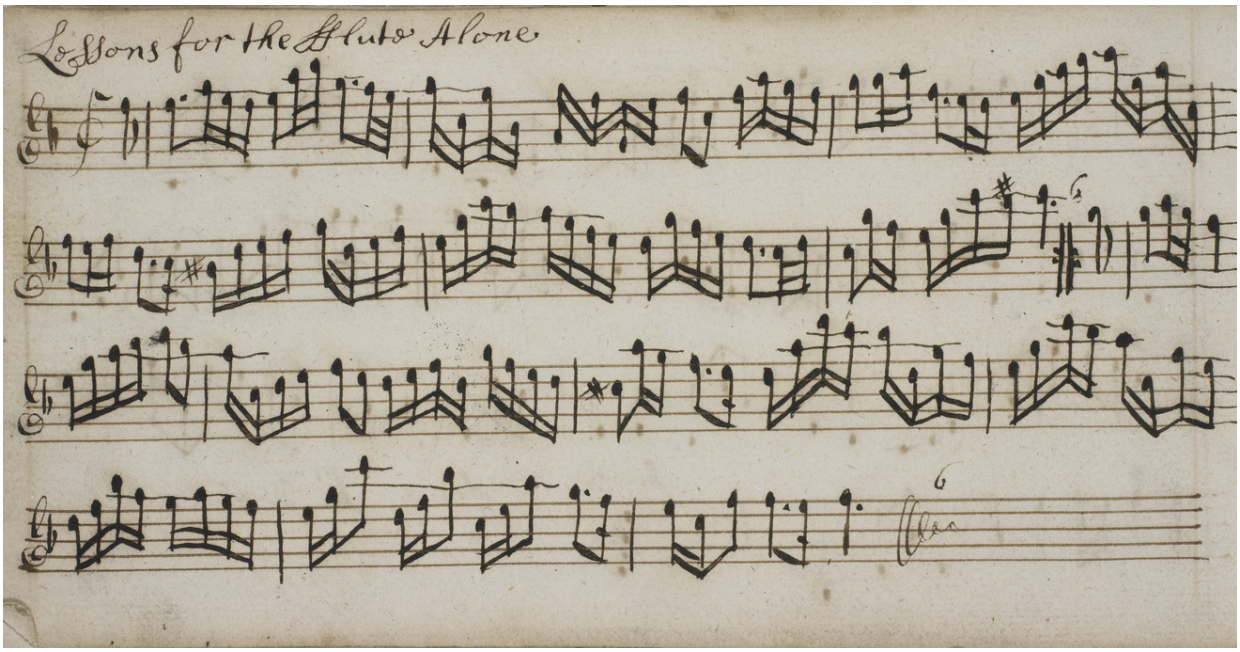
Img. 11. Image from Heartz, D., *Pierre Attaingnant Royal Printer of Music.*
The stems of the characters with diamond heads are only in one direction. The characters with the lozenge head included both up- and downward stems because of the asymmetrical drawing. Reprinted from King, 1968.

With the introduction of the round note, the position of the stem was also affected: composers used to attach the stem to the noteheads both to the left or the right, according to the composer's habits. The habit of printers using the same characters upside down made the stem inevitably fall to one side of the notehead, eventually standardising its position to the right when pointing upward and to the left when pointing downwards. This aesthetic is now so rooted in modern notation that a note with a downward stem attached to the right of the notehead would be not just strange but an actual formal mistake[44], even if it does not change the musical information. The limitations of the movable type technique sometimes influenced other habits in writing music, visible in the manuscripts of the time, but only some of these habits were preserved.
While printed music adopted many of these new conventions, manuscripts and handwritten music remained the primary influence on the evolution of notational aesthetics. Printers sometimes struggled to keep pace with the increasingly fluid aesthetic of notation: cutting and casting new sets of type were expensive, and most printers would use the music font they already had available, regardless of the differences with the manuscript. At the beginning of the XVIII century, Western music notation steadily settled its shape with round noteheads and joint note beams. Despite them, many editions printed with movable type old fashioned fonts with rhomboidal note heads that were not at pace with the visual aesthetic of written music notation.



Img. 12. Music type cut by Walpergen, Oxford, circ. 1695 (From the original matrices).
The peculiar noteheads depicted in this sample could represent a connection between ancient and modern visual aesthetics. Source: luc.devroye.org

44. Excluding chords and other more complex juxtapositions.

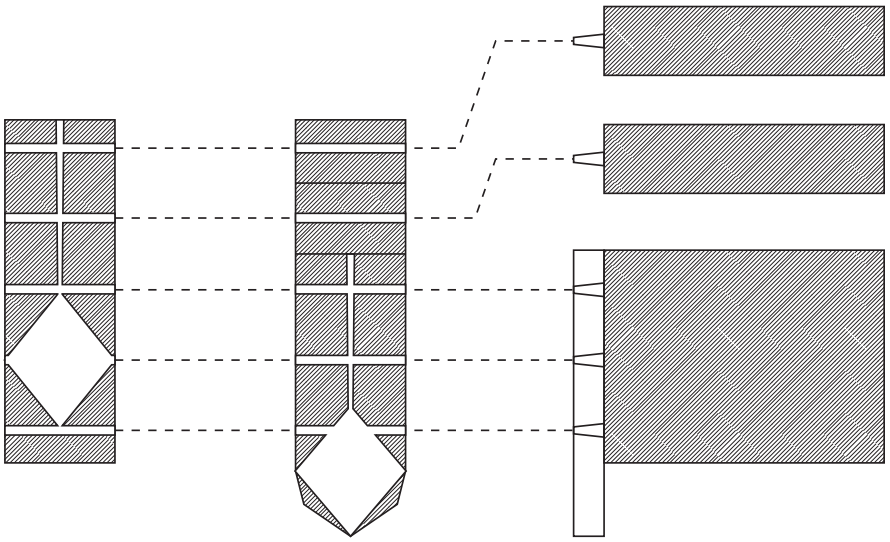


Constrains with music movable type

For single and multiple impression techniques, movable type presents a fundamental issue with music notation. Generally speaking, music notation moves over two main axes: the vertical one for the pitch and the horizontal one for the duration and the order and consequence of the sounds/musical instructions. This environment differs from the one used for linear alphabetical typesetting, where letters are stacked next to the others, following a unique horizontal dimension from one line to the other. Moreover, there is a strict relationship between the various musical symbols as their shape changes depending on the surrounding context. That is the case for note beams, slurs, and other notation segments. The movable type plate comprises many metal types arranged one next to the other. In the context of verbal text, they usually flow along one dimension only, one letter after the other until the new line. The lines of text are then placed one below the other to produce the printing plate. Mensural notation, the writing system used between the XV and XVI centuries, was still relatively simple and very different from the one in use today. The shapes of the notes were clear and separate from each other, and the number of possible combinations was limited. Gregorian Chant notation was reasonably complicated but was limited to "only" around 230 characters[45]. Such notation had a low grade of complexity and allowed early music printers to adapt the movable types used for text quickly. The type system would use a metal character for every duration and pitch. To make the system slimmer, the staff was divided into smaller parts, with pieces for each row so that they could be staked vertically to reproduce the entire staff. The same metal piece containing the information for the note duration could be used at different pitches, depending on its vertical position.

Img. 13. Unknown year, manuscript by Thomas Britton (1644 – 1714). With the introduction of the tied note, music movable type began to change the direction (rising or going down) of the beam along the same group of notes. This was sometimes adopted in manuscripts but fell into disuse after the rise of the aesthetic of copperplate engraving scores. The notation in the reproduced manuscript displays the stems of the notes consistently on the same side, regardless of their direction. Source: British Library – Public domain.

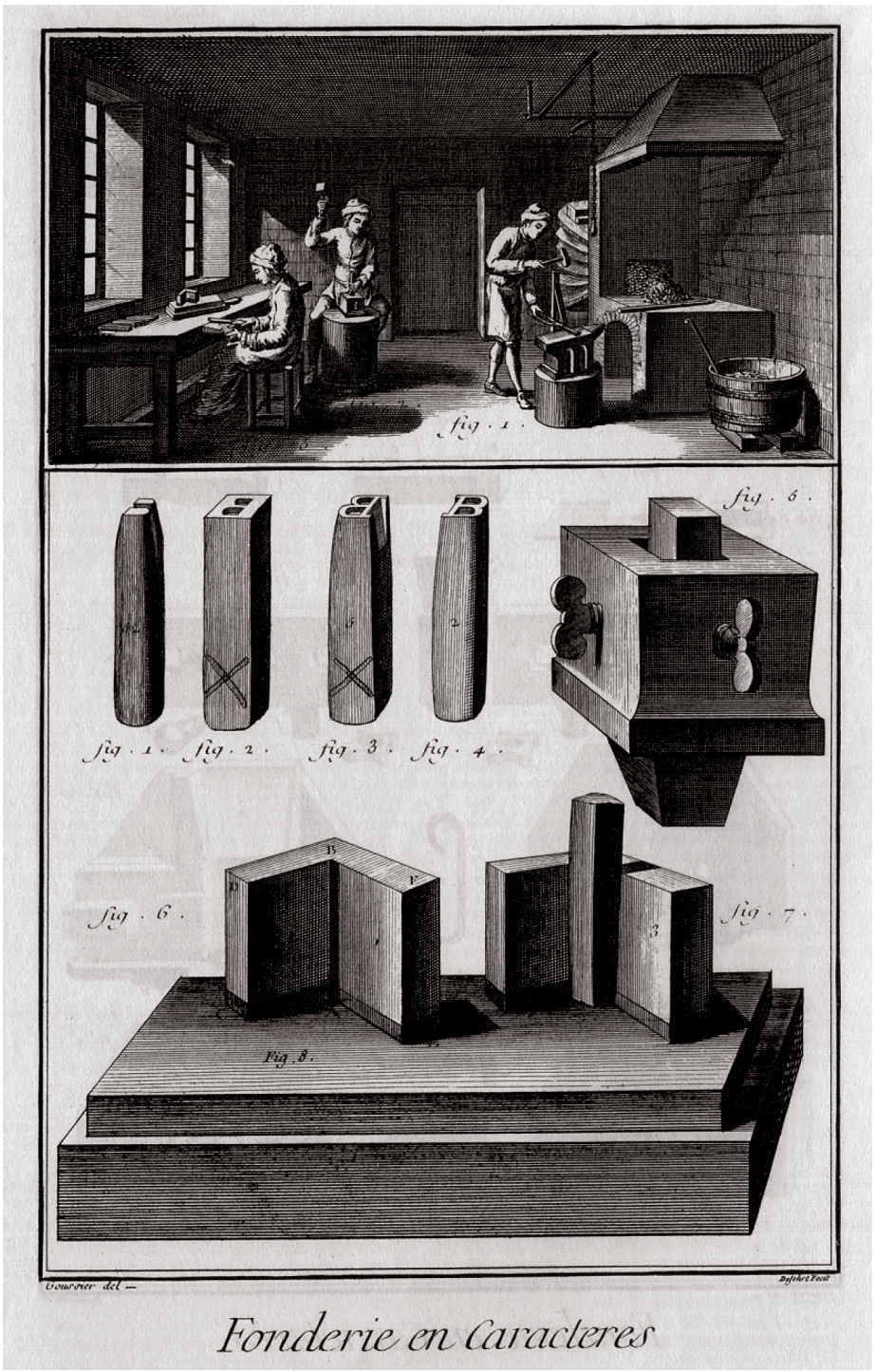
45. This figure refers to music typefaces cast during the latter half of the 19th century. Older typefaces may have had fewer characters.



Img. 14. Pattern used for typesetting with music movable type.
The diagram shows the juxtaposition of various characters to change the note›s pitch. The side view of the character on the left shows how kerned characters worked: the portion of the note extending the character boundaries allows the note to overlap the adjacent character.

This characteristic gives the process the complexity of non-linear typesetting, as the metal pieces must be set vertically to reproduce the pitch and then horizontally to reproduce the music line. There are other examples of non-linear typesetting systems, notably for borders and flourished figures used for decoration. However, music typesetting has a unique complexity that can be matched only with some peculiar typographical fields, such as the typesetting of mathematical formulas.

Since the XVII century, music notation and compositions have increased their complexity in both the style of music and the number of instruments and voices displayed. All these factors meant that the number of possible typographic combinations of musical signs was growing exponentially. Within this new context, conceiving a typographic scheme for music notation becomes very difficult. This struggle is evident for some musical signs, such as beamed notes and slurs, that often did not fit nicely inside the typesetting. Music printers usually tried to walk around these limitations by breaking the formal rule of notation. This compromise was at the expense of formal clarity and the overall quality of the score. These limitations will adversely affect the impact of movable type for music, primarily in comparison to its main competing printing technique, metal engraving. Throughout the 1700S, printers sought solutions to these limitations, facilitating a revival of typographic music printing in the latter half of the century.



Img. 15. Plate from the *Encyclopedia* by Diderot and D'Alembert published between 1751 and 1772.
The Illustration is dedicated to the printing trade, its instruments and tools. Being a *Dictionnaire raisonné des sciences, des arts et des métiers*, the plate describes in detail the passages required to cast and use movable type. These engravings will show up in many subsequent publications about typography.
Source: The Art Institute of Chicago, Chicago.

Context

Historical background of music publishing between 1700 and 1800, analizing the growing interest and argument in finding shared standards for the printing practice with movable type.

The printing industry in the XVIII century

The second half of the XVIII century saw a renewed interest in movable types for music, primarily due to the many improvements and innovations adopted for this technique. These refinements emerged within the context of the Age of Enlightenment. The printing trade was indeed an integral part of the intellectual movement that defined the XVII and XVIII centuries: the printing press and its ability to reach the masses allowed the spread of old and new ideas, especially the ones by the exponents of the scientific Enlightenment, allowing a better understanding of the current technologies and inspiring other scientists and academics. With the rapid diffusion of books and publications, the Age of Enlightenment affected many scientific and practical fields, including the printing trade. The techniques and methods used until that time for printing became subjects to be analysed, studied and improved. For this reason, many printers started to publish essays and treatises about the art of printing. At the same time, the first publications about the history of the printing trade started to appear. These books gained popularity among educated readers, enhancing the spread of knowledge and techniques from various printers..

This new interest was also due to a change of mind in the average readers: they did not just read as a hobby. They wanted to be informed and understand the world. For printers/publishers, there was a will and the necessity to define and objectify the art of printmaking. By the time these first technical writings and essays began to spread, many more printers started describing and visualising in detail the tools and machines they used, together with a critical view of the history of the trade. The essay by Joseph Moxon, published in 1683-84[46], is the first treatise about printmaking. The book served primarily as a practical manual. However, it introduced a theoretical approach to the field, including a small

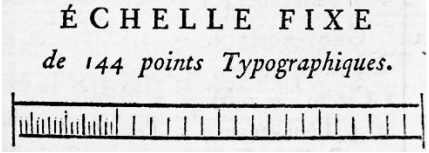
46. Moxon, J. (1683). *Mechanick exercises, or the doctrine of handy-works applied to the art of printing.* Joseph Moxon.

preface dedicated to the history and development of the printing industry. In this publication, Moxon tries to describe the printing process in all its stages for the first time, establishing a formal name for many of the tools and the mechanical parts involved (until then, often called differently from printer to printer). With his work, Moxon introduced some order in a practice full of inconsistencies between the various printing firms.

Another publication that spread the knowledge of the printing trade was the Manuel Typographique[47] by Pierre Simon Fournier Le Jeune. Fournier was a well-known figure in the publishing industry. His first specimen book, issued in 1742[48], showed the outstanding achievement of his practice. He struggled in his activity because the tools and techniques used by different printers at the time were hardly compatible. This lack of shared standards and techniques slowed down the trade's evolution. The only way to improve this situation was to rationalise the trace and introduce new standards for printing tools and processes. For Fournier, this standardisation had to start from the most essential element: a shared measurement unit for typography. As in many other scientific fields, the measurement units for the length were inconsistent from place to place, and there was little care in maintaining a shared standard. As a result, printers were unable to use tools from other workshops because the different sizes did not match every tool or machine.

The typographical point, the unit measure of the trade, was already known since early 1500. One of the first mentions of the typographic point appears with Francesco Torniello da Novara, even though it was not used for measuring type and it was not yet defined in length[49]. Fournier, inspired by the previous work by Sébastian Truchet (1657 – 1729)[50], brought the first widespread attempt for a precise standard of this measure. He was required to build a system to organise the typographic sizes with a mathematical and logical ratio. In 1737 he publishes *Tables des Proportions qu'il faut observer entre les caractères*, announcing the adoption of his typographic point system. Like many other measurement systems at the time, his meter unit for print was built in base 12, starting from the French foot[51]. The base 12 was a practical choice: it was very versatile as it could be easily divided by two or three. This measurement placed the typographical point at around 0,375 mm. Since then, this measure has varied through the centuries[52], but Fournier's point will become the basis for most of the following standards, some still in use even today. Fournier is a rare example of a "complete typographer", a master of complex but related skills in designing, cutting, founding new typefaces and composing them into the page.

47. Fournier le Jeune, P.S. (1764–1766). *Manuel typographique, utile aux gens de lettres et à ceux qui exercent les différentes parties de l'art de l'imprimerie.*
48. Fournier le Jeune, P.S. (1742). *Modèles des caractères de l'imprimerie.* Paris.
49. Torniello, F. (1517). *Opera del modo de fare le lettere maiuscole antique.* Milan.
50. Bringhurst, R. (2013). *The elements of typographic style* (4th ed.). Point Roberts, WA: Hartley & Marks.
51. 12 pouces for each French foot. The point de Fournier was defined as 1/72 of a French pouce.
52. The typographical point will vary between 0.35 and 0.4mm until the beginning of 1900.



Img. 16. A representation of the typographic scale by Pierre Simon Fournier, from his Manuel typographique, actual size.
Source: d39zsn48xaymk0.cloudfront.net – Wikimedia Commons, licensed under CC BY-SA 4.0.

From transitional to modern letter design

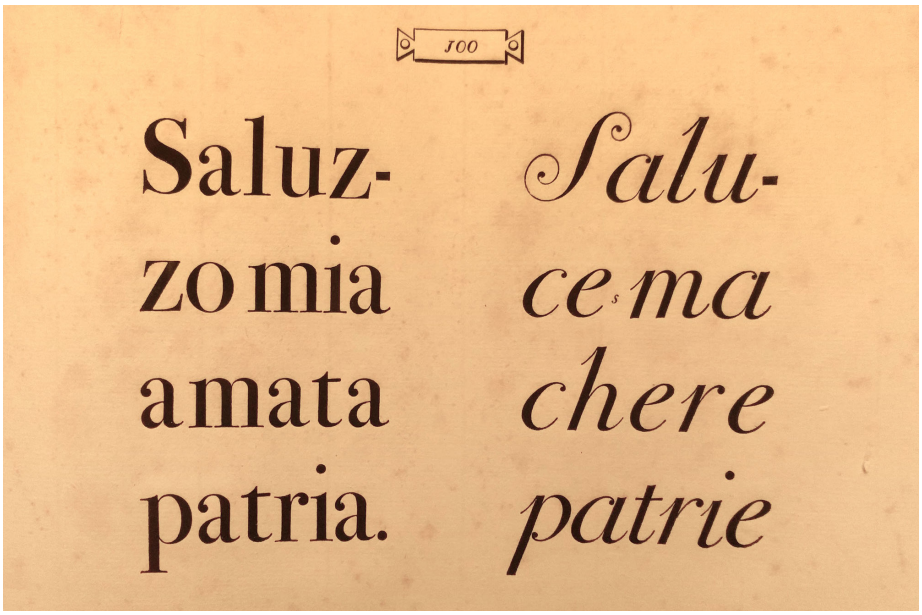
Given our strong influence from Fournier's work, it is possible to can consider Giambattista Bodoni's contributions within this framework of innovations and rationalisation. However, to understand his practice, it is essential to glimpse some of the technical and practical evolutions in the aesthetic of type design and the new tools used for printing and designing type during 1700. Between 1500 and 1700, the epicentre of the printing industry moved from Venice to Paris and London. What the typographic industry today calls "old-style" letterforms reached their final stage in the mid-XVIII century with the work of the Englishman William Caslon. At the same time, a new approach to design letterform emerged at the end of the seventeenth century: Philippe Grandjean cut the Romain du Roi (typeface commissioned to the french Royal Print Office in 1692), a typeface designed with a rational and mathematical approach. This new approach enhances the contrast between thin and thick strokes with a nearly vertical stress angle. The serifs become more detailed, thin and pointed, with less pronounced bracketing. The drawing of letters, once inspired by the stroke of the pen, was becoming increasingly distant from its calligraphic origins.

The Passage to more detailed and refined typefaces could only occur with a substantial improvement in every printing tool. Printers across Europe could rely on new and more precise printing machines and higher-quality paper. Until the beginning of the XVIII century, paper was often lined, featuring a surface that was not ideal for the impression of tiny metal types. Among his notorious activities as a typographer, John Baskerville (1706 – 1775) helped the introduction of the wove paper for printing[53]. This new kind of paper was smoother and had a more uniform surface, resulting in better performance with movable type characters. These improvements enabled typecutters to produce typefaces rich in detail, featuring significantly greater contrast between thin and thick lines[54]. This practice was prohibited until the introduction of wove paper, as finer details were often lost in the printing process on an uneven surface.

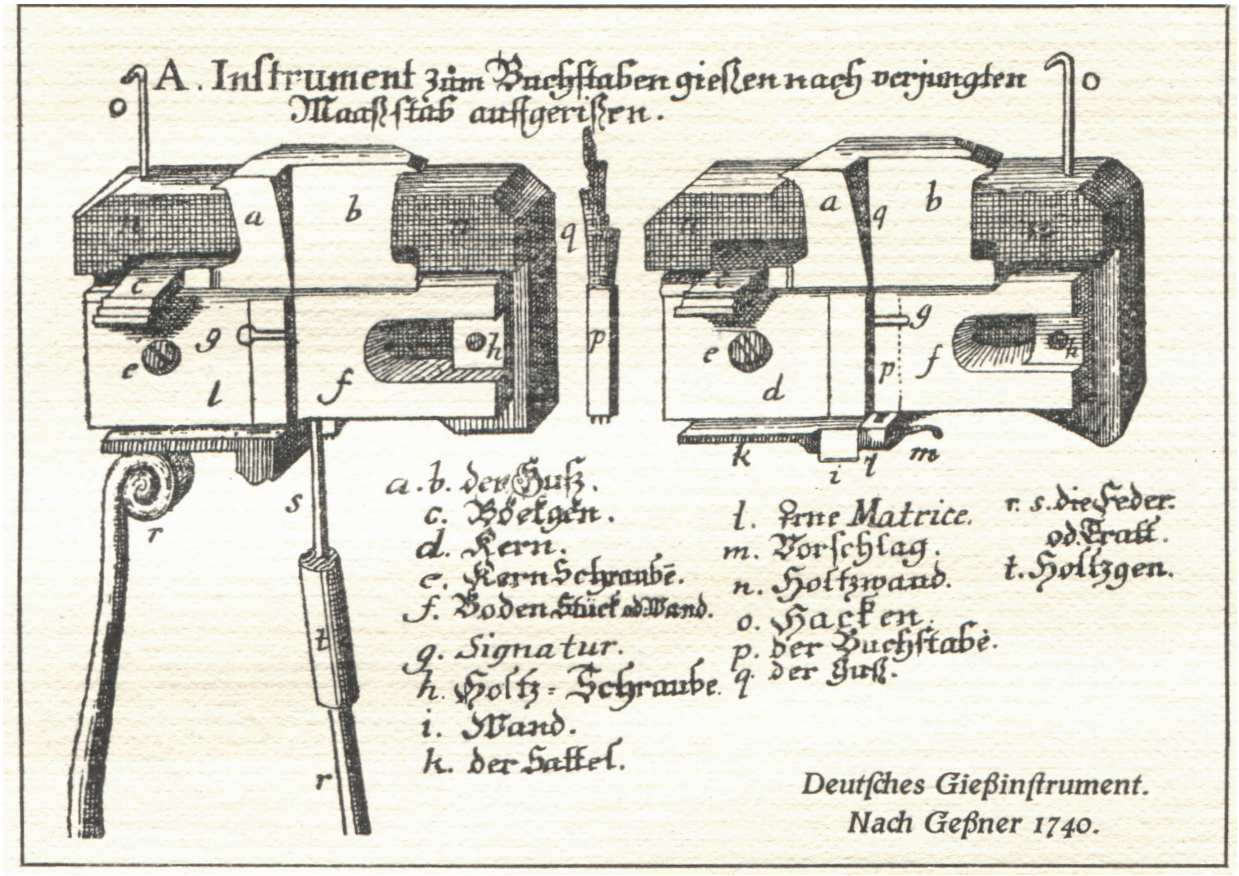
Bodoni's achievements were also possible due to innovations in the alloy used to cast type: the quality of the alloy was essential to giving strength to the metal type. The more resistant it was, the more details and fine lines could be cut without fear of breaking the type when printing. The famous typefaces cast by Bodoni are noticeable for their high contrast between the thin and thick strokes of the letters. This could not have been possible without an alloy that could have withstand the high pressure of the printing press, even in the thin and detailed part of the letter.

53. The wove paper was invented by James Whatman (the Elder) in ca. 1757, see Gaskell, P. (1959). *John Baskerville: A bibliography.* Cambridge: Cambridge University Press.

54. Kinross, R. (2019). *Modern typography: An essay in critical history* (2nd ed.). Hyphen Press.



Img. 17. Detail of spread from *Serie di Majuscole e Caratteri Cancelllereschi* (1788).
The publication can be defined as the first specimen book to showcase Bodoni's mature style of type. The use of extreme contrast from thin and thick lines and the use of an almost vertical stress denote the passage from the transitional letterforms, tipical in John Baskerville's and Pierre Simon Fournier's work, to the modern ones. Source: Museo Bodoniano.



Img. 18. Image from Gessner, C.F. (1740). *Die so nöthig als nützliche Buchdruckerkunst und Schriftgiessereÿ mit ihren Schriften.*
The image shows a hand mould with two screws to adjust the width of the chamber. Source: Creative Commons – Public Domain.

Another notable tool that was recently improved was the typographic mould. This tool was essential to mass-produce the final characters. A skilled 18th-century typefounder could cast around 10.000 characters per day with this tool[55]. In the first metal mould, the width of the opening, in which the hot metal was poured, was defined by the matrix attached to the bottom of the mould. This means that the matrix defined the shape of the final character and crucially, also the width and dimensions of the character's face. During 1700, the hand moulds

55. Carter, H. (1969). *A view of early typography up to about 1600.* Oxford: Clarendon Press.

described in many essays (including the one preserved at the Biblioteca Palatina and used in the Bodoni officina) display two screws to adjust the width of the case[56] in which the liquid metal alloy was poured to produce the characters. This mechanism made the final character's width independent from the matrix's width. The typefounder could calculate the width using a pilot character and tighten the screws on a specific width.

Bodoni's activity was also influenced the main characters of the typographical scene at the time. John Baskerville, businessman and type designer, greatly influenced Bodoni's work. Bodoni admired the work of Baskerville. After having worked for eight years at the Propaganda Fide printing press, Bodoni was so moved by the work of the English printer that he wanted to relocate to England to master his skills. Eventually, Bodoni had to renounce his trip after being infected by malaria. The work by Pierre Simon Fournier le Jeune was also part of Bodoni's influence. Bodoni will complete the transition begun by Baskerville and Fournier in the letterforms, adding more contrast to his letters and achieving an almost symmetric stress angle.

Music publishing with movable type in 1700

During the 1700s, the music publishing industry was already widespread across Europe. Between 1500 and 1650, Europe featured between 150 and 200 typefaces for music[57], scattered among many printing firms. These typefaces were not always consistent or standardized, and the printed editions issued by different presses varied widely based on the tools used.

In the second half of 1600, printing music notation by engraved copper plates was a well-known practice in various countries[58], and it was gaining a solid hold of the music printing market share. The introduction of the pewter plate and the punches for engraving many music symbols allowed quicker and cheaper production of the plates[59]. Above all, metal engraving allowed the freedom to print anything that could be drawn on a two-dimensional surface. Typesetting music lacked this freedom, as the composer had to stick within the strict grid of squares typical of movable type. In general, the XVIII century began with music movable type already less favoured than metal engraving. Moreover, at the beginning of the XVIII century, there was a substantial difference between the notation written by hand and the one printed by music publishers with movable type. The editions from the early XVIII century printed with types display old-fashioned notation featuring lozenge-shaped notes, often without joined tails. This appearance did not correspond well with the style of notation used at the time, which already included round noteheads, slurs, and joined beams. In 1532, Étienne Briard (supervised by composter Elzéar Genet) cast a music type with rounded heads, but this innovation was not adopted by other type-cutters and printers of the time[60]. The high cost of cutting a new set of types and the

56. Mosley, J. (1962). *The hand mould for casting movable type*. In *Journal of the Printing Historical Society,* (1), 1–17.

57. Guillo, L. (2015). *Music printing in France, 1500–1800*. In A. Lindmayr-Brandl, G. McDonald, & E. Giselbrecht (Eds.), *Early music printing in German-speaking lands* (pp. 111–134). London: Routledge.

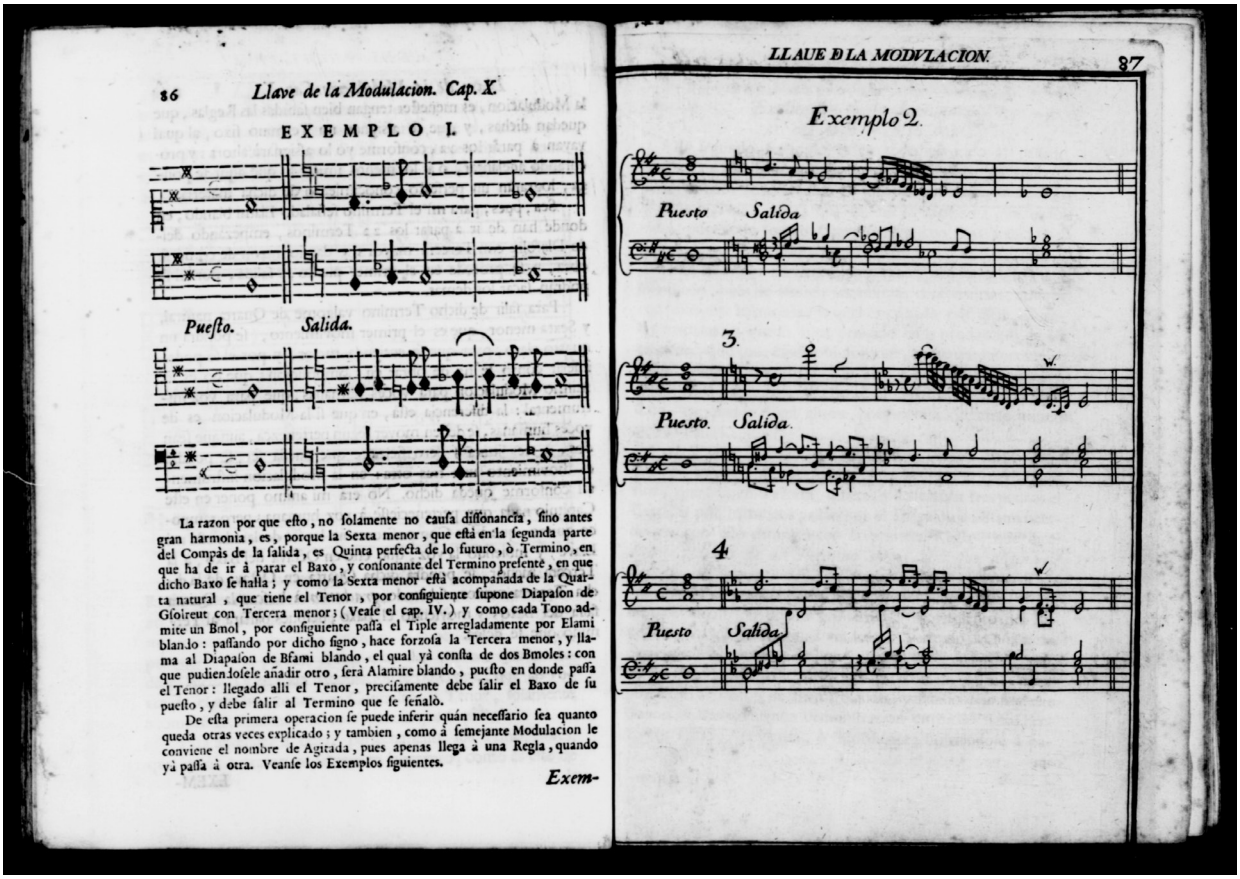
58. Poole, H.E., *Printing and Publishing of Music,* in *The New Grove Encyclopedia of Music and Musicians*. New York: Macmillan, 1980.

59. Ibid.

60. Ibid.

technical limitations of movable type systems discouraged the spread of this new aesthetic. Of course, the lack of new and modern music fonts made metal engraving even more eye-catching than movable type.

During 1700, some printers and punchcutters scattered across many countries decided to invest resources in building a new movable type system for music. This new system would allow to preserve the aesthetic of modern music manuscripts while mantaining the ease of use of the typographic system. It would hence aim to be a competitive alternative to metal engraving by preserving all the advantages of movable type (ease of mass production, compatibility with other typographic tools, regularity of the shapes). This improvement required dividing the musical signs into smaller parts, using more types. This subdivision raised the complexity of the type system, but it also allowed a more significant number of possible combinations and typesetting capabilities. The characters for the notes were the ones that deserved more attention. Printers schematised a system dividing the single notes into smaller components: note-heads, stems and beams. As was already happening for building the staff with multiple pieces, the single components of the notes were stacked together in the compositing line to reproduce the entire musical sign. The composer could use longer or shorter stems and build a beam with a specific angle by using different pieces of type, depending on the context of the group of notes. These components emerged after analysing the pattern used to describe musical instructions and synthesising it into a typographic construction.



Img. 19. Spread from Soler, A. (1762). *Llave de la modulacion,* Madrid: Joachin Ibarra.
in this rare example, it is possible to see two different printing techniques applied in the same publication. The left page is printed from movable type, and the right page was made from a hand-drawn engraving. The difference in style and look well represent the ahestetic gap between the two systems. Source: imslp.org – Public Domain.

The incredible complexity of this system was almost unique in the typographic field. The same printers would later name this kind of composition "puzzle" or "mosaic" technique. However, many printers claimed that this system ensured ease of use and was not more complex than writing in a different writing system. After all, this technique was applied to other typographic fields, such as mathematical formulas (even if it was a more confined intervention). The modularity of the typographic system was the primary characteristic that would allow every piece to fit into this intricat composition. As already mentioned, this was essential for building the notes with the staff lines using multiple characters. This feature would be further developed in this new typographic environment. The size of the module was the basic characteristic. Every piece would have a controlled width and height based on the module size. A character could, for instance, fit one horizontal module and two vertical ones or spread horizontally by two modules and fitting one vertically. In this way, all the pieces could link with each other. To allow the arrangement of many characters in the vertical dimension, the smallest module was often of low body size, typically between Nonpareil and Pearl sizes[61]. The system would also take advantage of kerned characters[62] for the signs that overlap with the surrounding ones. This conceived system had to balance the ease of use (having fewer pieces of type allows the composer to typeset easily) and the ability to represent all possible cases and combinations (possibly requiring more characters).

The role of the printed music

As explained in the previous chapter, the music score has precise needs and peculiarities compared with other publications. As a working tool, printers had to adapt the score to meet the musicians' needs to read and perform music as easily as possible. Every aspect, from the page size and orientation to the shape, size and distribution of the musical symbols, was a matter of great importance. The result depended heavily on the abilities and technologies involved in the production. Designwise, making a score elegant and user-friendly was a relevant feature, but, as with any other publication, the music score also served other important ends. Music notation in the 1700s was increasingly evolving, and the distribution of music scores helped the standardisation of musical of the formal aspects of music[63]. Finding a common formal representation of every notational element helped to establish a uniform way to communicate musical concepts and ideas flawlessly. The great number of music scores available also helped to make music accessible to a broader audience, shifting the earnings of composers and publishers from patronage to copy sales.

The distribution to a new burgeoning music market also helped to spread music education as more people became familiar with diverse musical styles and composers. This new circulation of knowledge also increased the possible client base (amateur and professionals) and, therefore, sales and demand for new music and music scores. This change is also reflected in the spread of chamber music. Many specimens of music with movable type are arias, duets or compo-

61. Between 5 and 6 pt, see Poole, H.E. (1980). *Printing and publishing of music.* In *The New Grove encyclopedia of music and musicians.* Macmillan.

62. See chapter 1.

63. In chapter 1, it is possible to understand how music movable type spread the rule for the direction of the stem of the notes from the central position to the left- or right-end position depending on its direction.

sitions for small ensembles. Often, the publication of a score depended on the relationship between composers and publishers. The composers benefited from printed scores, as their works could reach audiences beyond their local communities. This helped build their reputations and enabled them to gain recognition (acquiring new clients and work).
Printing and controlling the music scores was also a matter of control for the composition. Some scores were printed but not "published" to the public, produced in limited copies for wealthy privates, or to ensure control over the performance. This could happen for only some parts of a composition (for instance, the vocal parts were printed and distributed, but the orchestral parts were kept away from the public so that the owner of the full score could demand specific conditions over the performance).
Through this small excursus, it is possible to understand the importance of music scores in society and how their presence, absence, or availability could affect music production and distribution across Europe.

Technological innovations, the mosaic technique

At the half of the XVIII century, the use of movable type for music publishing probably depended on the main market that the publisher was dealing with: if he was mainly involved in ordinary typography and printing, movable type for music allowed him to have a quota of music publishing market without having to change his tools and machines completely. On the other hand, more recent publishers focusing only on music printing chose copperplate engraving as their primary production tool to satisfy the need for pleasing visual aesthetics and layout. Regarding these new sets of movable type, many printers and punchcutters claimed their invention to be the first and better one[64]. Without a doubt, some printers were heavily influenced by the work of other competitors. However, some of them were genuinely working on the same ideas and came up with similar solutions simultaneously. The following table summarises all the advancements and happenings in this field.

64. See the Gando-Fournier querelle in the following paragraphs.

YEAR	EVENT	SOURCE TYPE
1742	P.S. Fournier publishes *Modèles des caractères de l'imprimerie*	Essay/specimen
1750	Music movable type specimen by J.F. Rosart	Specimen
1756	Breitkopf publishes *Il trionfo della fedeltà*	Score
	Fournier publishes *Essai d'un nouveau caractère de fonte pour l'impression de la musique, inventé et exécuté dans toutes les parties typographiques*	Essay/specimen
1760	Enschedé Prints music with types by J.M. Fleicshmann	Score
1767	The firm W. Caslon & Son of London printed a specimen book with music type	Specimen
1764	Fournier publishes *Manuel Typographique*	Essay
1765	A. de Castro publishes *L'Arte pratica di contrapdot*	Music manual
	A. de Castro publishes *Manifesto di una nuova impresa di stampare la musica*	Essay/specimen
	P.S. Fournier publishes *Traité historique et critique*	Essay
	Gando publishes *Epreuve des caracteres*	Essay
	Nuovi incrementi dell'Arte della Stampa in Venezia, per rapporto alla Musica in Giornale d'Italia, (17)	Essay
1766	Gando publishes *Observations sur le Traité historique et critique*	Essay
	Fournier publishes the *Manuel Typographique* with *Réponse À un mémoire publié en 1766 par MM. Gando, au sujet des caractères de fonte pour la musique*	Essay/specimen
	Johann Jakob Lotter in Augsburg Prints music Edition with types	Score
1767	Henric Fougt music type patent in England	Patent
1768	Specimen of music type by Fleischman	Specimen

Table 1. Chronology of events regarding music movable type between late 1700 and early 1800.

YEAR	EVENT	SOURCE TYPE
1770	Fougt sells his types to Falkener	Selling docuement
1775	Haas attempts to print music notation with type	Claim[65]
1778	Letter from Gaspare Caroli to Father Martini cite the music font by Bodoni, presumably nearly accomplished	Letter
1785-88	G. Rotili elaborates a new system for typesetting music	Essay
1804	Letter from Francesco Fortunati to Bodoni, citing the music font by Bodoni. In the letters those character are described as invented twenty-five years ago	Letter
ca. 1810	Carl Tauchnitz applies stereotype technique to music publishing	Score
1818	Manuale tipografico published	Specimen

Table 1. Chronology of events regarding music movable type between late 1700 and early 1800.

Casting a new typeface for music was a laborious task, and the printers knew of the risk of the trade. The main issue was the regulations of the printing trade. Some printing firms have detained the right to be the only ones allowed to print with certain techniques. In music publishing, these firms had an undisputed monopoly that discouraged any other printer from entering the market. A notable example was the Ballard firm in France, which initially denied Fournier the use of his music types[66]. Music publishers with movable type were often already present in the general book market and viewed music publishing as a way to diversify their income. Before entering the market and investing in new tools, they ensured they had potential music commissions.

Despite this premise, in the second half of 1700, many publishers distributed books and pamphlets to advertise and showcase the new layout possibilities reached with movable type for music publishing, even though many of the authors had little or no follow-up in their music publishing activity. Many publishers were very close with some composers. Their relationship was not just business-oriented but sometimes a true friendship. Therefore, it is essential to have a precise context that allows one to understand the events that led the printers to embark on the music publishing trade by creating a new typeface for music. The events summarized below do not include the achievements made by Bodoni, as they will be discussed deeply in the following chapters.

65. Reed, T.B. (1887). *A History of the Old English Letter Foundries: With Notes.* London: Elliot Stock.

66. Fournier, P.S. (1756). *Essai d'imprimerie musicale* (with his own commentary).

Italy

The typographer Leilo Antonio Dalla Volpe (1685-1749), also known as Leilo Della Volpe, was active in Bologna since 1720. He published musical editions with movable type, using old-fashioned types with rhomboid heads. He will than move to metal engraving in 1744[67]. The son Petronio will inherit the activity. The editions will maintain the name "Leilo Dalla Volpe" on the front page[68]. For some editions Petronio used music typeface with a more modern aesthetic and round heads[69].

Antonio De Castro (1713-1793) was active as a publisher in Venice in the second half of 1700. Between 1765 and 1772, he was involved in music publishing. His activity is significant due to the printing technique he used. In 1765 he published *L'Arte pratica del contrappunto*, using new characters with round-shaped heads cast by Jacopo Falconi. Falconi claims in 1765 to have obtained a new method for printing music[70]. Antonio de Castro prints a small publication containing a short essay about his new printing types. In his booklet, he summarises a bibliography of essays about music and he complains about the need of a new kind of music type that could surpass the now obsolete notation with diamond heads.

> *A manner of writing Music came into use, very different from the diamond-shaped figure, which is embellished in printing and in the binding of the Notes, which, being it the easiest for Scholars, because it is common; it follows, that the ancient* [manner], *with respect to us, has become, and continues to become, less intelligible from day to day*[71].

He then explains how this need brought the advent of copper engraving, but he also notes how this method was expensive and that the engraved plate could not be reused. The achievement is also noted in an article published in 1765 titled Nuovi incrementi dell'Arte della Stampa in Venezia, per rapporto alla Musica[72]. The article claims that the production costs were the main advantage of the new movable types by Falconi compared to metal engraving.

Giuseppe Rotili, typographer and typecaster, was active in Rome in the second half of 1700. In 1786, he claimed the invention of a new casting method for music type. In 1788, he asked the authorities for the print monopoly with such a technique in all the Papal States except for Bologna (where Leilo dalla Volpe was active). He probably obtained only the license but not the monopoly. In 1789-90, he joined the Pilucchi firm (later known as Cracas) and made some publications with his new system. Other known examples are from Valle Sebastiano and Lipomi Vincenzo[73].

67. Tavoni, M.G., & Balata, N. (1986). *Dalla Volpe, Lelio Antonio Gaetano*. In *Dizionario Biografico degli Italiani* (Vol. 32). Istituto della Enciclopedia Italiana.
68. "Nella stamperia di Leilo Dalla Volpe", see Pericoli, P. (1769). *Sonate a sei a violoncello e basso*, or Martini, G.B. (1763). *Duetti da camera.*
69. See sample in the Appendix.
70. Falconi, J. (1766). *Manifesto d'una nuova impresa di stampare la musica in caratteri gettati nel modo stesso come si scrive.* [Pamphlet].
71. "Passò in uso quella maniera di scrivere la Musica, molto differente dalla figura a romboide, che s'adorna nella stampa e della legatura delle Note, la quale, essendo a'Studiosi la più facile, perchè la comune; ne segue, che l'antica, riguardo a noi, si rese, e si va rendendo, di giorno in giorno meno intelligibile".
72. Anon. (1765). *Nuovi incrementi dell'arte della stampa in Venezia, per rapporto alla musica*. Giornale d'Italia, (17).
73. Antolini B.M. (Ed.) (2019). *Dizionario degli editori musicali italiani 1750–1930*. Pisa: Edizioni ETS.

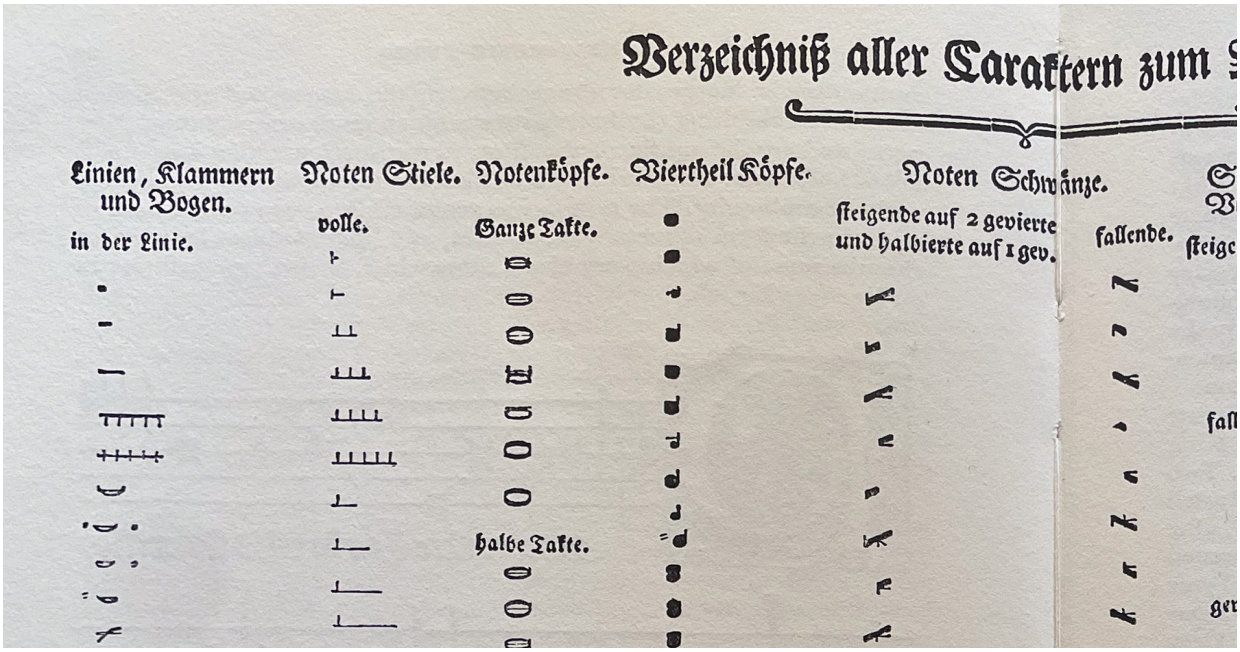
Holland/Belgium

Jacques-François Rosart was the first in the field to introduce a renewed set of types for music printing around 1750[74]. By looking at some autographed specimens and one page of music inside his Epreuve de caractères, it is clear that the typographer reached to obtain a system for printing music with a single impression[75]. The introduction of this system by Rosart brought him little fame if compared with the one produced by Breitkopf.

Johannes Enschedé took over the work by Rosart. The Typecutter Joan Michael Fleischman, employed by Enschedé, created in 1768 his new set of music types, also echoing the work by Breitkopf. A specimen can be found in his Proef van letteren[76]. The mosaic created with his characters is tighter than Breitkopf's music font[77] as it was the tradition in Dutch typography to save space and paper[78]. The subdivision of the music signs is translated to the extremes, even when it is unhelpful: for instance, the treble clef is divided into five pieces, each corresponding to a staff line. This subdivision might be helpful for production means, but it is a useless feature from a notation standpoint.

Germany

J.G.I. Breitkopf was a very well-known printer and publisher. He was also a music player, and it was just a matter of time before he started thinking about initiating the activity of a music publisher. He was in touch with P.S. Fournier le Jeune and had many exchanges with him about the music font he was about to build.



Img. 20. Detail from a synopsis of characters in Breitkopf's music font, actual size, image from Illustrate Geshichte her Buchdruckerkunst (1882). Reprinted from Poole, 1965.

74. Poole, H.E. (1965–1966). *New music types: Invention in the eighteenth century,* I & II. *Journal of the Printing Historical Society*, 1 & 2.
75. Rosart, J.F. (1761). *Épreuve de caractères, qui jè gravent & fondent dans la nouvelle fonderie de Jacques-François Rosart, dédiée à Son Altesse Royale.* Bruxelles.
76. Enschedé, J. (1768). *Proef van letteren welke gegoten worden in de nieuwe Haerlemsche lettergietery van J. Enschedé.* Haarlem.
77. Poole, H.E. (1965–1966). *New music types: Invention in the eighteenth century,* I & II. *Journal of the Printing Historical Society,* 1 & 2.
78. Kinross, R. (2019). *Modern typography: An essay in critical history* (2nd ed.). Hyphen Press.

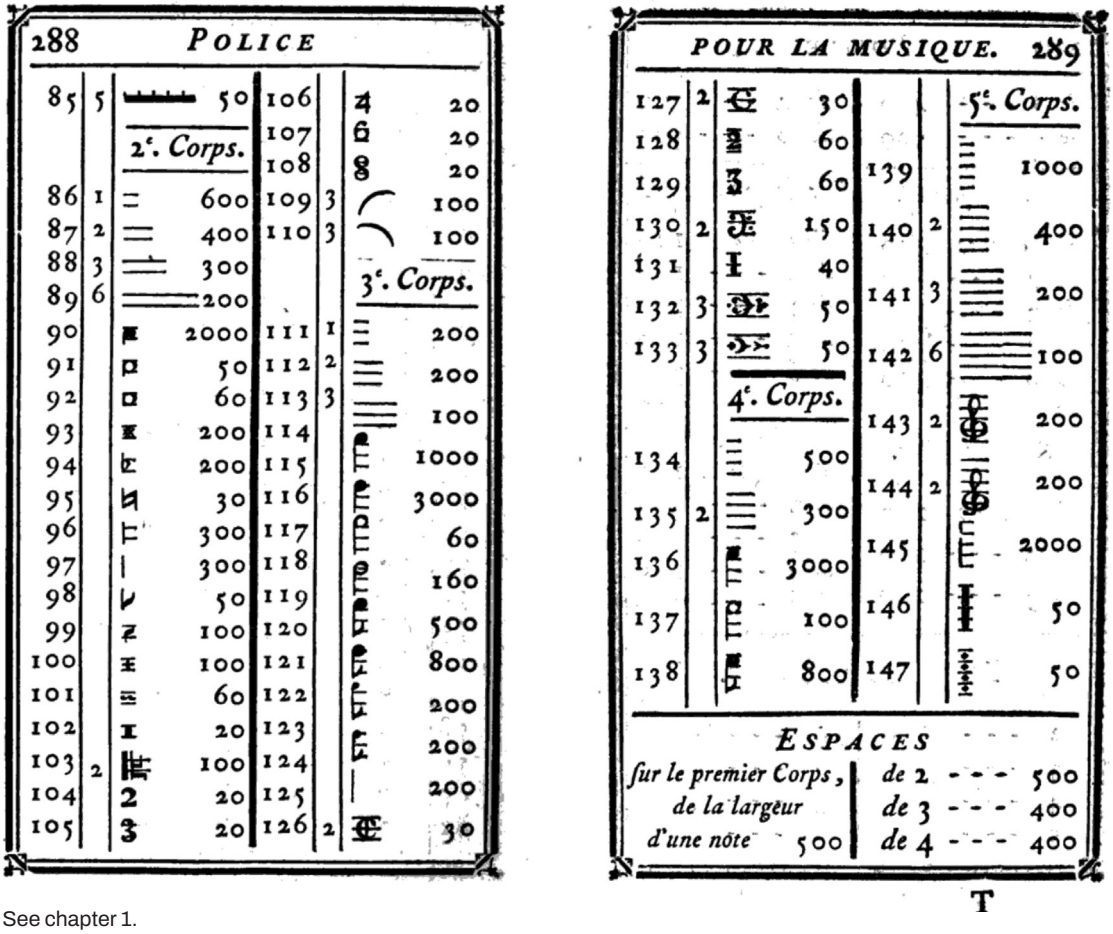
In 1816, Carl Tauchnitz introduced the stereotype technique in Germany [79], and he was the first to use it for publishing music scores. This technique allowed the typographer to reuse his type without worrying about keeping it in the frame for possible reprint, lowering production costs and improving the precision of the printed output.

Switzerland

In the historical treatise published by Reed[80] in 1887, the author claims in a footnote that the typefounder Wilhelm Haas the younger (1766-1838) in Switzerland was heading to the exact solutions adopted by Breitkopf for the new movable type for music, although no evidence has been found to back this claim.

France

Pierre Simon Fournier (1712-1768) was an important figure in the printing industry during the 18th century. He revolutionised the craft of font-making by setting a shared typographic scale. His work was inspired by the achievements of Breitkopf. The two typographers were in touch with each other and shared the solutions they came up with for music movable type. The typeface by Fournier was more versatile if compared to the Breitkopf's one. Breitkopf's font contained about three hundred characters. Fournier reduced the quantity to about one hundred sixty [81].


288 POLICE

2e. Corps.

3e. Corps.

POUR LA MUSIQUE. 289

5e. Corps.

4e. Corps.

ESPACES

sur le premier Corps, de la largeur d'une note 500

de 2 500

de 3 400

de 4 400

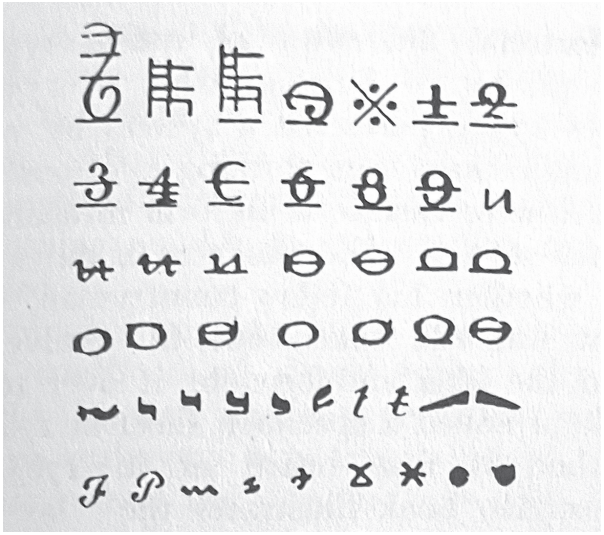
Img. 21. Spread from Fournier's manuel typographique.
The table shows the different characters along their casting number. Source gallica.bnf.fr / BnF

79. See chapter 1.
80. Reed, T.B. (1887). *A history of the old English letter foundries.* London.
81. Carter, H. (1973). *Fournier on typefounding.* Burt Franklin.

Nicolas Gando, type founder, born in Geneva early in the 18th century, resided first in Berne and then in Paris, where he established a foundry for a new musical type. His son, Pierre François, born in Geneva in 1733, was his assistant and successor. They published Observations sur le traité historique et critique de M. Fournier, etc.[82], showing that Ballard's process imitated Breitkopf's. It contained, amongst others, specimens of 6 pieces of ancient music printed by Ballard and a Psalm by Roussier in Gando's characters, and printed by his process, the notes and the lines requiring a different impression and the effect resembling copper plate. Fournier replied (see his 'Manuel typographique,' pp. 289–306), criticising the Gandos and their type, which was, however, superior to his own, though inferior to those of Breitkopf and still more to those of Duverger and others since. The father died in 1767, and the son in 1800, both in Paris.

England

Henric Fougt (1720-1782) was a Swedish printer and publisher active in London since 1767. In 1760, he developed his type system for printing music using just 166 characters, a very low number compared to other systems of the same age. The typographic system was more usable and presumably allowed to cut typesetting costs. Fougt is also famous for the low prices of his editions compared to the market price. Fougt used to sell music editions at one penny per page, or 18 for a shilling, far less than the sixpence a page which was the average price of music at that time, arousing friction with other sellers[83]. In 1770, after a legal dispute with another printer, Fougt sold his types to Falkener, who would continue to use them until 1780



Img. 22. Detail from the synopsis of characters by H. Fougt, taken by his patent (1767).
Reprinted from Gamble, 1923/R1971.

North America

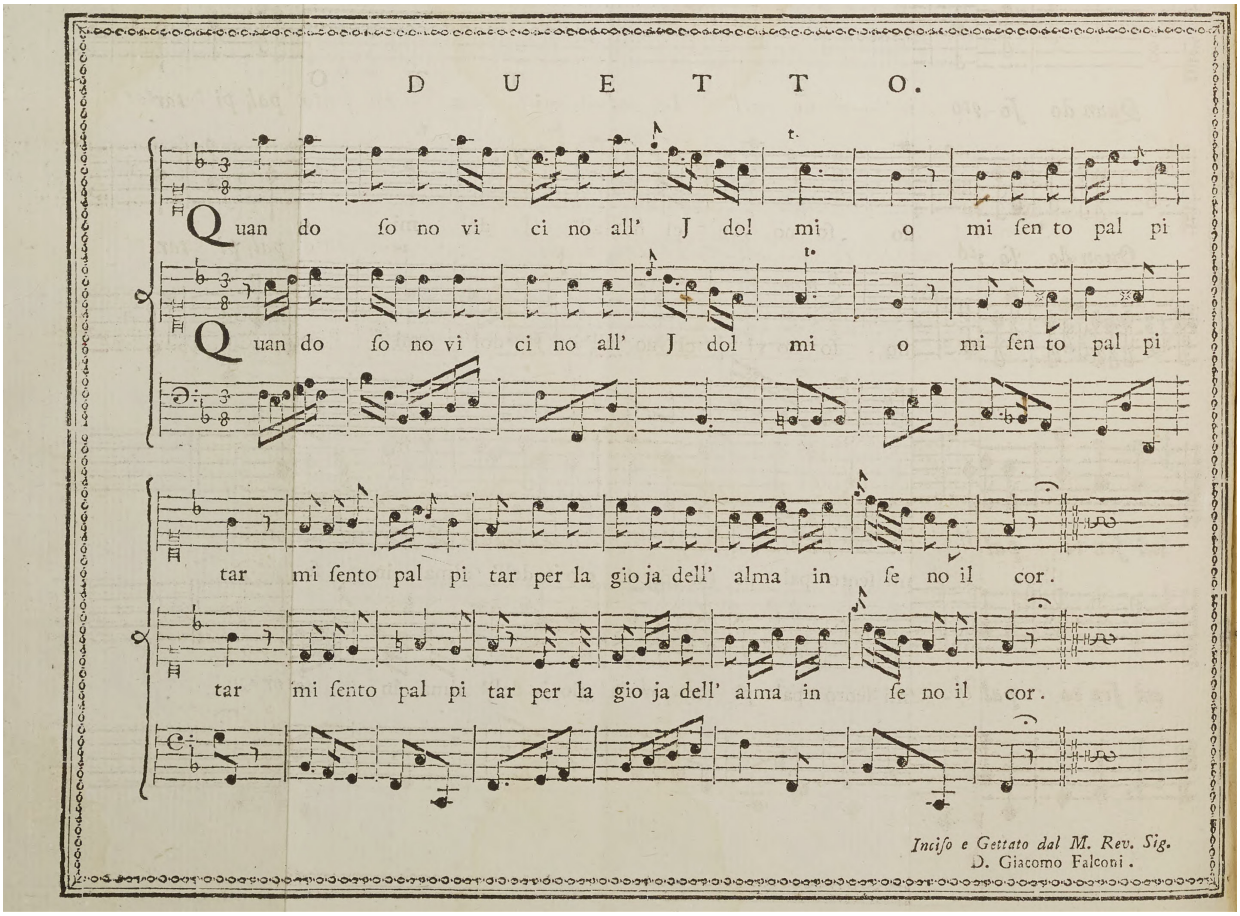
Music printing with movable type was also active in the new continent. However, it was mainly focused on sacred music and simple hymns for church and religious services.

82. Gando, N. (1766). *Observations sur le traité historique et critique de M. Fournier.* Paris.

83. Poole, H.E. (1980). *Printing and publishing of music.* In *The New Grove encyclopedia of music and musicians.* Macmillan.

Notable publications

During the second half of the XVIII century, many printers claimed to have achieved a new way to print music scores with movable type. They tried to substanciate their claims with small publications and specimens, describing the improvements over the system and the new possibilities available. Often the publication contained a small composition to show the layout with their typesetting and music font. The narrow publication by Giacomo Falconi, Manifesto d'una nuova impresa di stampare la musica[84] display what was produced by the author himself. He claims to have designed a new set of characters for music printing. A sample can be found at the municipal library in Lyon. Despite the short number of pages, the movable type for music featured many improvements. The book includes four music pages, two of which are folded to display music in a horizontal layout (much like in Bodoni's Manuale Tipografico).



Img. 23. Signed page from the specimen by Giacomo Falconi.
Source: British Library.

The short essay cites how some music editions were printed with old-fashioned notation instead of the current one. Despite music printing being a well-established practice, the author declared that handwritten copies were very frequent. He describes how copperplate engraving was emerging as a technique, but he also states that it was very time-consuming and not cost-effective, as the plate could not be recycled. In his publication, the author stated how the new types differentiate from the old ones still in use with the rhomboidal headnote. The publication includes two scores printed with old movable types and his new

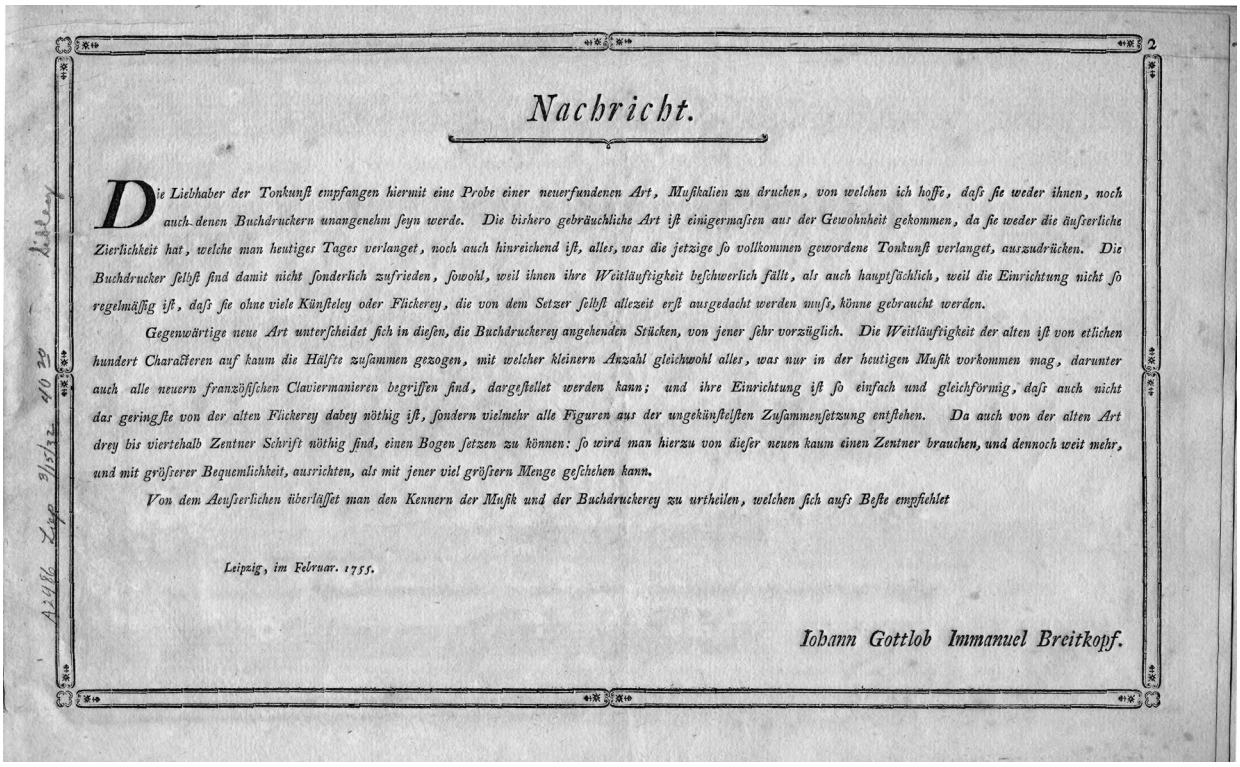
84. Falconi, G. (1765). *Manifesto d'una nuova impresa di stampare la musica in caratteri gettati nel modo stesso come si scrive.* A. De Castro.

ones.
Another series of publications that allows understanding the actual advancements in the field is the one composed by Pierre Simon Fournier le Jeune and Nicholas Gando. Soon after Fournier revealed his improvements in music type[85], Gando printed a reply[86] in which he accused the French font maker of copying the method developed by Pierre Ballard in the XVII century. The two will continue to publish essays to prove their thesis[87].
Meanwhile, in modern-day Germany, J.I. Breitkopf was also developing a music font of improved quality. Breitkopf and Fournier were in touch with each other and shared some information about their individual achievements. One of the first publications displaying Breitkopf's type is the score of the Opera *Il trionfo della Fedeltà*[88]. The volume opens with a preface from the printer himself, describing the work and the quality of the type used.

> *Preface — the adorers of acoustic art receive with this a sample of a newly invented manner to print music, which is hopefully not unpleasant for you nor for the book printers. The manner used until now has become more or less obsolescent because it has neither the formal neatness, which is wanted nowadays, nor the quantity of character to express everything that the acoustic art, which has become so complete, requires. The book printers themselves are displeased therewith because the vast extent is burdensome to them as well as mainly because the equipment is not so regular that it could be needed without much artificiality or patchery, which always has to be invented by the typesetter himself. The current kind is distinguished eminently from these pieces, which are concerning the printing office, to the others. The vast extent of the elderly are by several hundred of characters shrinked to barely a half of them, and with this little number, everything that is present in the music of nowadays can be posed, as well all the French piano manners; and it's installation is so easy and regular that not even the merest of the former patchery is necessary, but rather all figures are made by the unartificial composition. Because there are as well three to four and a half hundreds of lettering necessary to compose a bow: so for that a new one anyone won't need one hundred, but yet still much more, then what could happen with this larger quantity. [This publication is] Dedicated to the connoisseur of music and the book printers, which will be the best ones to judge from its appearance.*

Other already mentioned publications are the Manuel Typographique by P.S. Fournier le Jeune and the querelle with Nicholas Gando.

85. Gando, N. (1766). *Observations sur le traité historique et critique de Monsieur Fournier Le Jeune*, Berne.
86. Fournier, P.S. (1765). *Traité historique et critique sur l'origine et les progrès des caractères de fonte pour l'impression de la musique*. Paris.
87. Fournier, P.S. (1767). *Réponse à un mémoire publié en 1766 par MM. Gando, au sujet des caractères de fonte pour la musique*. Paris.
88. Gräfe J.F. & E.T.P.A. [Pastorella Arcada, E.T.]. (1756). *Il trionfo della fedeltà: Dramma per musica.* Leipzig: J.I. Breitkopf. The initials of Ermelinda Talia Pastorella Arcada, a name assumed for the occasion by Antonia Amalia Walburga, Princess of Saxony.



Nachricht.

Die Liebhaber der Tonkunſt empfangen hiermit eine Probe einer neuerfundenen Art, Muſikalien zu druchen, von welchen ich hoffe, daſs ſie weder ihnen, noch auch denen Buchdruckern unangenehm ſeyn werde. Die bishero gebräuchliche Art iſt einigermaſsen aus der Gewohnheit gekommen, da ſie weder die äuſserliche Zierlichkeit hat, welche man heutiges Tages verlanget, noch auch hinreichend iſt, alles, was die jetzige ſo vollkommen gewordene Tonkunſt verlanget, auszudrücken. Die Buchdrucker ſelbſt ſind damit nicht ſonderlich zufrieden, ſowohl, weil ihnen ihre Weitläuftigkeit beſchwerlich fällt, als auch hauptſächlich, weil die Einrichtung nicht ſo regelmäſſig iſt, daſs ſie ohne viele Künſteley oder Flickerey, die von dem Setzer ſelbſt allezeit erſt ausgedacht werden muſs, könne gebraucht werden.

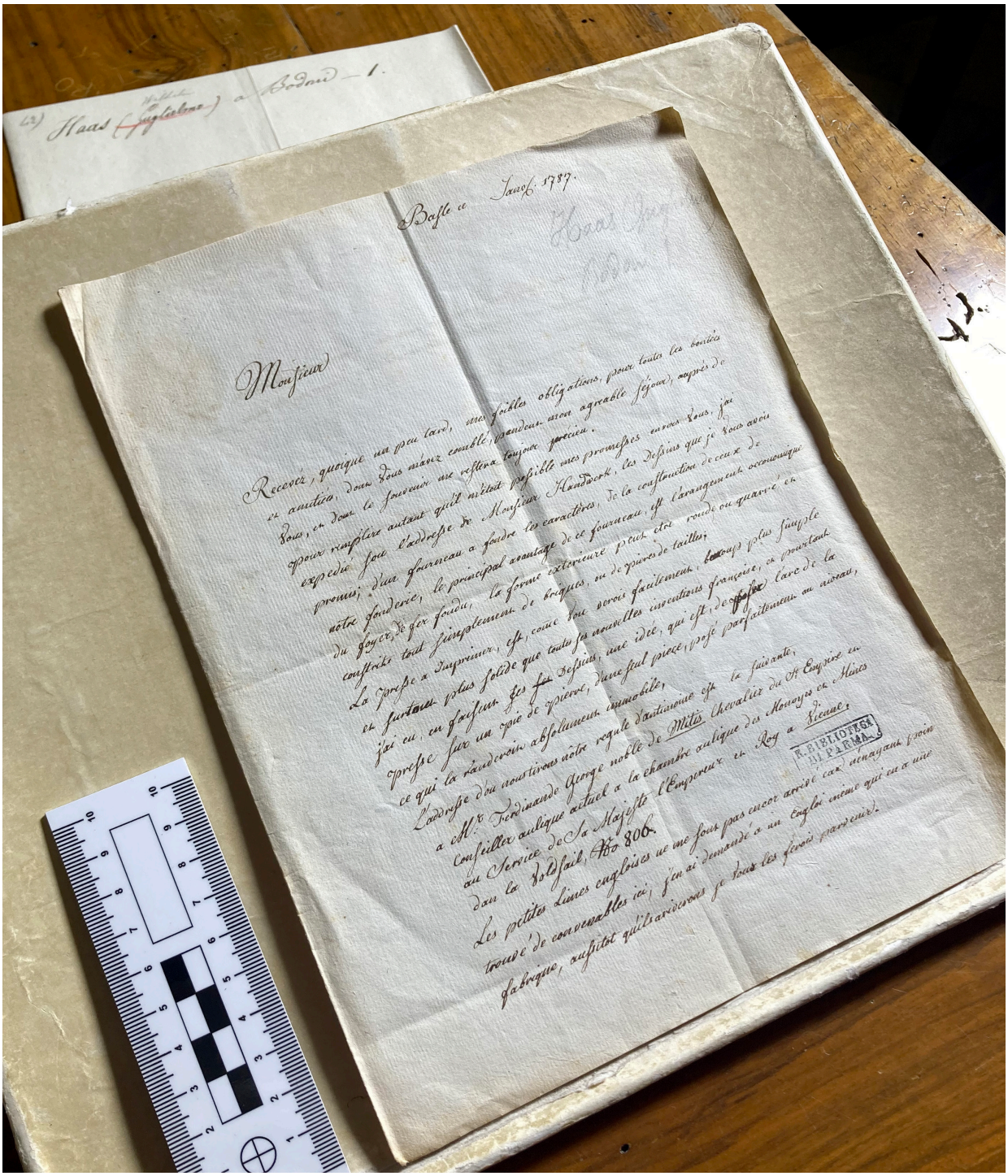
Gegenwärtige neue Art unterſcheidet ſich in dieſen, die Buchdruckerey angehenden Stücken, von jener ſehr vorzüglich. Die Weitläuftigkeit der alten iſt von etlichen hundert Characteren auf kaum die Hälfte zuſammen gezogen, mit welcher kleinern Anzahl gleichwohl alles, was nur in der heutigen Muſik vorkommen mag, darunter auch alle neuern franzöſiſchen Claviermanieren begriffen ſind, dargeſtellet werden kann; und ihre Einrichtung iſt ſo einfach und gleichförmig, daſs auch nicht das geringſte von der alten Flickerey dabey nöthig iſt, ſondern vielmehr alle Figuren aus der ungekünſtelſten Zuſammenſetzung entſtehen. Da auch von der alten Art drey bis viertehalb Zentner Schrift nöthig ſind, einen Bogen ſetzen zu können: ſo wird man hierzu von dieſer neuen kaum einen Zentner brauchen, und dennoch weit mehr, und mit gröſserer Bequemlichkeit, ausrichten, als mit jener viel gröſsern Menge geſchehen kann.

Von dem Aeuſserlichen überläſſet man den Kennern der Muſik und der Buchdruckerey zu urtheilen, welchen ſich aufs Beſte empfiehlet

Leipzig, im Februar. 1755.

Johann Gottlob Immanuel Breitkopf.

Img. 24. The preface from *Sonned auf das Pastorell Il trionfo della fedeltà*, music by Johann Friedrich Gräfe, printed by Breitkopf's workshops in 1755. Source: imslp.org – Public Domain



Img. 25. Original letter by Willem Haas to Giambattista Bodoni, document preserved at the Biblioteca Palatina in Parma.

Bodoni and his music font

About Giambattista Bodoni's contribution in music printing and publishing. A chronology of the events that led Bodoni to create his music typefaces, diving though the sources preserved at the Biblioteca Palatina in Parma.

Sources

Giovanni Battista, or Giambattista Bodoni, is one of the most influential and renowned figures in Italian typography and printmaking. His work revolutionised the printing trade, developing new tools and a typographically enduring aesthetic. Today, the name "Bodoni" is synonymous with modern typographic style, alongside the work of other well-known figures such as Firmin Didot (1764-1836) and Johann Julius Walbaum (1724-1799). Many publications dive in depth into Bodoni's life and accomplishments[89].

For the sake of this research, the work of Bodoni could be summarised in four phases: the early years in Rome, the work in the Reale Stamperia di Parma founded in 1768, the opening of Officina Bodoni in 1790, the last years from 1800 to Bodoni's death. He was son and nephew of printers and took over his father's enterprise after an apprenticeship at the Propaganda Fide, the Vatican printing house in Rome. Probably inspired by the great English typographer John Baskerville, he planned to move to England, but severe health issues eventually forced him to renounce his journey. In 1678, Bodoni founded the Reale Stamperia di Parma, working with the typefaces designed by Pierre Simon Fournier. This first accomplishment marks the beginning of the first phase of his working life. His most notable works in this period are characterised by a rococò style, heavily influenced by the work of Fournier[90]. The third chapter of his life began in 1790 when the Borbone family granted Bodoni to establish *Officine Bodoni*, a private foundry. This passage was a critical step for him in building his vast collection of tools and machines to cast his famous types. During his life,

89. See De Pasquale, A. (Ed.). (2013). *Bodoni (1740–1813): Principe dei tipografi nell'Europa dei Lumi e di Napoleone.* Parma: Grafiche Step.

90. Kinross, R. (2019). *Modern typography: An essay in critical history* (2nd ed.). Hyphen Press.

he managed to grab the attention of many significant figures of the time from Italy and abroad. As a result, his practice was well-established and famous all around Europe.
Several recurring publications, including many specimens of characters, mark Bodoni's activity. Bodoni began issuing them in 1771 with the first volume, *Fregi e majuscole*. This publication was then followed by *Essai de caractères russes* (1782) and than by his first *Manuale tipografico* (1788). It included 100 Roman types and 50 italic ones, from the small "Parmigianina" to the big "Papale" size. This first edition led Bodoni to develop his final Manuale, which would be eventually published in 1818 after his death. Among this kind of production, it is possible to add some specimens on free paper sheets that Bodoni was issuing as gifts to typographers from Italy and abroad.

The music scene in Parma

In 1768, Bodoni was introduced to the court of Duca Ferdinando di Borbone. In court, he met many artists who were active in Parma. Some of those artists will work with Bodoni in the following years to produce illustrations and engravings for his publications. One of the first music-related publication published by Bodoni was the libretto for the *Feste di Apollo*[91], an illustrated book about a musical performance that took place the 24th of August 1769 in the Teatro Ducale. The publication featured one of the most influential composers of the time, Christoph Willibald Gluck (1714-1787). Bodoni was able to build relationships with many musicians active in Parma, such as Giuseppe Sarti and Ferdinando Paer. He collaborated with them by printing librettos[92]. Bodoni's work allowed him to introduce himself in the music production sphere in Parma, and he established strong bonds with many artists and musicians. Some of those artists will then be close friends to him. It seems that Bodoni was genuinely interested in working for these music-related publications: composing and printing librettos was, for Bodoni, a way to diverge from the classical typographical standards to a more dynamic and articulated composition[93].
Bodoni was not a trained musician, but he often participated in the creation of many publications related to or linked to music. He was also a music lover who enjoyed music concerts. In a letter, Bodoni records one episode that testifies his passion for music: on the 26th of December 1801, some thieves entered Bodoni's workshop while the typographer was at a music concert. They managed to steal some valuable items, but Bodoni is relieved when he discovers they did not touch his matrices and punches. As found through the letters between him and Giovenale Sacchi, he decided to include music publishing in its range of expertise. With the commission by Giovenale Sacchi, Bodoni probably saw an excellent opportunity to be further involved in the music environment. He probably understood that, by producing the right tools for publishing music scores, he could use his links with the composers and musicians in Parma to

91. *Le feste d'Apollo, celebrate sul teatro di corte nell'agosto del 1769 per le auguste seguite nozze tra il reale infante don Ferdinando e la R. arciduchessa infanta Maria Amalia,* libretto di musica a stampa, Giambattista Bodoni, 1769.

92. Including the aforementioned *Feste di Apollo* in 1769, *Gare degli amanti*, music by Gian Francesco Fortunati, 1772; *Alessandro e Timoteo*, music by Giuseppe Sarti, 1782; *I pretendenti burlati,* music by Ferdinando Paer, 1793.

93. Ajani, S. (1964). *Bodoni e la stampa della musica*. Excerpt from Graphicus, July–August 1964.

start new collaborations. Despite this perspective, producing the music fonts was a low priority for Bodoni. As reported by Gaspare Caroli in one of his letters, Bodoni himself stated that he was too busy with other work. Even with the complexities of designing and casting the music system, the types for music created by Bodoni remained almost unused.

Bodoni's music font

The literature about the music font by Bodoni is very narrow. The only two articles that tries to cast a light about this topic are Ajani[94] and Moschini[95]. The general literature about Bodoni often mentions that he was dealing with music notation among all the other scripts. However, only some articles and publications try to develop this matter. The difference between standard typography and music publishing fields causes this detachment. The interest in Bodoni's figure is mainly focused on the pure typographical field. Furthermore, the lack of music literacy among the experts of Bodoni's work may have caused the lack of opinions about Bodoni's work for music notation. Despite that, Bodoni is mentioned in the Dictionary of Italian Musical Editors 1750-1930[96]. The entry in the dictionary states that Bodoni publishes no known music editions. It acknowledges six samples of music printouts: the hymn O delle scene italiche lume, delizia, onore, dedicated to the singer Eufemia Echart, a single paper sheet without a date, containing a plate with an Andantino for guitar *Non odi il Voto unanime* and a poetry over two columns (1801); a single paper sheet without date containing the air for guitar titled Ho già penato crudel Brunetta (1805, maybe a printing draft for the composition with the same title included in the Manuale); the three examples collected in the second volume of the Manuale Tipografico; four engraved plates in the edition of the tragedy Cleonice[97].

Having cast a massive amount of punches for foreign and historical scripts, the idea of casting and producing a font for music can be seen as one of the many pieces that complete Bodoni's bigger picture: building and expertise in all the possible typographical fields and environments. Bodoni was already an expert on typecasting issues, and the recent previous experiences of J.E. Breitkopf and P.S. Fournier le Jeune guided him in this new environment for music. The many challenges in casting typefaces for music pushed Bodoni to try to perfect this printing technique. As stated in his Manuale, Bodoni cut three different typefaces: plainchant notation (double impression), modern notation with double impression technique, and modern notation with single impression technique. Ajani mentions that the body size of the characters for music was 26pt, but this measure does not cope with the modular nature of the typeface. Supposing to use the Fournier point (approx. 0.345mm), the 26pt size appears slightly taller than the height of the staff line. The size mentioned by Ajani cannot be fully trusted as it is plausible that the height of the pieces that would compose the staff lines would extend this measure. Apparently, at the time, there wasn't a common way to refer to type size for music type. The typographic system for music could not

94. Ibid.

95. Moschini, D. (1995). *Gli indiavolati caratteri.* In G. Bertero (Ed.), *La collezione bodoniana della Biblioteca Civica di Saluzzo* (pp. 36–57). Altieri.

96. Besutti, P. (2019). *Bodoni, Giambattista.* In B.M. Antolini (Ed.), *Dizionario degli editori musicali italiani 1750–1930* (pp. 81–83). Edizioni ETS.

97. *I tentativi dell'Italia; cioè Eduigi, Cleonice, Irene, e don Rodrigo.* Tragedie del conte Alessandro Pepoli, Stamperia reale, Parma, 1783.

be measured in the same way as text type. Generally, music mosaic type had a wide variety of sizes within the same set. The name of the sets often described their function, and there was not a wide variety of sizes compared to text type. Only in the 19th and 20th centuries typographers did begin to adopt the same names used for text type sizes, despite the very different context of use[98]. The music fonts developed by Bodoni had little history in commissioned work. The only sample of actual publication outside his Manuale Tipografico is in Principj di canto fermo, o sia gregoriano[99], printed in 1832 (well beyond Bodoni's death), which contains samples written in plainchant notation with four or five lines. As stated earlier, when Bodoni produced his music fonts, music from movable type was created by single or multiple impressions (staves and notes printed together or separately). Heavily influenced by Fournier, Bodoni cut and cast different sets for double impression and single impression techniques. He will then print two pages with those types in his Manuale Tipografico. The font is remarkable in many aspects. It includes a wide range of characters, including slurs and beamed tails. Despite that, the characters feature some economy over the character, such as the clef signs. Each piece of type varies widely in dimensions and shape and displays a high quality of details. The specific attributes of the system are analysed in the next chapter.

The Biblioteca Palatina

Located at the Palazzo della Pilotta, at the core of Parma, the Biblioteca Palatina is home to most of the Bodoni's heritage. Some of these materials are on display at the adjacent Museo Bodoniano. The library was founded in 1761 by the Duces Filippo and Ferdinando Borbone. Thirty years after Bodoni's death, following the death of his wife Margherita Dall'Aglio, the librarian Angelo Pezzana convinces Maria Luisa di Borbone to purchase the entire kit of matrix and punches for the modest sum of 50.000 lire[100]; the collection includes 22.618 punches and 42.148 matrices from 289 different typefaces, and also mould, presses, clamps, typographic lines, and many other tools, for a grand sum of 76.000 pieces. In 1847, Duchess Maria Luisa also purchased the correspondence owned by Bodoni with about 12.000 letters. These letters are a precious reference to understand the backstory, the challanges and the struggles in Bodoni's activity.

98. Gamble, W. (1923/R1971). *Music Engraving and Printing: Historical and technical Treatise,* London.

99. Mattei, G. (1832). *Principj di canto fermo, o sia gregoriano, scritti pei cherici d'onore del S.A.I.O. Costantiniano di S. Giorgio / dal Cappellano Costantiniano G.M.G.* Parma : co' tipi Bodoniani.

100. De Pasquale, A. [edit] (1740-1813). *BODONI Principe dei tipografi nell'Europa dei Lumi e di Napoleone,* Grafiche Step editrice, Parma, 2013.

Sources

The Biblioteca Palatina preserves most sources for understanding the order of the events that led to Bodoni's music fonts. The following are the source objects of this fieldwork.

DATE	SOURCE
1778	Letter from Gaspare Caroli to Giovanni Battista Martini
1781-1786	Letters from Giovenale Sacchi to Bodoni
1787	Letter from Willem Haas to Bodoni
1804	Letter from Francesco Fortunati to Bodoni
1818	Introductions of the Manuale tipografico

Table 2. List of analyzed sources.

By analysing these sources, it is possible to roughly understand when Bodoni worked on his music type and how this set evolved.

The letter by Fortunati

The letter by Gian Francesco Fortunati (1746-1821) is unique because it allows a rough dating for the production of the music types by Bodoni. Fortunati was a well-known figure in the music scene in Parma during the second half of 1700. He was the director of the singing school in Parma and was appointed conductor for the orchestra of the Ducal Theatre. The two already knew each other as Bodoni was also in touch with different figures from the musical scene of Parma. In the letter that Fortunati wrote to Bodoni in 1804, he mentions the type for music, and he stated that Bodoni "invented" those types "25 years ago"

> *You addressed, few days ago, to order a page of music of a difficult kind, to publish it with your astonishing movable type, alredy invented by you 25 years ago [...]. I know that in Paris, a remarkable artist of your same grade, after 11 years of restless activity, has recently created something of that genre that you, I repeat, 25 years before, perfectly succeded in just few months*[101].

He then continues his letter thanking Bodoni for commissioning him "a page of music of a difficult kind". The piece of music was intended to be used for the pages of the Manuale, which address music notation. Fortunati writes that he saw the set of types and found it beautiful. However, the music for the Manuale Tipografico was yet to be composed.

101. "Ella degnossi, pochi giorni sono, di ordinarmi un pezzo di musica qualunque, ma di genere difficile, per pubblicarlo poscia colli sorprendenti suoi caratteri, già da lei medesima inventati venticinque anni sono [...]. So che a Parigi, un valente Artista della sua classe dopo undici anni di irrequieta occupazione, ha dato recentemente alla luce qualche cosa in questo genere nel quale, ripeto, 25 anni prima, ella non si occupò che per pochi mesi, e ne riescì alla perfezione".

Letter from Caroli to Martini

The letter from Gaspare Caroli (first Double Bass of the R. Concert at the Court of Parma) to the priest Giovanni Battista Martini is dated 1778 and proves that Bodoni was already working on some tests for the music characters. The letter describes how Bodoni struggled to work on the music types: his efforts were primarily focused on his main duties with the publication for the Royal Court, and he could only dedicate a few efforts to his desire to print music. In the same letter, Caroli states that he asked Bodoni if he would like to print a music publication and that he saw the drafts of the characters, finding them good.

The letter and the meeting with Haas

Bodoni's relationship with Willem Haas (1741-1800) could be meaningful as the latter was supposedly working on a project for a music font[102]. He and Bodoni could have exchanged their opinions and discoveries on the matter. Haas was the son of a typefounder with an active printing enterprise in Basel. After acquiring his father's business, he was the author of many innovations in typographic tools and machines. Haas travelled to Italy in 1786 with the precise intent of meeting Bodoni. However, his main interest was not involving the types for music. Instead, he tried to get clues on Bodoni's smoothing press to produce the smooth paper. As mentioned in earlier chapters, producing smoothed paper was essential to achieve a detailed print, allowing the casting of typefaces that are rich in detail. Bodoni revealed the technology behind the press, and Hass used it to make his machine and extend its capabilities. Bodoni will continue to reach Haas to produce smoothed paper[103]. There is no evidence that the two shared information about music type, but it is plausible that they knew each other's work. It is a matter of fact that Bodoni had already worked on his music fonts when he met with Haas. The unique letter by Haas stored in the archives of the Biblioteca Palatina is dated 1787 (after his trip to Italy), and it contains information referring to a particular and convenient oven for melting the metal (maybe an exchange over the information that Bodoni passed to Haas about the smoothing press). In his letter, Haas sends the address of Ferdinando de Mitis, a printer active in Vienna.

The letters by Sacchi

Giovenale Sacchi (1726-1789) was a musicologist and churchman of the Barnabiti order. The letters by Giovenale Sacchi to Bodoni are dated between 1781 and 1785, and they are extensively discussed in the article by Moschini[104]. In his letters, Sacchi is intensely interested in publishing with Bodoni a series of compositions by various artists in the style of Benedetto Marcello. It seems that the prospect of this work lighted the fuse that led Bodoni to cast his types for music. This assumption is more or less consistent with the dating implied by Fortunati's letter (which dates the type to around 1780). It has to be noted that Bodoni might have started working on these types before the first letter by Sacchi, as stated in the letter by Caroli dated 1778. In his letters, Sacchi ar-

102. Reed, T.B. (1887). *A history of the old English letter foundries: With notes.* London: Elliot Stock.

103. Bruckner, F. (1954). *Schweizer Stempelschneider und Schriftgiesser: Ein Beitrag zur Geschichte der Typographie in der Schweiz.* Zürich: Zollikofer & Co. AG.

104. Moschini, D. (1995). *Gli indiavolati caratteri.* In G. Bertero (Ed.), *La collezione bodoniana della Biblioteca Civica di Saluzzo* (pp. 36–57). Collegno: Altieri.

gues that in Italy, no one prints music with the aesthetic of modern-day notation through type and that the first to start this activity would have significant commercial and economic growth. In the previous chapter, the chronology of the events proves that some printers were already involved in printing music with modern notation in Italy. However, it seems that Sacchi was not aware of it. He could also be keen on printing with a famous and recognised figure such as Bodoni. Unfortunately, there is no trace of Bodoni's replies in the archives. However, by evaluating the letters by Sacchi solely, it is possible to understand how the system grew and evolved. The letters include requests for corrections, meaning that during these four years, the exchanges from Bodoni to Sacchi included some print proofs. The corrections were both on the type-design side (shape and size of the characters) and the typesetting side (request to have even line breaks due to the fatigue of changing lines for the musicians). Of course, these corrections could only be addressed by a trained musician. In 1784, the exchanges between Sacchi and Bodoni started to get cold. It seems that Bodoni asked to advance the money for the work, as he had already spent money in advance on creating the type and working on the printing proofs. To achieve his goals without anticipating the money, Sacchi writes to the Duke of Parma, hoping the Duke would press Bodoni to continue the work. Eventually, Sacchi drops the possibility of printing with Bodoni, and he will publish instead abroad in France (after a failed negotiation in Lipsia). His edition will finally be printed with engraved plates. Even after publishing his work in France, Sacchi writes to Bodoni, arguing that

> *[...] if he* [Bodoni] *had completed the task, he would have done a better job.*

A complete analysis of the letters and the original samples can be found in the article by Moschini[105].

Introductions to the Manuale tipografico

The *Manuale tipografico* summs up Bodoni's work and expertise. His last edition of the Manuale was published in 1818, 5 years after he died in 1813. The Manuale Tipografico, the summit and summary of all his work and expertise, was printed upon the diligent supervision of his widow Margherita Dall'Aglio. It contains specimens of 665 different alphabets and a series of around 1,300 friezes. Unlike the Manuel Typographyque by Fournier, this Manuale is not meant to be a technical volume. Bodoni himself states at the beginning of his introduction to the reader:

> *It is not my worry to deal with the machines, and to teach the* [printing] *art to those who want to practice it*[106].

The publication, one of the first of its kind, is designed to showcase the beauty and variety of Bodoni's work in a comprehensive catalogue of typefaces. The Manuale's true and real subjects are Bodoni's letterforms. The Manuale is set in two volumes. The first one contains chancery, English typefaces, and Latin cap-

105. Ibid.

106. "Né però mio pensiero è di trattar de' mezzi meccanici, e insegnar l'arte a chi vogliala esercitare", Bodoni, G. (1818). *Manuale tipografico* (2 vols.). Parma: Stamperia Reale.

ital letters. The second one is composed of Greek, exotic, Gothic, and Russian types, as well as countless flourishes and types for music printing. In addition, the Manuale contains three introductions, two by Bodoni's widow (one to the Queen and one to the readers) and one introduction composed by Bodoni himself before his death. In her Introduction to the reader[107], Margherita Dall'Aglio added a paragraph about the music typefaces, emphasising how they had their peculiarities.

> *[...] He did not, however, omit the Musical Characters, which, in addition to the mentioned numerous series of scripts of many forms and languages, he also wanted to engrave, overcoming the great challenges in cutting and casting the two kinds of notations, plainchant and modern. Of the latter, he offers two kinds to the public; one kind in which the lines are printed first, and then the notes, of which the composite plate was done aside and substituted the lines that are lifted from the press and with great precision was placed in its place so that with the second impression on the page already marked with the lines, the notes would find their place on the space or on the line that they have to fit precisely: an operation that requires great accuracy for the part of the press. In the other [kind of music], there is the advantage of the missing second impression, as the notes and the lines are printed in a single strike; but for the extreme precision it requires in all its parts, the cut of the punches is very complicated. He [Bodoni] said this difficulty consists of making sure that all the parts would connect so well that, once sorted all together, the perpendicular, vertical and oblique lines would meet accurately and produce a perfect whole. The proofs of these Musics brings the Manuale to the end*[108].

The introduction to the reader by Bodoni, explains the ideals of beauty that inspired Bodoni in his work. However, unfortunately, it is not revealing clues about the music fonts. The topic is just mentioned at the end of the introduction, citing "the typographical difficulties of the plain chant and modern notations"[109], but it does not go in detail about the subject.

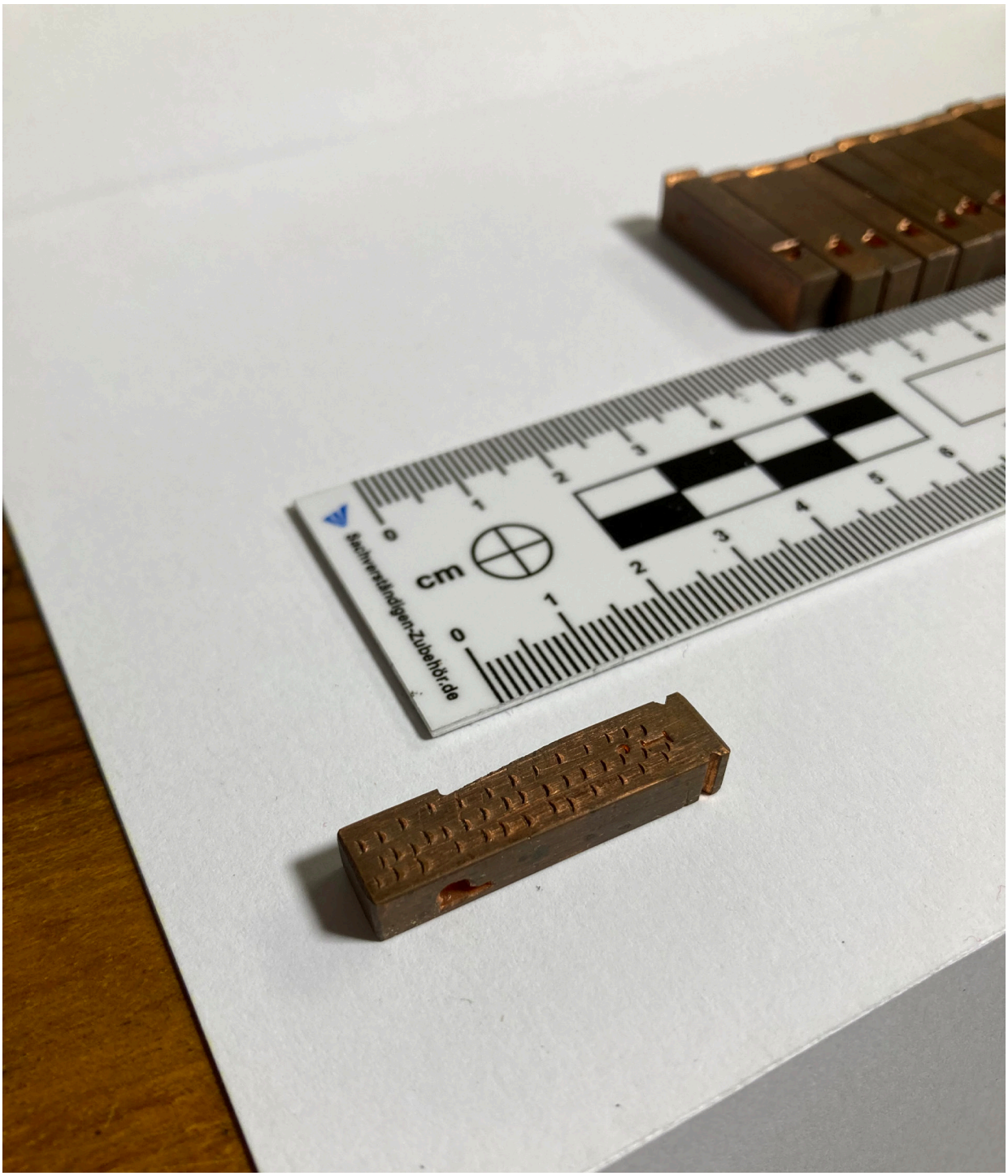
107. Ibid.

108. "[...] Non furono però omessi i Caratteri Musicali, che, oltre le enunciate numerose serie di alfabeti di tante forme e di tante lingue, volle pure incidere, superando le grandi difficoltà che si incontrano nell'intaglio e nel getto delle due Musiche Gregoriana e Figurata. Di quest'ultima, due sorti ne offrì al Pubblico; una in cui si stampano prima le linee e poi le note, la composizione delle quali è fatta a parte per essere sostituita a quella delle linee che levasi dal torchio, e con grande esattezza viene posta in suo luogo, affinchè con la seconda impressione sul foglio già rigato tutte le note si trovino o nello spazio, o nella riga che devono precisamente occupare: operazione che richiede accuratezza grandissima per la parte del torchio. Nell'altra vi è il risparmio della seconda tiratura, poichè le note e le linee sì imprimono in un sol colpo; ma per l'estrema precisione che esige in tutte le sue parti, assai complicata e difficile ne riesce l'incisione de' punzoni: e questa difficoltà consiste, diceva egli, nell'attenzione che tutte queste parti siano prese talmente bene, che, unite poi insieme, i tratti perpendicolari, orizzontali ed obliqui s'incontrino esattamente, e producano un tutto perfetto. Le prove di tali Musiche mettono fine al Manuale". Ibid.

109. "Ma troppo tutt'ora questa mia prefazione sarebbe lungi dalla fine, se degli altri due generi [di tipi] similmente volessi discendere ai particolari, [...] o alle tipografiche difficoltà delle due musiche, Gregoriana e figurata]". Ibid.

The events

Besides the details being uncertain, the research on these sources can affirm that Bodoni started his work for the typefaces for music a few years before 1780. He then continued to work on his sets between 1780 and 1785, producing some drafts for Sacchi. Bodoni was genuinely interested in the matter but was also attracted by the potential commissions, as stated in the letters by Sacchi. Perhaps this same experience with Sacchi discouraged Bodoni from accomplishing a complete music publication: the corrections and the increasing costs for producing the first drafts drained time and money. Bodoni was probably also frustrated that the musical lines did not allow him to handle the typesetting and the use of white as he used to do in other works. The unique utilitarian role of the music score prohibits shifting the layout without obstructing the ability to read the notes correctly. Finally, in 1785 Bodoni started to complain about Sacchi. According to his letters, his work was turning out to be unprofitable. The letters by Sacchi and by Fortunati describe the sets of type as highly valuable, and the writers describe their disappointment over the fact that Bodoni was not keen to use them to publish new scores.



Img. 26. The side of a Matrix (facing up) of a quarter-note head from the typographic set for music by Bodoni preserved at the Biblioteca Palatina.
It is possible to note signs of rasping and a number engraved (1) with a dot on top.

Analysis

Exploring Bodoni's music fonts and printed outputs displayed in his Manuale. Description of the sources, methodology and process used to find the typographical patterns in the printed specimens.

Primary sources

The primary sources for this research are located at the Biblioteca Palatina. The content of the following paragraphs is based on the analysis of these items.

DATE	SOURCE
1780	Matrices and punches for music characters stored at the Biblioteca Palatina[110]
1818	Pages of the Manuale Tipografico devoted to music notation[111]
1843	The inventory of the tools owned by Bodoni[112]

Table 3. Items analyzed from the collection at the Biblioteca Palatina

The analysis took place in the Biblioteca Palatina and reflects the direct observations of the sources, along with further research on the digitised samples collected during the fieldwork. The investigation of the musical samples focuses only on the features that pertain to typographic or typesetting topics and layout peculiarities. Therefore, it will not address the scores' purely musicological or compositional aspects.

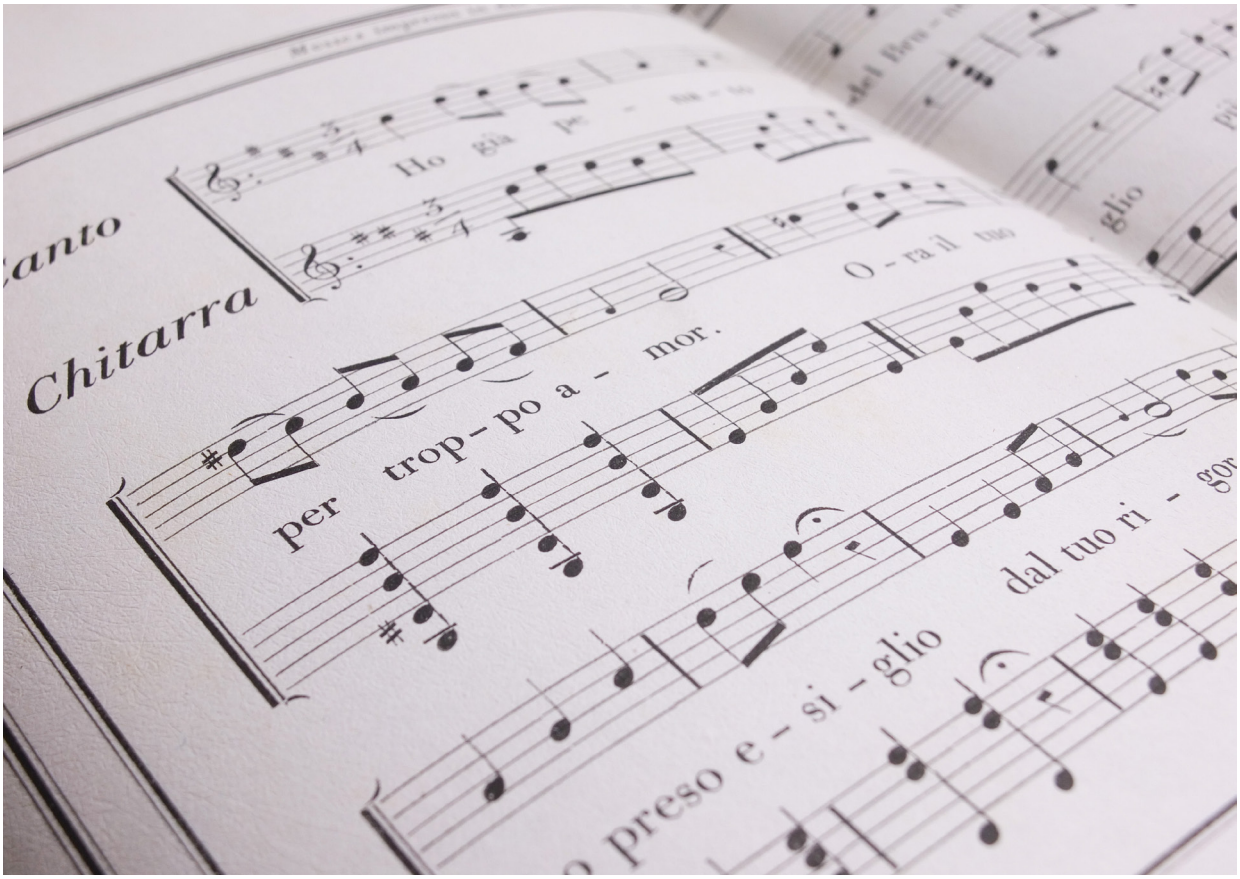
110. Locations: "D1 ultima basso", "D1 penultima basso", "D2 cassetto 1", "D2 cassetto 2", "D2 cassetto 3", "D2 cassetto 4".

111. Bodoni, G. (1818). *Manuale tipografico* (pp. 273–275). Parma.

112. Dall'Aglio, M. (Ed.). (1943). *Inventario della collezione dei polzoni, matrici, ed altri oggetti relativi all'arte tipografica del cavaliere Giambattista Bodoni ora appartenenti alla sig.ra vedova.* Parma.

The music scores in the Manuale

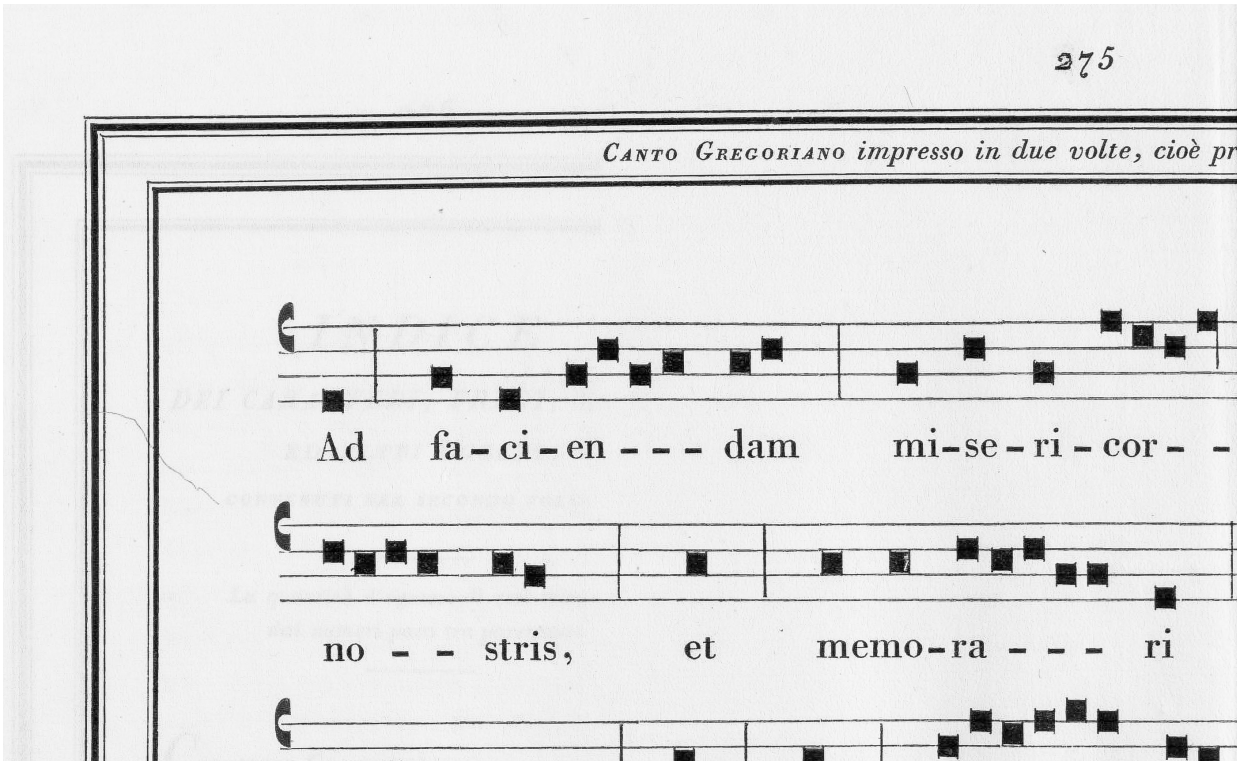
As mentioned in earlier chapters, the very last pages of Bodoni's Manuale are devoted to music notation. They feature specimens of mensural and modern notation. Differently from the samples by other typographers[113] , These pages unfold horizontally, resulting in a landscape orientation. The possible reason for this layout is to prevent line break fatigue for the musician and to facilitate typesetting. It is possible to find a similar approach in Breitkopf's work[114]. Having a different page size for the rest of the publication, Bodoni (or the workers supervised by Margherita Dall'Aglio) invested time and effort in binding these oversized pages and folding them inside the *Manuale*. Bodoni wanted to show off the most readable and reliable notation for his score specimens. The page layout put the scores at the centre of the page, surrounded by classical Bodonian frames. Between the frames, the page includes explicative titles: *MUSIC printed in two times, hence first the lines, and then the notes*[115], *Music printed only one time, hence the lines together with the notes*[116], and *Plainchant printed in two times, thus first the lines, and then the notes*[117]. The paragraphs below will refer to these pages as *Aria* (page 273), *Minuetto* (page 274) and *Plainchant* (page 275).



Img. 27. Giambattista Bodoni, Manuale Tipografico, closeup of the Aria score. The folding reveal the full score. Image taken during the fieldwork at the Biblioteca Palatina.

113. See Fournier and Fleischmann.
114. Gräfe J.F. & E.T.P.A. [Pastorella Arcada, E.T.]. (1756). *Il trionfo della fedeltà: Dramma per musica.* Leipzig: J.I. Breitkopf.
115. Bodoni, G. (1818). *MUSICA impressa in due volte, cioè prima le linee, e poi le note,* in *Manuale tipografico* (273). Parma.
116. Ibid. *MUSICA impressa una sola volta, cioè le linee insieme colle note* (274).
117. Ibid. *CANTO GREGORIANO impresso in due volte, cioè prima le linee, e poi le note* (275)

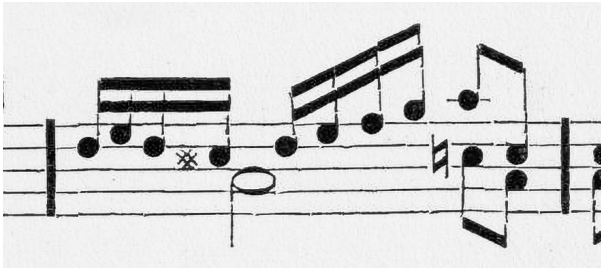
The Plainchant score displays a monodic melody. The text seems taken from a "Benedictus" chant. Each music line ends with a fraction of the bar, including the Custos, a sign that refers to the pitch of the first note on the new line. Being four-line staves, the distance between the staff lines is visibly higher than in the other scores with modern notation. The flat sign in the last line has modern traits and does not fit with the overall notation style. This score shows significantly how the textual components (lyrics) could work evenly with the details of the notation. The distinctive thin serifs of Bodoni's letters in the text lines match perfectly with the detailed corners of his squared notes. This score is relatively simple if compared to the ones with modern notation. Despite the neumes in the Gregorian chant notation could be fairly complex, in this page there are no articulated neumes. Due to the overall simplicity of the score, Bodoni needed very few characters in his type system. The score's typesetting and printing processes were probably less laborious than those required for the modern notation scores. Unfortunately, the score includes only simple notes (longa, breve and semibreve, with rests between the notes), and there is no trace of other characters among the preserved punches and matrices. Bodoni did not seem to foresee many other characters (the system lacks some of all the possible metrics), at least for his specimen. Having more characters would have significantly improved the system, but it would also have increased its complexity.



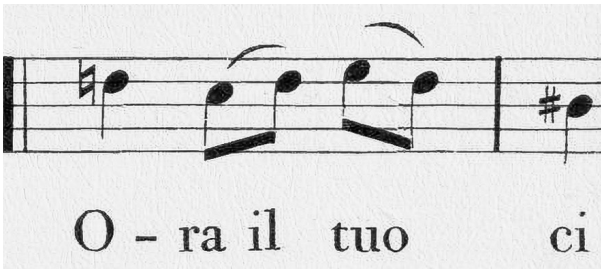
Img. 28. Giambattista Bodoni, Manuale Tipografico, detail from the Plainchant page.

The pages with modern notation contain a rather more elaborated output. They display two scores, a *Minuetto for keyboard* and an *Aria for voice and guitar*. The musical genres of these two scores (keyboard and chamber music) were highly in vogue in the late 1700s. Therefore, the composer of the scores may be trying to grab the readers' attention with a background in music education. The resulting message is clear: Bodoni's music fonts are suitable for publishing precious and bestselling music scores, paired with the typographical beauty that distinguishes the publications by his Officina.

In general, the notational content of the two scores follows the standard conventions of Western music notation, consolidated through late 1600. However, several aspects deserve some attention, not just from the notational standpoint but also from a typographic and layout view. First, the two scores display similar but not identical characters and show substantial differences in style and typesetting. These differences reflect the peculiarities of the two typographic systems designed for single or double impressions. The noteheads of the Minuetto are narrow and almost circular, while the Aria features wider drop-shaped noteheads (perhaps with a more modern-looking shape). The roots of this choice might be that the set for double impression does not need intricate joints and allows a broader and less forced horizontal shift. This ample space was, of course, causing less graphical congestion and was preferable to the eye. As a result, the score is much less stiff compared to the Minuetto. The "rest" characters are different between the two scores. The quarter rest in the Minuetto displays a terminal with an almost calligraphic trace. Differently, the quarter rest in the Aria is more constructed, becoming practically identical to the octave rest, which has the same but mirrored drawing. The accidental signs also present substantial differences. The presence of more modern-looking sharp signs in the Aria reveals some clues about the publication that Bodoni was working on with Giovenale Sacchi. Sacchi advises on the accidental signs in the letters between him and Bodoni. He asks for longer stems on the natural symbol and a more visible sharp sign[118]. It is impossible to know if the pages of the Manuale include these corrections. However, it is possible to speculate that Bodoni tried to apply Sacchi's corrections only in the double impression set because the sharp signs differs in the two scores. Thus, the corrected characters presumably appear only in the Aria score. If this hypothesis is confirmed, it would be clear that Sacchi and Bodoni identified the types for double impressions suitable for Sacchi's score production.



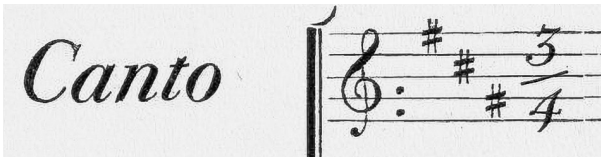
Img. 29. Sharp and natural sign of the Minuetto score, 150% enlarged.



Img. 30. Sharp and natural sign of the Aria score, 150% enlarged.

118. G.S., Milano, 18 June 1781.

Unlike the Minuetto, the Aria features a line of text for the singing voice that fits elegantly between the staves. The page with plainchant notation displays the clefs signs across every scoreline. Differently, the modern notation scores hold the clef signs only on the first line of the score (the lower staff of the Minuetto has multiple clef changes, but it still lacks the clefs at the beginning of every line, as it is used nowadays). The same happens for the key signature. About the key signature, the upper voice of the Aria correctly holds the F, C and G sharps signs, but the lower voice has an unexpected D sharp, which is supposed to be F. This typesetting mistake reveals the difficulty for the (type) composer in dealing with this set of types for double impression. Despite being more flexible, the system did not allow for precise visual reference for the pitch while typesetting the notation. Only an accurate control of the modular design would let the composer get the correct pitch (vertical position) for each sign. The treble clef holds two dots over the fourth line of the staff, indicating the G, with the same function in the Bass or Alto clefs. However, as the evolution of the clef signs testifies[119], this design is inappropriate for the treble clef and there's no reference to other publications holding this peculiar clef sign.



Img. 31. Detail of the Aria part, 150% enlarged. The detail shows the treble clef design with two dots. The detail also shows an unusual indication of the sharps in the key signature (maybe due to typographic constraints). The beginning of the score also presents an unusual typographic solution for the time signature, with italic figures.

Img. 32. Time signature, detail from the page of the Minuetto, 150% enlarged.

The two pages with modern notation display the same 3/4 time signature. The time signature of the Aria page contains numbers in Roman cut, with the terminal parts that fall above and below the staves. Some French publications produced a similar output[120]. The Aria part displays elegant italic numbers, separated by a tilted fraction sign, which is unusual for a modern score. There is no sign of the matrices for these two signs. Bodoni probably borrowed them from another set of figures. Either way, this time signature style represents a rather unusual choice. The same time signature could be found in some Dutch productions[121]. Both the scores hold many issues with the ledger lines: these are often offset from their vertical position, shrinking the usual space between the lines to save vertical space. For the Aria, lower B and lower A lay at almost the same height in the upper voice. Bar 12 of the lower voice holds two lower As that are also misaligned. These details confirm the difficulties in finding a system that could fit the notation characters without making them clash with the surrounding ones. The bar before the last one displays a lower octave D, and the additional staff line signs are compressed together without the proper spacing as it would happen in a modern score. The same does not occur in bar 6,

119. Stanford, C.V., & Forsyth, C. (1918). *A history of music.* Macmillan.

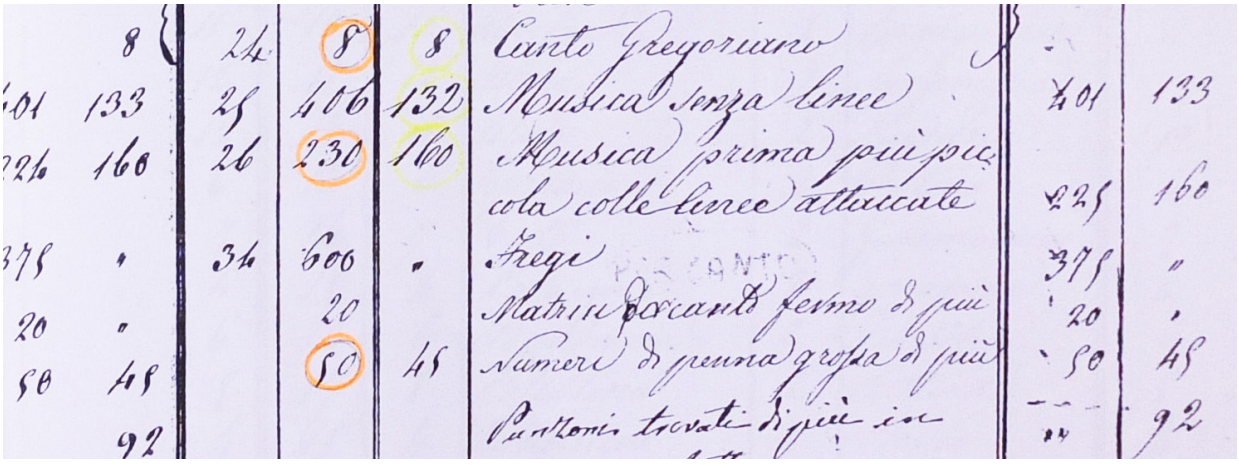
120. (1765) *Anthologie françoise, ou Chansons choisies, depuis le 13e siécle jusqu'à présent, Joseph-Gérard Barbou.* Paris, with Fournier types.

121. Mozart, L. (1766). *Grondig onderwys in het behandelen der viool* (2nd ed.). J. Enschedé.

where a lower octave E is correctly displayed, with the staff lines evenly separated. Generally speaking, Bodoni designed the ledger lines unusually thicker than the staff lines. The staccato in bar 11 of the Aria holds with single quavers. The (type) composer might have chosen this typesetting to display the articulation better (unfortunately, the manuscript by Francesco Fortunati is not available, but it is possible to assume it was his choice). The Minuetto part also presents different mistakes. There is an evident metric mistake in bar 8. At bars 10 and 12, the score presents a strange half-note with an apparent quaver tail. The repetition of the evident mistake might be caused by reusing an almost identical typesetting pattern that reflects the same error over two bars. The note stems are the same thickness as the staff lines in the Aria and Minuetto scores. This detail determines a lack of contrast between the stem and staff lines but also causes a strong visual contrast between the noteheads and the stems. This high contrast in the drawing of the notes reflects the overall typographic activity of Bodoni, stretching the contrast between thick and thin lines, completing the transition between the low-contrast humanistic letterforms to the high-contrast ones of 1800. It is also worth noticing the height of the stems: the Minuetto score displays many notes with stems shorter or longer than expected. This detail fits together with the angle of the beamed notes, which is sometimes steeper than required (see bar 7). The beam amount also has a role since it consumes vertical space (see demisemiquaver in bar 13). The Aria score also has some issues with the length of the stems, but in this case, there are not so many instances, also due to the lack of notes shorter than quavers.

The inventory

The inventory[122] lists the quantity of all the tools in the Bodoni workshop. It is dated 8th May 1843, when Bodoni's heirs sold all the typographer's tools and belongings to the Duchess of Borbone. The inventory served as a sale document during the collection sale to the Duchess Maria Luisa di Borbone.



Img. 33. Table from the inventory with the data about the music fonts (photocopy of the original).
Full page available in the Appendix.

The main table of the document lists all the matrices and punches for all the alphabets and scripts. The rows dedicated to the musical characters state the following.

122. Dall'Aglio, M. (Ed.). (1943). *Inventario della collezione dei polzoni, matrici, ed altri oggetti relativi all'arte tipografica del cavaliere Giambattista Bodoni ora appartenenti alla sig.ra vedova.* Parma.

PACKAGES	MATRICES	PUNCHES	NAMES OF THE DIFFERENT FRIEZES[123]
24	8	8	Plainchant
25	406	132	Music without lines
26	230	160	First music with lines
	20		more Matrix for plainchant

Table 4. Trascription from the inventory of the tools related to the music font.

There are different annotations at the sides of the table (including two columns named M. and P., possibly standing for "Matrici" and "Punzoni"). This may be a subsequent recount of the tools. In any case, the numbers are similar, if not identical.

If the set for plainchant notation ("canto Gregoriano") appears to count just eight characters, the other two sets contain more pieces. The inventory mentions two sets for single (Music without lines, meaning with lines printed separately) and double impression ([...]music with lines, meaning with notes and lines on the same characters). Curiously, the characters for single impression show the caption *Musica prima più piccola colle linee attaccate*. The use of the word "prima" could imply that this system was the first, the first solution designed by Bodoni. On the other hand, the naming "più piccola" could refer to the smaller module size used for the set for single impresison[124]. Looking at the quantities, the double impression set has more punches but a far inferior number of matrices compared to the set for single impression. This quantity is consistent with the limits and possible combinations allowed with the set that uses separately lines and notational characters.

Punches and matrices

The punches and matrices used for producing the music font are stored in different drawers and boxes at the Biblioteca Palatina in Parma. Each box or drawer contains several pieces grouped in different stacks. Although the grouping criteria are unclear, it is possible that the archiver used a similarity ratio, even though not all of these stacks follow this rule. Each stack of matrices has a label with a card containing the name and number of the stack and the typology of the matrices contained.

Img. 34. Label of the envelope containing matrices from the typographic set for music.

123. Pacchetti, Matrici, Punzoni, Nomi diversi dei Fregi.

124. See chapter 4, paragraphs below about the modular grid.

It appears that these labels are of a more recent origin than the year of the inventory. These labels could date back to the date of acquisition of the tools by the Biblioteca Palatina (1963). Interestingly, the cards display a different categorisation from the one used in the inventory or from the pages of the Manuale.

TYPE	TITLE	Q.TY
Punches	Fregi e segni diversi, musica senza linee	98
Punches	Fregi e segni diversi, musica prima più piccola colle linee attaccate	166
Matrices	Fregi e segni diversi, canto gregoriano	9
Matrices	Fregi e segni diversi, canto fermo da stanza	21
Matrices	Fregi e segni diversi, musica senza linee	197
Matrices	Fregi e segni diversi, musica seconda detta piccola	197
Matrices	Fregi e segni diversi, musica nuova[125]	399
Matrices	Fregi e segni diversi, musica prima più piccola colle linee attaccate	21

Table 5. Titles in the labels of the packages containing the music font matrices and punches.

The first thing noticeable is the difference between the categories of punches and matrices. There could be a series of causes for this issue, with the main one being that the set of tools is incomplete. This suspect becomes more evident because there is no trace of the punches used for the matrices set here labelled Canto fermo. There are also punches with no correspondence in the sets of matrices. These discrepancies indicate that the set stored at the Biblioteca Palatina could be incomplete. The labelling of the drawers categorises punches and matrices into six groups: *canto gregoriano* and *canto fermo*, *music without lines*, *first minor music with lines*, *new music*, and *second music called minor*. This labelling is somewhat inconsistent with the one of the inventory and could imply inaccurate cataloguing (perhaps a lack of musical literacy by the cataloguer). Another hypothesis is that the punches could be used for both printing techniques, with or without preprinting the staff lines. This hypothesis is revealed wrong due to the difference in the modular grid (see chapters below). Moreover, the word "minor" is used inconsistently, first in the set "first" with lines, then in the set "second", growing doubts about the true meaning of these labels. This labelling system is not compatible with the other sources. The Invenario mentions three categories of tools, and the Manuale stores three pages with three different sets of types. As far as this research goes, this labelling of matrices and punches is of little use. This statement does not mean that the other sources are perfect but that the naming and labelling here found cannot work as a primary reference for this research. By analysing the different packages, it is possible to understand that the packages labelled with "nuova" refers to the system for double impression. Hence the previous table could be updated here.

125. As later stated, the adjective "nuova" refers to the double impressione system.

TYPE	MATRICES	PUNCHES
Gregoriano	9	-
Canto fermo	21	-
Music without lines (double impression)	596	98
Music with lines (single impression)	218	166

Table 6. Updated table after the analysis. The categories were renamed and regrouped for clarity.

It is helpful to recall the table of the inventory.

PACKAGES	MATRICES	PUNCHES	NAMES OF THE DIFFERENT FRIEZES
24	8	8	Plainchant
25	406	132	Music without lines
26	230	160	First minorminor music with lines

Table 7. Trascription from the inventory of the tools related to the music font.

The sets preserved at the Biblioteca Palatina do not match the figures mentioned in the inventory. It is obvious enough that the figure of 8 matrices and punches for the mensural notation does not fit with the actual characters of the font. The package labelled Canto gregoriano (referring to the inventory) contains eight matrices. Another package of matrices labelled *Canto fermo da stanza* contains 21 matrices that clearly show mensural notation signs, with some exceptions: the accidental signs, with and without staff lines, display a more modern shape. The flat sign with the staff lines is clearly part of the system for single impression. By comparing the numbers, it is possible to see a significant inconsistency in the counting of the set for double impression[126]. The reason for this inconsistency is unknown at the current stage. The inventory remains a reference for the analysis. However, it cannot be the primary source of information because of the many discrepancies with the actual number of matrices and punches. The two sets of punches and matrices are stored in groups with varying numbers of metal pieces. The order and consistency of those groups are variable and differ for punches and matrices. The ratio of the grouping seems to be related to the similarity of the signs. However, possibly due to the archiver's lack of music literacy, there are many inconsistencies in the labelling[127]. The punches are tightened with adhesive tape that does not allow the analysis of the single pieces. The pieces seem to need some restoration, and the analysis relies only on the photographic captures of the pieces.

126. The count of the matrices carried out for this research is also counting possible duplicated punches or matrices, but the gap between the numbers of the pieces counted and the ones stated on the inventory is in any case too wide.

127. Check the Appendix for a complete list of the packages.

Img. 35. A package of punches stored inside the Biblioteca Palatina in Parma. Some notes on the packages dating 1995 suggest that the pieces are yet to be checked or studied more carefully.

Most of the matrices have the nick[128] on top, as established in French tradition[129]. The matrices are sometimes duplicated. The set of matrices includes the duplicated ones for no apparent reason. Some of the matrices display rasping signs to correct the width when of the piece if it was cut too narrow. Some matrices have a side engraved with a number and sometimes a dot over the number. This peculiarity is an interesting feature that could imply a categorisation of some sort set by Bodoni. However, it is not possible to determine the meaning of these signs. Further research could be pursued to understand if this feature is only relevant to the types for music or if it is present in other sets of matrices. Some matrices for the slurs or the crescendo/diminuendo are of an unusual length. It is unclear if these pieces required a custom mould due to their peculiar length.

Img. 36. Matrices of different widths for crescendo or diminuendo, actual size. There is no reference of these types on the printouts inside the Manuale.

Limitations

Despite having access to all the sources described, many limitations affect the present research. Due to these constraints, some of the findings in this research cannot be considered fully reliable. The lack of the final characters for music represents the heaviest limitation. After the acquisition by the Duchess of most of the tools in the Bodoni's workshop, the characters might have been sold and fused to produce new types. The lack of these characters causes two main prob-

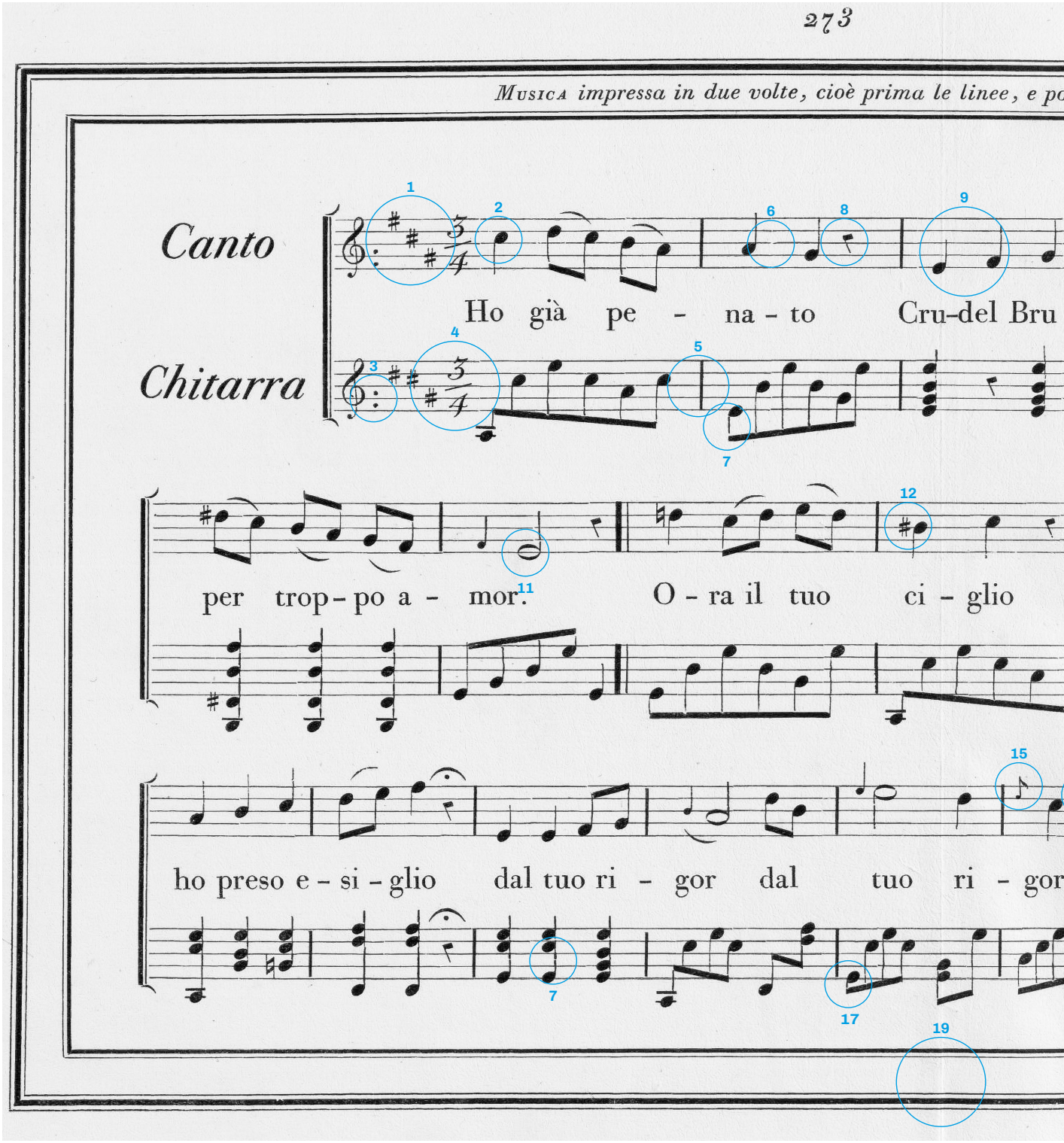
128. The nick was the little notch used to recognise the orientation of a matrix.

129. Many of the characters could be used upside-down, but others have a fixed orientation. Therefore it is possible to say that the nick is on top of the matrices.

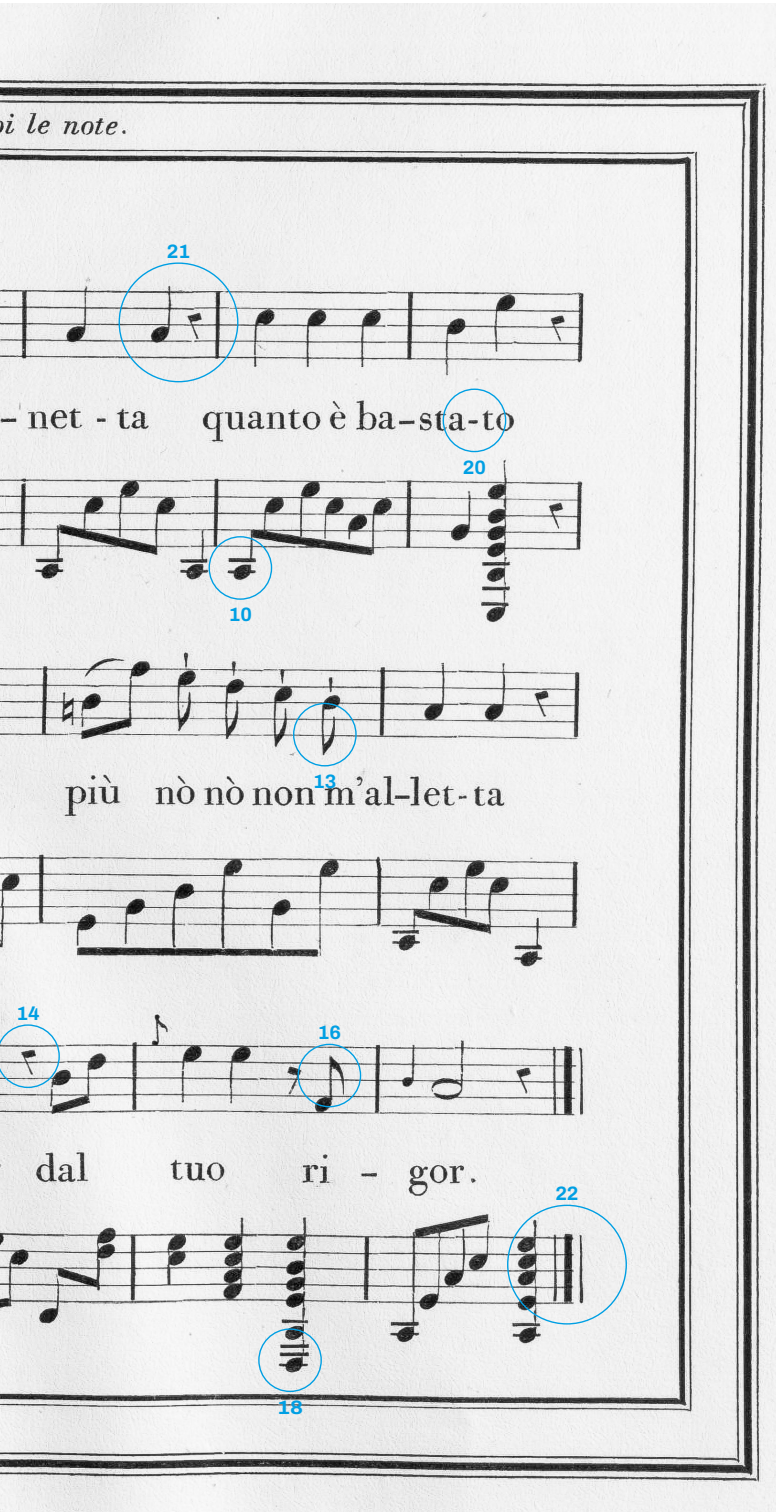
lems: the impossibility of obtaining the precise width and height of the final characters (useful information to determine the modular system) and the lack of data regarding the kerned characters. The main tools used to design and cast the type are the punches, the matrices and the typographic mould. Bodoni had different moulds for each type size in use. The moulds used by Bodoni had a mechanism to adjust the with of the final character. The mentioned width was set by using a pilot character as a reference. Once the register was tightened, it was possible to remove the pilot character and apply the fused metal alloy to produce the actual types. The use of a mould with adjustable width and the lack of the final pieces of type determines the complete lack of data regarding the measurements of the final character. This situation makes the modularity of the system difficult to understand. Knowing how the modular system works is essential to comprehend how the pieces link together and work as a whole system. Due to the lack of the final font, the research cannot investigate the feature of the kerned characters in the sets designed and used by Bodoni. The music fonts developed in this period relied on several overlapping characters. This feature was possible thanks to an alteration of the final characters: part of the body of some characters was trimmed so that the printing part of the character could overlap with the adjacent character. This alteration is observable in the final pieces of type; therefore, it is impossible to understand how many characters included this feature. Having a typographic system working in both the vertical and the horizontal scale, it is plausible that the kerned character could overlap on both the vertical and the horizontal dimensions. Furthermore, the final font would have included the characters created with the set of matrices and the spacer characters. Differently from the other characters, the role of the spacers was to fill the gaps between the actual characters so that the composition could be tight in place. The study of the spacers could have given more critical clues to discover the system's modularity. Another limitation is the lack of a synopsis of characters, a list with all the characters used in the font. Following the exchanges between Bodoni and Giovenale Sacchi, it is clear that Bodoni printed some specimens of characters to be evaluated by Sacchi. Unfortunately, these specimens are yet to be found. The absence of specimens by Bodoni implies an in-depth analysis of each metallic piece of the system so that the research could also consider the characters omitted on the Manuale. By the way, it has to be noted that, differently from verbal text fonts (trade was establishing a rationalisation in late 1700), there was no standard for music fonts at the time, and each font maker relied on different systems to reproduce music notation with more or fewer characters. At last, the lack of the composition manuscript by Fortunati used for the typesetting gives no clue about some peculiarities in the printed score. The presence of unclear signs and or notation mistakes could not be tracked to the original, meaning that their cause could be an error in the typesetting or a misunderstanding of the manuscript due to poor musical literacy of the (type) composer, which could be Bodoni himself or one of his assistants. In addition to these critical aspects, many clues suggest that the set of punches and matrices preserved is incomplete. Some printed signs do not find a proper match with the matrices. In addition, some matrices miss their relative punch and vice versa. Therefore, the analysis will consider the punches only to ensure consistency but will focus mainly on the matrices.

Visual analysis

By analyzing the printout of the manual, it is already possible to find different details worth noticing. These details characterize the music font and the resulting layout, displaying the features of the typographic systems. The analysis can also detect the style differences between the fonts for single and double impression. At first glance, the two scores look quite similar, but a closer inspection reveals multiple details that are worth noticing. The following pages display the aforementioned scores with a comprehensive list of the main peculiarities. The



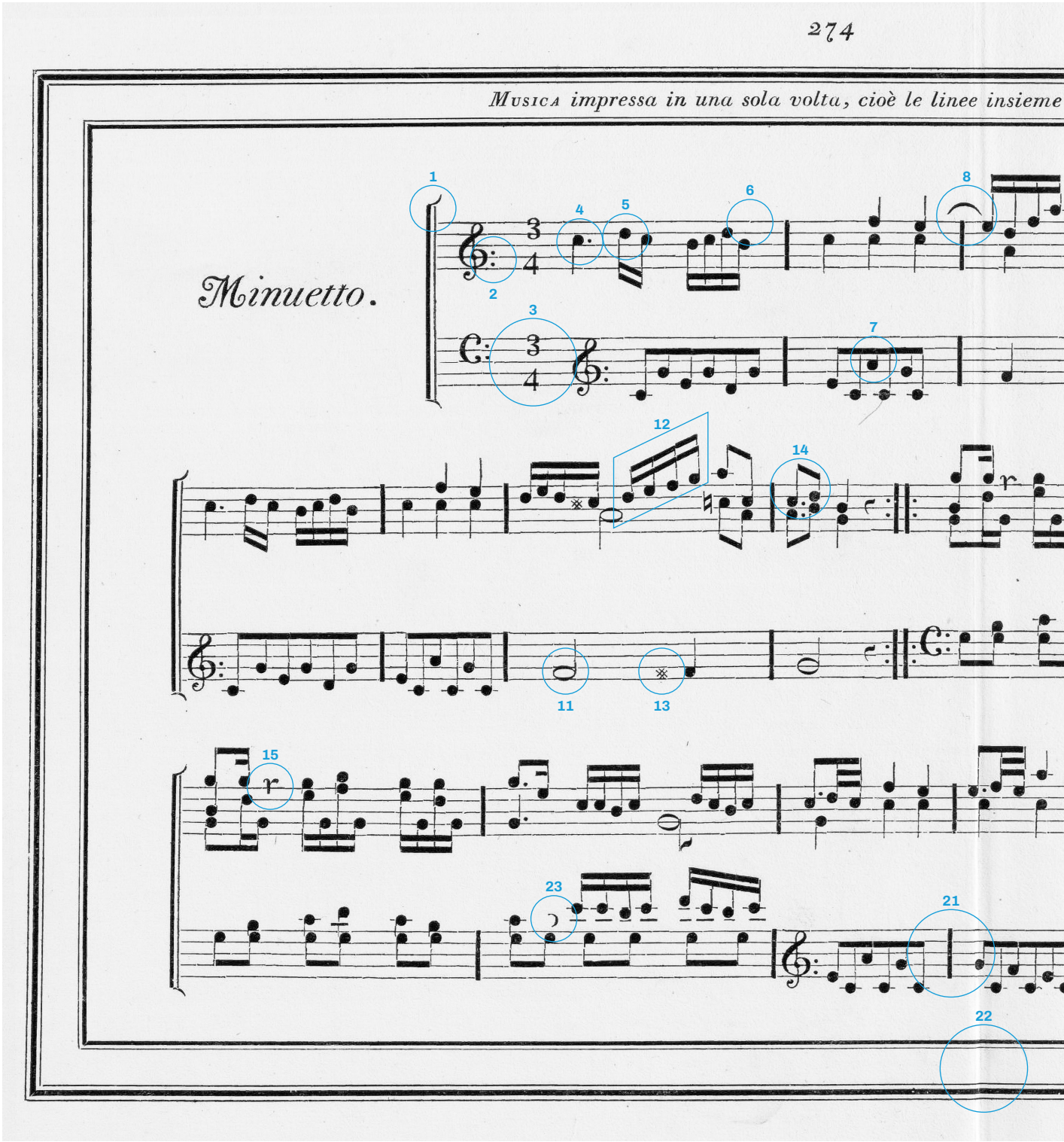
main difference between the scores is the shape of the notehead, which is drop-shaped in the Aria score compared to the round-shaped notehead of the minuetto. The reason for this difference is unclear: Bodoni might have designed the two sets in different periods and could have been influenced by different sources. The drop-shaped notehead certainly feels more consistent with a modern-day layout. At the same time, the sharp signs differ between the two scores, with the one in the Aria being more modern-looking. Another reason could be that the rounded notehead could better fit inside the complex and articulated mod-



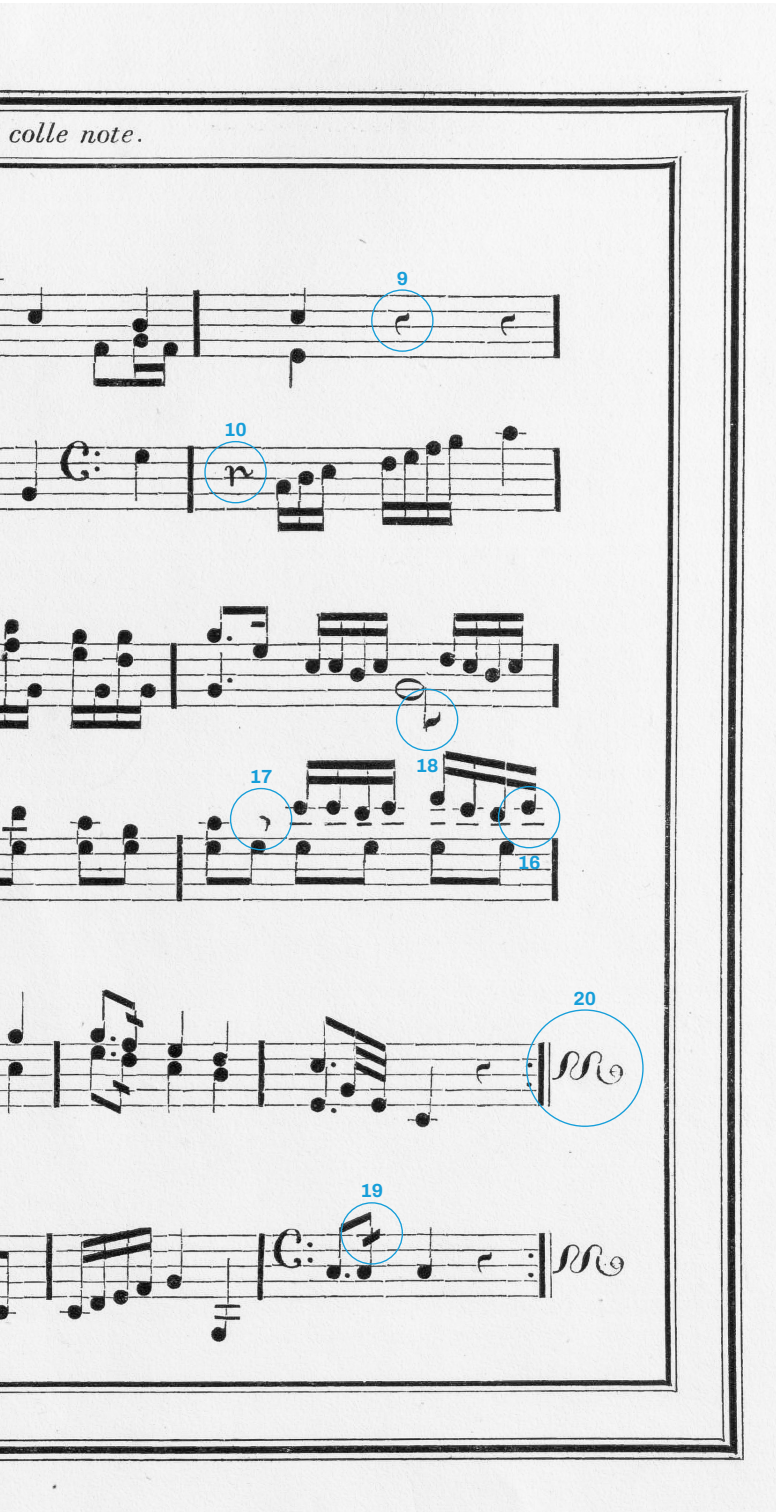
Img. 54. Bodoni G. (1818). *Manuale Tipografico,* page 273 Musica Impressa in due volte, cioè prima le linee, e poi le note. Actual size.

1. Accidentals, unusual order, formal mistake in the lower voice
2. Drop-shaped notehead, high contrast with staff lines and stem
3. Unusual mark for G-clef
4. Unusual calligraphic style for time signature
5. Thick bar lines
6. Breaking point bewteen stafflines
7. Breaking point between stem and beam
8. Unusual quarter note rest
9. Inconsistency between stems lenghts
10. Ledger lines visibly thicker than staff lines
11. Wide half-note notehead, almost horizontal contrast
12. Modern-looking sharp sign (inconsistent with Minuetto score)
13. Quater note downward tail
14. Vertical shift for rest
15. Calligraphic grace note
16. Quarter note upward tail
17. Very short stem in some grouped notes
18. Irregular disposition of ledger lines for layout purposes
19. Fold mark
20. Inconsistent use of n-dash and hypens
21. Inconsistent note-spacing (also in relation to text)
22. Triple end bar

ular system for one impression. Besides these main peculiarities, the two scores differ in overall look and feel. The typesetting of the minuetto score appears, at a glance, much stiffer and clumsier. The rigid modular system that allows a unique typesetting for notes and staff lines comes at the cost of visual clarity and elegance. Other differences can be noted in the rest signs, which vary significantly between the two scores. Similarities can also be found; both scores share the same shape for the half-note sign. The notehead is wide with a width-height ratio of almost 1:2, and the stress of the shape is almost horizontal. The



inner counterform is wide, allowing the staff line to appear when the note falls over it. Unlike the sharp sign, the natural sign is almost identical. Additionally, the ledger lines are unusually thick in both scores. The ledger lines are sometimes placed at uneven distances, resulting in a lack of clarity regarding the intended pitch of the note. Another common detail is the dots beside the G-clef sign and the thick bar lines. The typographer chose to place the clefs and the key signature just on the first line; this could indicate an economical choice to avoid using excess characters and space or could suggest a lack of music prepa-



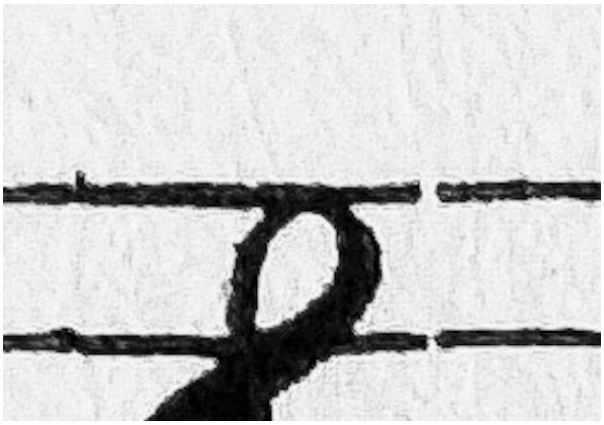
Img. 55. Bodoni G. (1818). *Manuale Tipografico,* page 274 Musica Impressa in una sola volta, cioè le linee insieme colle note. Actual size.

1. Staff brackets extending over usual points.
2. Unusual mark for G-clef (consistent with the Aria score)
3. Time signature extending above and below the staff
4. Round shaped notehead
5. Breaking point between notehead and stem
6. Breaking point between the stafflines
7. Short stem on some contexts
8. Slur extending short between notes
9. Unusual demiquaver-rest sign
10. Unusual quarter-rest sign
11. Open and wide half-note notehead
12. Unconsistent angle of beams and note-heads
13. Old-style sharp sign
14. Metric mistake
15. Inconsistent demiquver-rest sign
16. Inconsistent thickness for ledger lines
17. Unclear quaver-rest sign
18. Unclear tail sign on half-note
19. Unclear demiquaver beam
20. Typographic decorations
21. Thick barlines
22. Folding sign
23. Inconsistent quaver rest

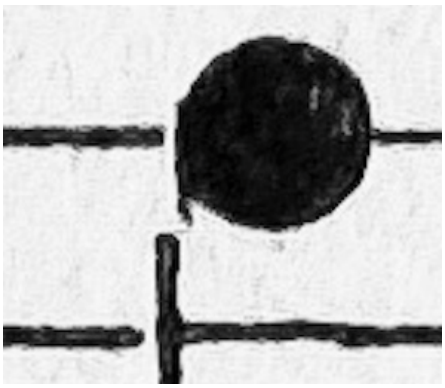
ration. Both scores display mistakes: the Aria part holds an incorrect key signature in the lower part, while the minuetto score contains metric mistakes and unusual tails on certain notes. The Aria part features some calligraphic traits, with the time signature and the grace notes being the main examples. Different calligraphic details can be found in the minuetto score, mainly in the rest sign and the decorations at the end of the score. Although these differences might seem negligible, they reflect different approaches to typesetting, composition, and character drawing. The following paragraphs will describe in detail other less visible peculiarities, such as the different staff line heights and the overall typesetting capabilities of the two typefaces.

Methodology

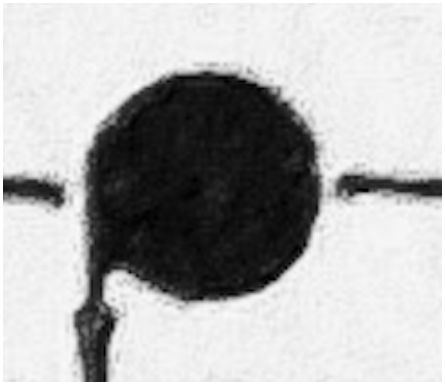
The research tries to compensate for the mentioned limitations by closely analysing the metallic tools and the printed specimens. By looking in detail at the printout, it is possible to understand the system's patterns and modularity. This understanding could also reveal the presence of some kerned characters. The printout that enables the most complete analysis is the one printed in single impression. The page printed with double impression allows a limited analysis, and the composition remains much more obscure. Furthermore, the analysis is possible uniquely for the characters the composer used for the final pages of the Manuale. The breaks between the type pieces are the most important clues that reveal the mosaic of the composition. There are many different ways to identify the breaks. First, there are the clear breaks where the pieces that should join together enclose a gap, and the printout reveals a white space between the signs. A second type of break is the misalignment between different pieces, which is still very distinguishable. This kind of break often occurs when a piece with a vertical drawing is between two horizontal lines. A third type of break features a mass of ink larger than expected. The mass is caused by excess ink trapped between two joined pieces and released over the paper in the printing process. This last type of break is less distinctive and hard to identify. All the breaks in the printed scores could be identified in one or a mix of these categories.



Img. 37. Detail from the Minuetto Score, top of clef sign. The breaks on the staff lines reveal the use of more than one character.



Img. 38. Detail from the Minuetto Score, notehead (bar 1, upper voice).
The misalignment between the top part and the bottom part of the stem is clearly showing the composition with more than one character.

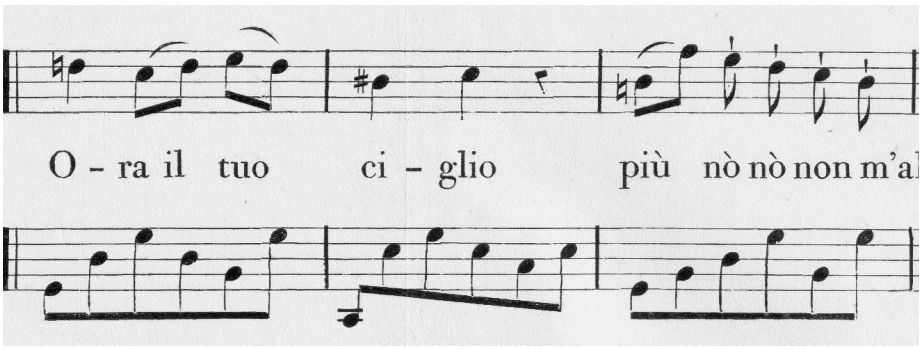


Img. 39. Detail from the Minuetto Score, notehead (bar 1, upper voice).
The mass of ink at the neck of the stem reveals the presence of two different characters.

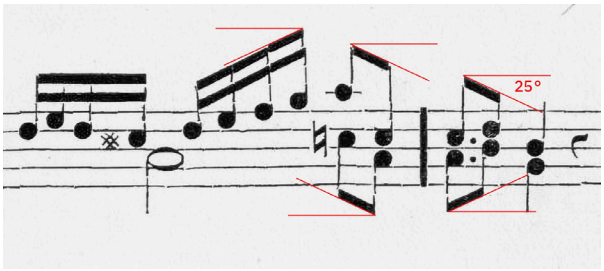
By underlying these breaks in the composition, it is possible to reveal the structure and even identify some of the characters used by comparing the isolated sections of the printout with the matrices. With this kind of analysis, the Minuetto part returns much more data compared to the Aria part for obvious reasons: the single impression types needed to have a much more puzzled composition and the breaks between the character are more evident to the eye. On the other hand, the Aria part does not allow a deep analysis of the breaks because of the large amount of "spacing" characters used for the composition. Nevertheless, it could give some clues about the similarities or differences between the two typographic systems for single or double impressions.

Typesetting analysis

The two scores differentiate in many ways despite using the same notation system. The main feature that jumps to the eye is the higher output flexibility in the Aria. This peculiarity is visible mainly in the tails of the quavers and the slurs: the typesetting in the Aria is much less "forced", the tails of the quavers are flexible and tilting with more angle variations, as it happened with engraved scores, the slurs cross easily through the staff lines. The double impression technique allowed these advantages: having a second impression that excludes the staff lines brings more freedom to the typesetting of the notation signs and enables a less rigid output. Another general difference concerns the distribution of the characters. In the Aria, the horizontal space between the notes is much more balanced, but few exceptions. The result is a score with very low visual clutter. Indeed, the typesetting of the Minuetto is much more "clunky". The few slurs present are forced outside the staff lines, and the groups of beamed notes are rigid and unevenly spaced. The beams that tie the group of notes have very few solutions: they can be wholly horizontal or heavily tilted, reducing the possible typesetting combinations to very few solutions.

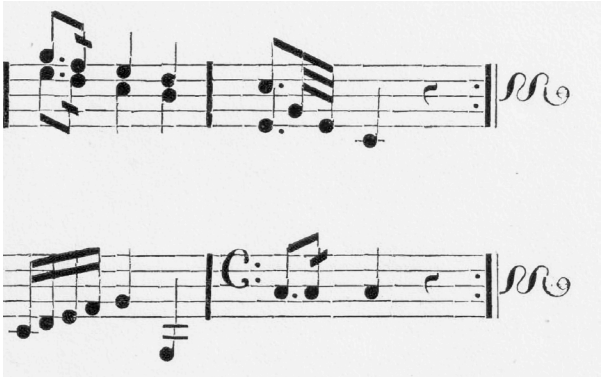


Img. 40. Detail from the Aria patr (bars 9-11).
The Aria part is much more diverse in the orientation of the beamed notes. Aside from the flat beams, it is possible to find different angles from 18° to 5°. This more significant variability shows the typesetting freedom that this environment allowed, despite needing two different impressions. The typesetting possibilities here are exponentially higher than the typesetting with the types for single impression.



Img. 41. Detail from the Minuetto part (bar 7).
The Minuetto part displays the beam between the notes as flat or at a constant 25° angle. Usually, the score would display more variations to display more elegantly different combinations of notes. In this system, a wide variety of slopes for the beams would have compromised the control over the rigid horizontal module. The only beams that fall out of this constant 24° slope are at bars 10, 12 and 15).

This output was necessary because the system for single impression had a much more rigid horizontal structure. The control over the tilted beams was crucial to follow the horizontal modularity of the typesetting. Having more angle combinations would have heavily increased the complexity of the system. Despite this limited set of combinations, the typesetting of the last bars shows how it was hard to find the proper structure of characters: the beams in bars 14 (higher voice) and 15 (lower voice) cut through the stems of the demiquavers the resulting output is still legible but imperfect from a formal viewpoint.



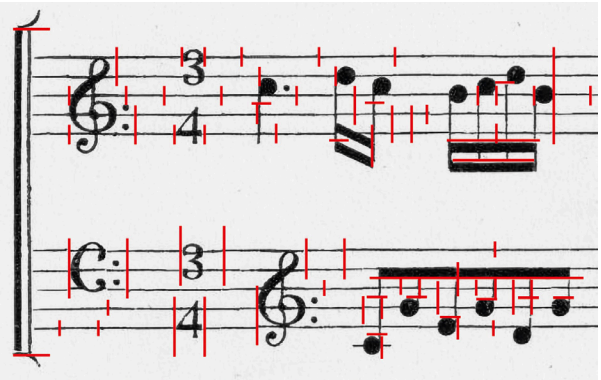
Img. 42. Last bars from the Minuetto Score.
The detail shows an unusual demiquaver tail.

The two scores share a common ground: both techniques are based on a similar modular system. The double impression technique allowed a more elegant and less stiff output, but it needed a solid reference to ensure that the notes would be printed in their exact place over the lines. The difficulty of this technique was not just inherent to the printing stage. The typesetting of the notation was also a laborious task that required a complete understanding of the modular units of the system. With this font, the composer had to typeset the notation signs without a direct visual reference of the staff lines, making the whole process much more complex than the one with the single impression technique. The resulting mistakes (mainly regarding the vertical position of notes or accidental signs) would only be visible in the printed drafts. For instance, it is possible to identify a mistake in the key signature of the Aria. The guitar part has a misplacement

of the sharp sign near the key (it should be F-C-G, but the part displays D-C-G). If the double impression technique was more prone to error, the single impression technique was painstaking for other reasons. The composer had to choose the right combination to ensure every combination of notes joined correctly. Due to the numerous joints between the characters, it was challenging to find the right typesetting combination. Is it therefore possible to see many bars with the same notes that feature almost the same typesetting (the bars differ in the horizontal distribution between the groups of notes)[130].

The modular grid

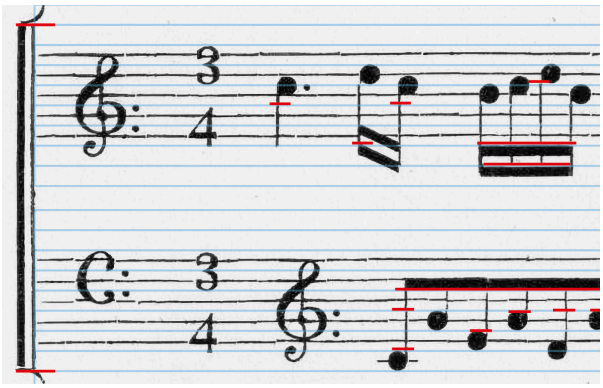
The control over the typesetting would not have been possible without a system designed to follow the constraints of a movable type environment. By analysing the breaks between the notation, it is possible to reveal the pattern of the typographic grid used for the composition. This grid helps to compare the identified characters with the matrices, understanding the actual size of the final pieces. The pattern could be divided into two dimensions: vertical and horizontal. This binary division represents the strength of the movable type system for music: typesetting with a music font requires thinking to pitch and rhythm consistently with music notation, making clear choices over the spacing and positioning of each character. It also grants a consistent use of the space, as the typesetting could be replicated by using the same composition. Both the Minuetto and Aria scores allow this analysis. However, the double impression technique allowed a much less "broken" composition, leaving few traces of the breaks and, thus, of the typesetting. All the measurements in typographical points in this paragraph refer to the Fournier point (1pt = 0,345 mm).



Img. 43. Ink breaks highlighted in the first bar of the Minuetto score.
The width of the noteheads and the space between the notes are also critical evidence for the horizontal module pattern.

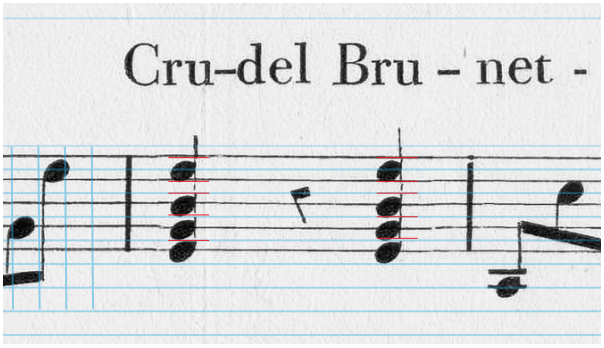
The vertical pattern reveals the main module in which the system was built. In the Minuetto, the resulting vertical grid has a 6pt step. Inside the stave, the staff lines rest at the centre of each module. As a result, to reproduce the entire stave, the composer must use at least five modules. However, this number of modules could be reached with just one or a combination of vertically stacked characters. The character for the notehead between the lines of the staves fits two vertical modules.

130. See bars 1-2 and 5-6, 9-10 and 11-12.



Img. 44. First bar of the Minuetto with horizontal breaks, 150% enlarged.
The ink breaks reveal the pattern for the vertical module. The pattern falls on the white spaces of the staves.

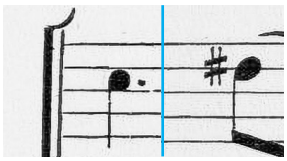
By measuring the staff lines of the Aria score, it is possible to find a similar vertical pattern. However, the Aria score shows a slightly higher module, measuring 6,5pt instead of the 6pt of the Minuetto. It is unclear why Bodoni applied this difference between the two systems, as the presence of the lyrics inside the score does not seem to justify an entire different size approach for the score. Nevertheless, this small but visible distinction could explain the naming of the single impression technique, which is labelled in the archives as "Smaller"[131]. The freedom of the double impression system might have included the possibility of having "half-module" characters, suppressing the need for vertical-kerned notes.



Img. 45. Horizontal breaks in the Aria score (detail from bar 3), 150% enlarged.
The freedom of the double impression system might have included the possibility of having "half-module" characters, suppressing the need for vertical-kerned notes.

In the Minuetto score, the vertical pattern is almost fixed: the note's pitch has to match a precise height in the score, ensuring a precise point over the vertical pattern for each note. Differently, the horizontal module is harder to decipher. The horizontal dimension is much more flexible than the vertical one because of the many different variations in the horizontal distribution of the characters. It is influenced by the value of the notes and the context around each character. Furthermore, for both the Minuetto and Aria scores, the score needs that the two voices share the same length for each bar. Consequently, the horizontal pattern has to be more flexible and thus include more steps than the vertical one. The hypothesis that seems to be more solid is that the horizontal grid uses steps of 3pt. The noteheads represent the primary reference for this measurement: some fall in a 9pt grid, while others in a 6pt grid.

131. "Musica più piccola"

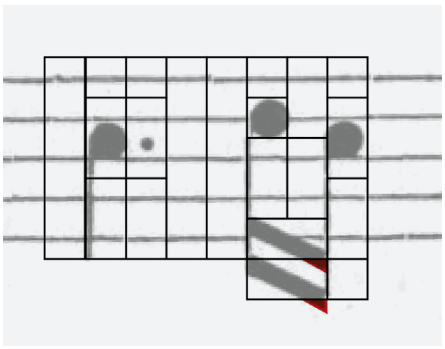


Img. 46. Differences in the vertical module size between the Minuetto (left) and the Aria (right) scores, 150% enlarged.

The positioning seems to be not dependent on the value of the notes but is more linked to the vertical position of the noteheads. If they are close to each other (in small intervals), the space is more ample, allowing a better separation between the characters. Instead, when the noteheads are far enough from each other (wide intervals), the noteheads can fit a smaller grid. For the double impressions system, it is possible to guess the horizontal line by looking at the groups of quavers linked toghether. By analyzing these section emerges a vertical pattern almost twice the size of the one used for the Minuetto. The noteheads fill two modules and between the notes it is possible to have a spacing of two or three modules. The score reveals some breaks on the stafflines falling outside the horizontal module. However, these breaks seems only to attest that the stafflines were built upon different pieces, their position does not interfere with the pattern of the remaining notation, as it used a second impression and a completely different typesetting.

Img. 47. Detail from the Aria Score (bar 9, upper voice), 200% enlarged.
The section highlights the with the horizontal pattern, with noteheads fitting two modules and slures fitting four.

By looking at the printout and comparing it with the set of matrices, it is possible to understand the basic typesetting. The reconstruction of the typesetting reveals which characters have a part of the sign outside their body. This detail is a possible sign of the presence of a kerned character. Some details indicate that the only characters that could feature kerning were the characters for the beamed notes.



Img. 48. The reconstruction of the typesetting in Minuetto (bar 1, upper voice), 210% enlarged.
The part of the characters that falls outside the body are highlighted in red.

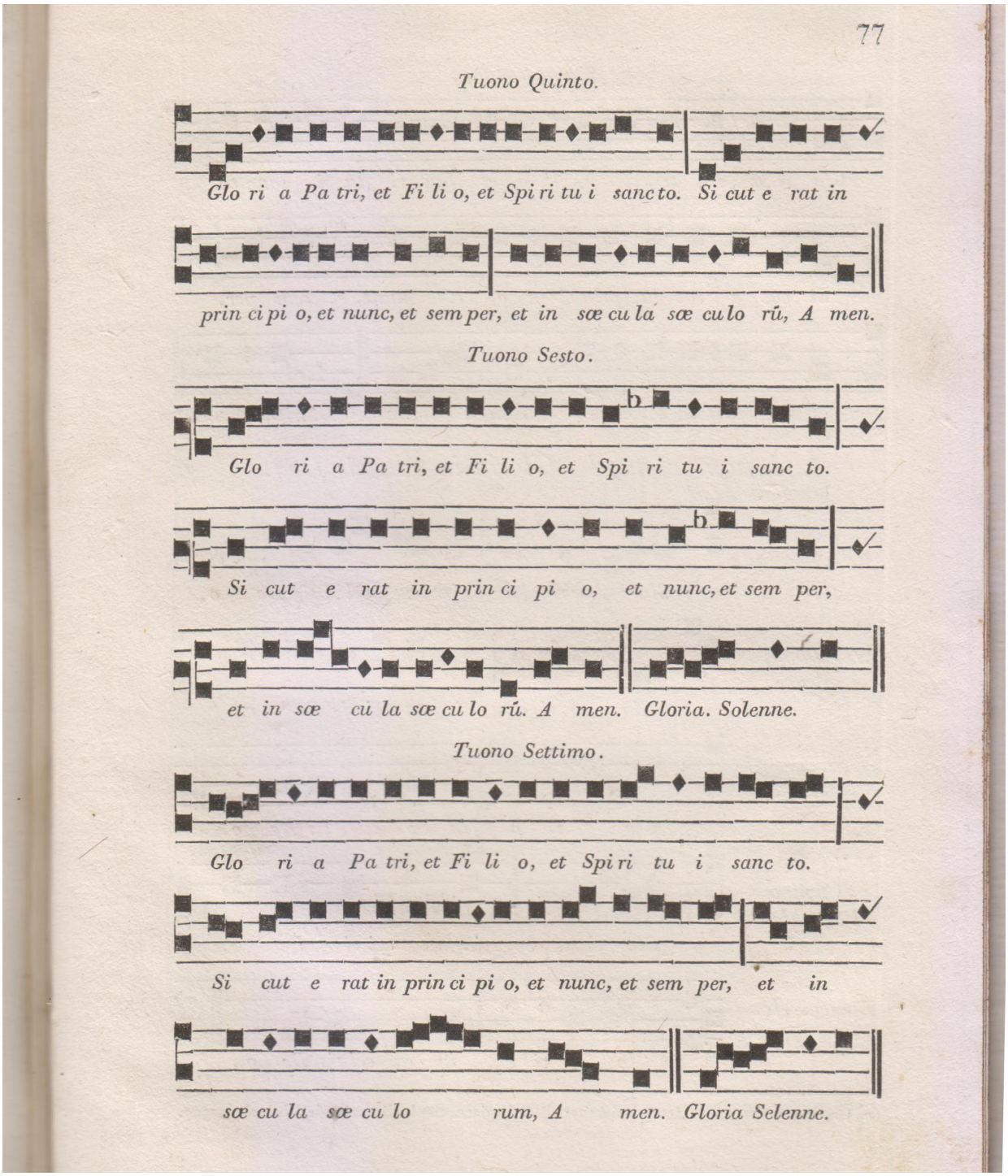
Visual comparison

It is possible to make a visual comparison over the three main examples of music movable type: the one by Bodoni, Fournier's type and Breitkopf type[132]. The visual analysis will take into consideration only the set of type for single impression, as it is the one that includes the major typographic challanges. The score layout by Breitkopf is minimal but sufficently clear. The klefs signs are less distinctive than the usual ones and the space between the notes is very narrow (possibly influence the approach used in the Nederlands). The characters for the noteheads seems to omit the space on the sides, sometimes resulting in excessive clutter of notes. The accidental signs are quite small compared to contemporary standards. The slope of the beams has only two very steep angles, leading sometimes to unpleasant typographic compositions, where the stems are too short. Fournier's work is more clean than the one by Breitkopf. Despite using fewer characters, he was able to obtain a more modern look and feel. the slope of the beams flows gradually with a less ripid angle. the typesettig is still very compact but less clustered, with some more space around the noteheads. Despite limited space between the lines (causing some stems to be cut short), the layout mantains its clariy. The thick lines of the staff are generally too heavy, causing some useless visual noise trought the entire score. Both works By Breitkopf and Fournier shows an overbundance of decoration along the edges with borders and brackets on the edges of the score. The same attention to the detail is a bit lost in the notation elements. The search for elegance in non-notation elements is in contrast with the clear challanges of the typesetting, sometimes unable to retain the same elegance. Bodoni's work follows the path started by Breitkopf and Fournier, achieving a higher grade of clarity. In his sample, the autor of the typesetting uses an elegant Frame which is less decorative than the one used by Breitkopf. The border composed of thin and thick lines is a well known Bodoni's signature. The notation is compact but not too crowded, the contrast between the notation and the staff is higher, resulting in more visual hold over the noteheads and the beams. The Minuetto scores shows some olde fashoned accidentals but big enough to be seen. It is also possible to partly compare the spatial performance of the characters (the amount of notes and bars that is possible to typeset in a fixed amount of space). Fournier's sample follows a vertical page layout, thus it is required to have a really high density in the typesetting to justify at least the presence of three bars per row. Breitkof's sample has an horizontal page layout. The high density of the characters allow the layout to have around six bars per line. The priority in Fournier's and Breitkopf's specimens seems to be oriented towards the compactness of the score rather than its visual elegance. Bodoni's sample is less focused on compactness but since the composition itself is serving the purpose of showing the typeface by Bodoni it is possible that the typographer was free of the limitation that the typesetting of a real music composition faces. A more compact typesetting can cause clutter and interfere with the reading abilities of the interpreter but it also allow fewer page turns that could be problematic during performance. The printing results could differ not only for the typographyc set used but also because of a different wheight in the press or different paper used.

132. Samples of the scores are available in the Appendix.

Conclusion of the analysis

The analysis of the printed specimen of the Minuetto allows a deeper understanding of the modularity in the typographic system for single impression. The analysis of the Aria score does not allow the same clarity over the dimensions of the characters. However, it is sufficient to understand the basic modules and if the system used kerned characters. It is possible to imagine the presence of the kerned characters' used in the single impression type system. The characters in question are most notably the beams that link various groups of notes. Through all the details from the research, it is possible to understand the extent of the typographic system. Unfortunately, because the set of matrices and punches could be incomplete and improperly sorted, it is impossible to say that the gathered data represents the complete set.



Img. 49. A page from *Principi di canto* fermo by Giovanni Mattei, detto il Garfagnino (1832). Printed in Parma.
The publication features on the front page the wording “Co’ Tipi Bodoniani” (With Bodoni’s type), suggesting the use of Bodoni’s fonts for the typesetting of both music notation and text. However, inconsistencies can be found between this music sample and the one inside Bodoni’s Manuale. The clef sign differs, and the gap between the notes and the staff lines indicates the use of a single impression process, while the font for plainchant designed by Bodoni was developed for double impression. Still, the shape of the neumes remains almost identical.

Conclusions and outlook

Overall meaning of the research, implications, possible future outcomes, open questions and perspectives.

Role of the research

This research is meant to fill a missing spot in music publishing history: discovering and evaluating the experimental intervention by Giambattista Bodoni within music movable type technology. While Bodoni's music fonts never reached full publication status in actual music scores[133], his designs reflect a serious attempt to bridge typographic excellence with the complex visual structure of music notation. His serious interest is testified by the fact that he dedicated a considerable amount of time and money to study and design a new set of movable types just for this purpose, inspired and motivated by the work of contemporary figures active in the field of music movable type. The specific focus of this exploration on music movable type allows to define clear boundaries for the research. This study is characterised by extensive historical and technical research that compiles the necessary resources needed to understand the setting surrounding the main subject and establishes a framework to contextualise the main topic.

The story of music movable type could be divided into three main periods. The first one (from late 1400 to late 1600) refers to the introduction of the printing tools for music, which occurred by adapting generic movable type for regular text to music notation. This period includes the almost immediate spread of the first available music fonts and the first technological improvements, above all, the passage from laborious multiple impressions to a single impression, allowed by adapting the fonts to print music signs and staves with a unique impression. This first period is well documented and analysed in available lit-

133. In the Dizionario degli editori musicali italiani, under the entry "Bodoni, Giambattista" the author states that an edition of *Principi di canto fermo* by Giovanni Mattei was printed in 1832 with Bodoni's type. See Besutti, P. (2019). *Bodoni, Giambattista.* In B.M. Antolini (Ed.), *Dizionario degli editori musicali italiani 1750–1930* (pp. 81–83). Edizioni ETS. However, the printed output does not entirely match the one featured inside Bodoni's Manuale Tipografico (see img. 28 and 49).

erature[134]. The intervention of Ottaviano Petrucci – the first well-known typographer to mass produce music scores – and the realisation of his scores printed with movable type is also well rooted in basic music training and, generally, in many theoretical textbooks. As a result, the advent of the first movable type for music is usually well-known among performers, scholar and professionals in the music field. The relevance of this passage is easily understood, as the introduction of movable type and the subsequent mass production of printed media radically changed the use and consumption of any publication, whether it was a regular textbook or a music score.

To protect against the stealing of certain technologies and ensure a trade monopoly, printing privileges were granted not just for specific editions and contents but also for specific printing techniques, discouraging other printers from stealing "patented" technologies. Therefore, different reproduction technologies started soon to compete with music movable type. This phase identifies the second period in the history of music movable type, and it includes all its improvements required to keep pace with the other competing printing techniques, most notably metal engraving. During this second phase (from early 1700 to the 1850s), the improvements in music movable type were both technical and aesthetical. From one side, there was the desire to find the right balance between the system's capability and usability. Conversely, the system had to adapt to the new features and the formal changes in written music notation. These changes included the passage from diamond-shaped note heads to modern round ones, the introduction of the joined tails and the tie/slur. As a matter of fact, the constant push for a more modern-looking score does not pair well with the very nature of metal fonts. Movable type was meant to be durable and resist the wear caused by usage. Making a new font at the time was very expensive, and a mere formal change in the notation could not justify it. For this reason, even during the second half of 1700, some printers still relied on outdated typefaces with old-fashoned noteheads and style. Furthermore, many visual elements of the evolving music notation were almost impossible to fit inside the typographic grid, requiring a different and less rigid approach for producing the printing matrices.

The third and last period (from the 1850s to the 1950s) regards the subsequent settling of music fonts. Due to its limitations in printing music, the movable type technique applied to music was eventually surpassed by metal engraving. This same technique, during its standardisation, evolved even further with the introduction of punches, allowing a consistent and regular look to the score and creating a bridge between metal engraving and movable type. Still, the movable type technique held an important function in some particular publishing contexts. Considering the ease of use and the cost-effectiveness for a large print run, music fonts worked remarkably well for simple scores with one or more vocal lines (including lyrics already available as movable type) accompanying the notation. Church music was one of the main outputs with music movable

134. Poole, H.E. (1965–1966). *New music types: Invention in the eighteenth century* (Parts I & II). *Journal of the Printing Historical Society,* (1 & 2). Gamble, W. (1979). *Music engraving and printing: Historical and technical treatise.* New York: Arno Press. (Originally published in 1923.). Boorman, S., Selfridge-Field, E., & Krummel, D.W. (2001). *Printing and publishing of music.* In S. Sadie (Ed.), *The New Grove Dictionary of Music and Musicians* (2nd ed.). London: Macmillan. King, A.H. (1968). *Four hundred years of music printing.* London: The British Museum.

type during this phase, most notably in the United States[135]. Thanks to the introduction of stereotyping in the early 1800s, printers using movable type could eventually avoid storing the frame with the composed type in case of a possible reprint, bypassing one of the major disadvantages of movable type for music publishing. During this period, music font underwent a refinement and standardisation process as the technique continued to be used, produced, improved and perfected in the subsequent decades. The second and third periods of music movable type history described above find less space in scientific literature than the first period.

The intervention of Giambattista Bodoni takes place in the second phase of music movable type history, a phase characterised by its renovation but with the absence of a standard design for music fonts. As already introduced, this period started at the beginning of the XVIII century and lasted until the first decades of the 1800s. During these years, the music publishing industry in many countries has shown a renewed interest in music movable type, testified by multiple publications claiming the introduction of new and improved sets of type dedicated to music[136]. During these years, printers and publishers used different techniques (sometimes even in the same publication) to print music scores. Despite its limitations, the movable type was still seen as a competitive technique for music publishing. The existent literature about this period[137] allows an overall understanding of the most famous typographic systems for music publishing at the time. Giambattista Bodoni represents one of the most influential Italian typographers, but his role in the specific field of music score production is still poorly analysed, essentially due to a lack of information about the typefaces for music he developed. As a result, Bodoni's work and efforts in improving music printing with movable type are often cited without an accurate understanding of the capabilities of his system and a true assessment of the tools he designed. By analysing his work, it emerges that the experience of the famous punchcutter in music publishing is valuable.

The appreciation[138] for his work in this field, despite being limited to a few printouts, proves how Bodoni was able to apply his typographer expertise to music score production, despite it being a highly different publishing environment, on both the technical and marketing side, compared to other publishing fields. Although he produced some first promising results, Bodoni never released actual music scores. It is possible that the set of music types he created is not fully completed but only built for demonstration purposes, especially for the printouts included in his Manuale. It's clearly impossible to know the potential impact of Bodoni's work if he succeeded in his commission by Sacchi.

135. Gilson, F.H. (1915). *Music book printing.* F.H. Gilson Company.

136. Fournier, P.S. (1765), *Traité historique et critique sur l'origine et les progrès des caractères de fonte pour l'impression de la musique.* Paris; (1766) *Réponse à un Mémoire publié en 1766 par MM. Gando, au sujet des Caractères de fonte pour la Musique;*
Gando, M.N., & Gando, P.F. (1766) *Observations sur le Traité historique et critique de Monsieur Fournier le jeune, sur l'origine et les progrès des caractères de fonte, pour l'impression de la musique,* Berne;
Breitkopf, J.G.I. (1754). *Introduction* in *Il trionfo della fedeltà*;
De Castro, A. (1765). *Manifesto per una nuova impresa di stampare la musica in Caratteri gettati nel modo stesso come si scrive,* Venice.

137. Most notably Poole, H.E., 1979.

138. See the letters of appreciation from Giovenale Sacchi after having seen the drafts of the scores.

It's plausible to say that, having Bodoni issued actual music scores, his results would have elevated his role in music publishing to the level of his contemporary figures in Germany, England and France. Bodoni himself was aware of the challenge he was facing, and the inclusion of the types for music in his Manuale testifies to the high value he perceived toward them. These challenges were also known to Bodoni's wife, Margherita Paola Dall'Aglio, who assisted in his work for over twenty years. She even mentioned the challenges of music font production in her first introduction to the Manuale that she would publish after Bodoni's death. As a matter of fact, despite Bodoni's experience, the typographer encountered various obstacles in score printing, not least the difficulty in handling the page layout. The creation of a layout of a music score faces many more constraints than the one for a regular page of text, which is the activity in which Bodoni excelled. The elegant and clean layout that Bodoni used to produce with his usual types could hardly be replicated in the context of a music score. Each sign and character had to pass through a strict review by a music-trained eye as the slightest inaccuracy could generate doubt or, to say the least, difficulty in immediate comprehension by the performer. Eventually, the outputs drafted in Bodoni's Officina enjoyed a favourable opinion by Sacchi, the practicer musician who commissioned the work. However, knowing if this activity could have led to market success, being used in actual scores, is impossible. The compositions included in Bodoni's Manuale Tipografico as specimens of his characters are meant to represent some of the prevalent music genres at the time. The only way to understand the potential of Bodoni's tools is to explore the preserved pieces to verify their capability and ease of use.

This research allows an exploration of Bodoni's typographic system, drafting a first understanding of the set of characters and how they work together while returning the typographer to its rightful place in the development of music font technology. In the second stance, the research is also an assessment of the very few publications and sources regarding music movable type, as many of the most comprehensive study on this matter are dated over 40 years ago.

Typographic analysis

To evaluate the magnitude of Bodoni's intervention, it was necessary to analyse all the preserved materials regarding his music fonts. The investigation examines mainly the specimens for conventional music, suitable for printing with single or double impressions. The analysis started from the printed specimen, with a close look at the breaking points left by the uneven alignment of the characters. Despite the punchcutting and typesetting accuracy, these breaking points are almost unavoidable. The position of these breaks reveals the grid that presumably was used for the typesetting. By measuring this grid, it is possible to assume the size of the module used for the typographic system. Differently from regular fonts, the characters of a music font are different in size (both width and length). However, their size should fit inside a modular grid, allowing an even tessellation during the typesetting. Despite the limitations caused mainly by the lack of the final fonts, analysing the printed specimen and the matrix and punches preserved made it possible to determine several statements about the typographic system.

Compared with the original matrices, the printed specimens reveal that the two typographic designs use two slightly different module sizes for the typesetting. The use of two different sizes implies that the two systems are independent

and incompatible. The reason for this difference is not yet fully understood but could have a relation with the distinct look and feel of the two typographic systems. The single impression required a typographic design with a stiff and rigid grid. Instead, the system for double impressions allowed a more flexible typesetting and more breath between the characters, resulting in a more precise output if the registration was well aligned for the double impression. In the typesetting of the Minuetto (the second score in the Manuale), it is possible to observe a few bars that preserve the same typesetting. This detail lets us understand that the typesetting with this font was not easy. If the bar preserved almost the same notation as the one previously typeset, the composer would reuse the same pattern. The two printed scores suffer from several inaccuracies that testify to how these specimens were not intended to be published as scores but as mere application examples. It is possible to spot rhythmic mistakes and unpleasant character combinations. The rhythmic inaccuracies are less problematic from a design point of view and could be explained by a lack of double-checking from the typographer-composer. The unpleasant typesetting solutions are more relevant to the research and reveal the physical limitations of the typographic system, as this research has already mentioned.

Research questions

Through the historical and technical analysis, it is possible to at least partially answer the research questions of this research.

Which music typeface used Bodoni as groundwork for his design?

In his early work, Bodoni used in his pubblications typefaces from Pierre Simon Fournier[139], as the Italian typographer was a fan of Fournier's work and he will base his first works on Forunier's typefaces:

> *The types in this specimen book derive from Fournier and we hope that those who understand such matters will, at least, not withold their approval of an accurate imitation*[140].

Bodoni was probably aware of his activity in designing music fonts and, by extension, he knew also the work by J.G.I. Breitkopf. Bodoni was also in touch with the contemporary Swiss typographer Willem Haas that was experimenting on music font in the early 1780s[141], even though their connection was regarding different technological issues. It is possible to say that the work of Bodoni synthesised the achievements of other contemporary typographers but was for some aspects more elaborate than the music fonts by other printers. The designed fonts achieved an excellent score quality but at the cost of a very intricate typesetting.

139. De Pasquale, A. (2010). *La fucina dei caratteri. Gli strumenti di lavoro di Giambattista Bodoni*. Monte Università Parma.

140. Bodoni, G. (1771) *Fregi e maiuscole incise e fuse da Giambattista Bodoni,* Parma: "I caratteri adunque in questo saggio impressi, sono una derivazione dei Fourneriani, e chi vale nella cognizione di queste cose, non ci priverà almeno delle tenue lode di un esatta imitazione".

141. Claim unsubstantiated by evidence. Reed, T.B. (1887). *A History of the Old English Letter Foundries: With Notes*. London: Elliot Stock.

Why was the music typeface never used for actual music publications?
The effort and accuracy expended by Bodoni to produce his music fonts were objectively remarkable, and he was genuinely motivated to find solutions to the many typographical issues in music movable type. However, in the end, Bodoni was never able to use his design outside of his Manuale. Several causes could explain this. The main one is represented by Bodoni's numerous duties and his primary work. His regular activities as a typographer took priority over the challenge of music publishing. Another factor could be the unavoidable frustration inherent in music typesetting: this task was (and, in some ways, still is today), by its nature, very different from the ones he usually dealt with, which were mainly text-based publications. The utilitarian aspect of the music score did not align well with the pursuit of a clean and breathing printout. The efforts to produce a clean and clutter-free output – efforts that have always characterised the Bodonian typographic aesthetic – clashed with the critical multi-dimensional needs of music notation. Due to its non-linear nature, the music score requires a precise output that rarely gives the typographer the freedom of choice. Almost every musical sign holds a spatial relationship with the surrounding elements in a score, significantly reducing the design and layout possibilities. Last but not least, the economic issue: Bodoni incurred many expenses for the initial trials of his music font and was not inclined to complete the work without receiving financial support from his backer, support that eventually never came[142]. The lack of funding caused Bodoni to suspend his work on the music fonts in the early 1780s, only to return to it later for his Manuale, which will be published in its final version after his death, curated by his widow.

What is left from Bodoni's experience and experimentations?
From a typographic standpoint, this research sheds light on a very unusual type system. As historical research attests, movable type technology gradually became less favoured for music typesetting. Today, the vast majority of modern technologies for producing music scores[143], from both the historical and technical standpoint, are almost entirely based on metal engraving practice and experience (despite the punches used for engraving being quite similar to the one used for movable type production). By discovering alternative ways to synthesise and systematise music notation, such as those produced by Bodoni, the research could help reflect on how to display music information in various physical and digital environments. Moreover, one of the possible natural consecutions of this research could lead to the design of new digital tools that can recreate the kind of typesetting environment available with music fonts. Understanding the system allows the conception of a model for font-based solutions inspired by Bodoni's preserved sets of types. The result of this digital revival would enable further consideration of the limitations and possibilities of the tools. Finally, this research about forgotten and less-known aspects of Bodoni's engagement in music publishing – beyond allowing a first understanding of his system of characters and how they worked – can also represent an incentive for further research to advance and improve the current standards for music typesetting/engraving.

142. Moschini, D. (1995). *Gli indiavolati caratteri.* In G. Bertero (Ed.), *La collezione bodoniana della Biblioteca Civica di Saluzzo* (pp. 36–57). Altieri.

143. Eg. Avid Sibelius, MakeMusic Finale (now discontinued), Lilypond, Musescore.

Establishing connections with modern technologies

The role of music typesetting and music font technology in the broad music publishing field has interesting similarities with modern fonts and music publishing technologies. Most of this research is focused on the limitations of typographical (metal) music fonts. From their initial basic system to their most complex one, music fonts were able to print and represent music notation only to a certain extent. Modern digital font technology is based on the ancient, hard metal one. Besides the numerous advantages the digital environment brought to the industry, music fonts (which are now software for all purposes) retain some of the many limitations that the old metal font had. These inbred defects are the cause of an undesirable printed output, if compared with the scores published with engraving plates.

Nowadays, fonts are designed to work best for any "standard" script, but there are very few designs for music notation. The main limitation is always the same: music notation has an interconnected bidimensional structure, with symbols horizontally and vertically interconnected. In this environment, the placement of every element may alter the one surrounding it, making the whole writing system complex and rich of possible variations. Fonts (both modern digital and ancient metal ones) lack of this flexibility and variable outcome. They are instead built to repeat a fixed and constant pattern. The most spread modern music notation programs are built by imitating the most used and preferred scores, the ones printed though engraved plates. The affection to this printing technique is so important that today the programs used to typeset and print music scores preserve the wording "music engraving" software, even though today there's no engraving activity of any kind.

While many elements of the score are handled by the engraving software, the whole process uses font technology for replicating and positioning fixed shapes such as noteheads, kefs, accidentals and any other symbol with fixed shape. The same software allows to change the font to obtain a different kind of score appearence. The main elements that mantains their shapes and are unbond from the font used are notably the beams, the slurs, the angled symbols for dynamics. Basically, all the shapes that requires a good amount of flexibility and stretch are computed by the software algorythm rather than being stored inside the font. This division is basically mimicking the use of punches and gravers used in metal engraving, the first ones used for noteheads, clefs, accidentals, and so on, and the second ones used for ties, beams, long sign of dynamics, and so forth. Despite these signs are independent from the font used, almost all the music engraving software allow a full control over the visual aspects of the notation. Besides the modern-era digital music typesetting is based on music engraving techniques, many improvements happened over digital music font still required to run music typesetting software.

The first music fonts were born for the need of a specific music software and there was no standard for storing the font information and characters. This prevented the music fonts to be compatible with more than one music engraving software. The introduction of a standard allowed font producers to produce cross-compatible music fonts such as it happens for regular text fonts. Today most used standard for western modern notation is SMuFL[144], created by Daniel Spreadbury while developing the music engraving software Dorico. and MUFI

144. Standard Music Font Layout https://www.smufl.org/ (visited in May 2025).

(Medieval Unicode Font Initiative) for medieval music notation. These standards provide a reasoned mapping for music symbols, acting as a standard specification for music font developer, the same way Unicode does for regular font developers[145]. It is important to state that SMuFL is built for music typesetting software and is not built for a different environment. To avoid the interdependency between font and music engraving software, some developers tried different approaches. One of the most relevant ones is building a standalone font software that works in any text editor environment. Alexis Luengas is the author of Cavatina[146], an experimental font for musical notation. The font allows to type music in any text editor, using the computer keyboard as the keys of a piano. The font uses many techniques and programming instructions to display and vary the aspects of the signs depending on the surrounding elements. In the end, the same limitation that applied to old metal music fonts ends up being persistent in this digital environment. Despite the complexity, the font is not capable of covering the need of a complex score and can't compete with modern music engraving software. To the problems derived from the non-linearity of music notation, the digital environment also introduces the input problem: while old music fonts could be stacked similarly to text font in the composer stick, modern digital input (usually a keyboard) does not allow the vertical stack of symbols. With this kind of input device, everything is required to flow in a unique direction (character by character). This limitation requires the creation of a specific syntax to handle the vertical and horizontal distribution of the musical signs.

In conclusion, for many reasons, standalone music fonts, as it was for music metal fonts, are capable of reproducing modern music notation only to a certain extent. The standalone font approach was found more successful for simpler music notation systems such as early mensural music notation[147]. In this much less cluttered environment, a well-crafted font containing all the appropriate symbols can reproduce the typesetting of the original scores.

Further research

This research inevitably suffers from limitations due to missing sources. The unidentified letters from Bodoni to Giovenale Sacchi, along with the missing draft printouts of the first characters proposed by Bodoni, would have provided a clearer view of the conception and evolution of the system. The inability to observe the samples of the final font (probably remelt) also leads to many uncertainties and speculations. Locating these resources – a possibility that cannot be ruled out – would strengthen this research and could confirm or deny many intuitions raised by this work. This research enables future scholars to analyse and better compare Bodoni's work on music type with that of other authors already documented in existing literature. This comparison falls outside the scope of this research but could serve as a starting point for new studies and writings on different design approaches to creating music typographic systems. The absence of a standard typographic solution for typesetting music and

145. In 1998, a range of 220 glyphs for musical symbols was added to the Unicode standard, but this specification was too limited and therefore not widely adopted.

146. https://github.com/LexLuengas/cavatina (visited in May 2025).

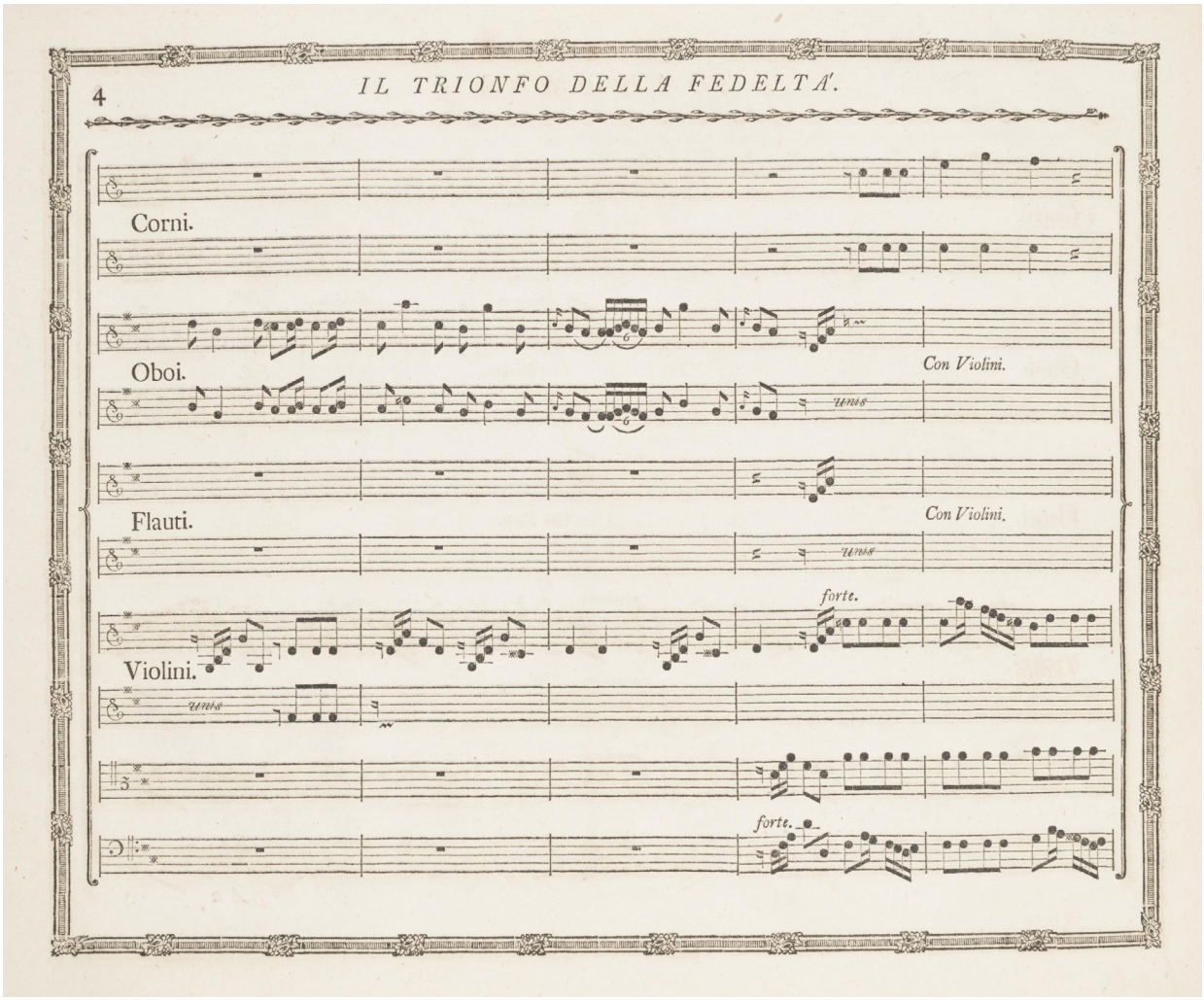
147. See, for instance, Early Notation Typesetter, https://typesetter.earlynotation.com/index.html (visited in May 2025).

creating movable music type provides insight into how these typographic systems were conceived by each author. Examining the various solutions applied throughout history offers a glimpse into all possible approaches, their ease of use, and their capabilities. The potential outcome of this extensive research would be the development of a new model for typesetting movable music type and the application of this model with modern digital fonts. After all, finding the right combination of musical signs is a complex and multi-layered graphical and mathematical challenge. This scientific area could benefit from the experiences derived from past technologies. The field of contemporary score design still offers many opportunities for improvement. This exploration aims to highlight the contributions and efforts of a renowned typographer from the 1700s whose influence can continue to inspire the development of innovative and enhanced score design practices.

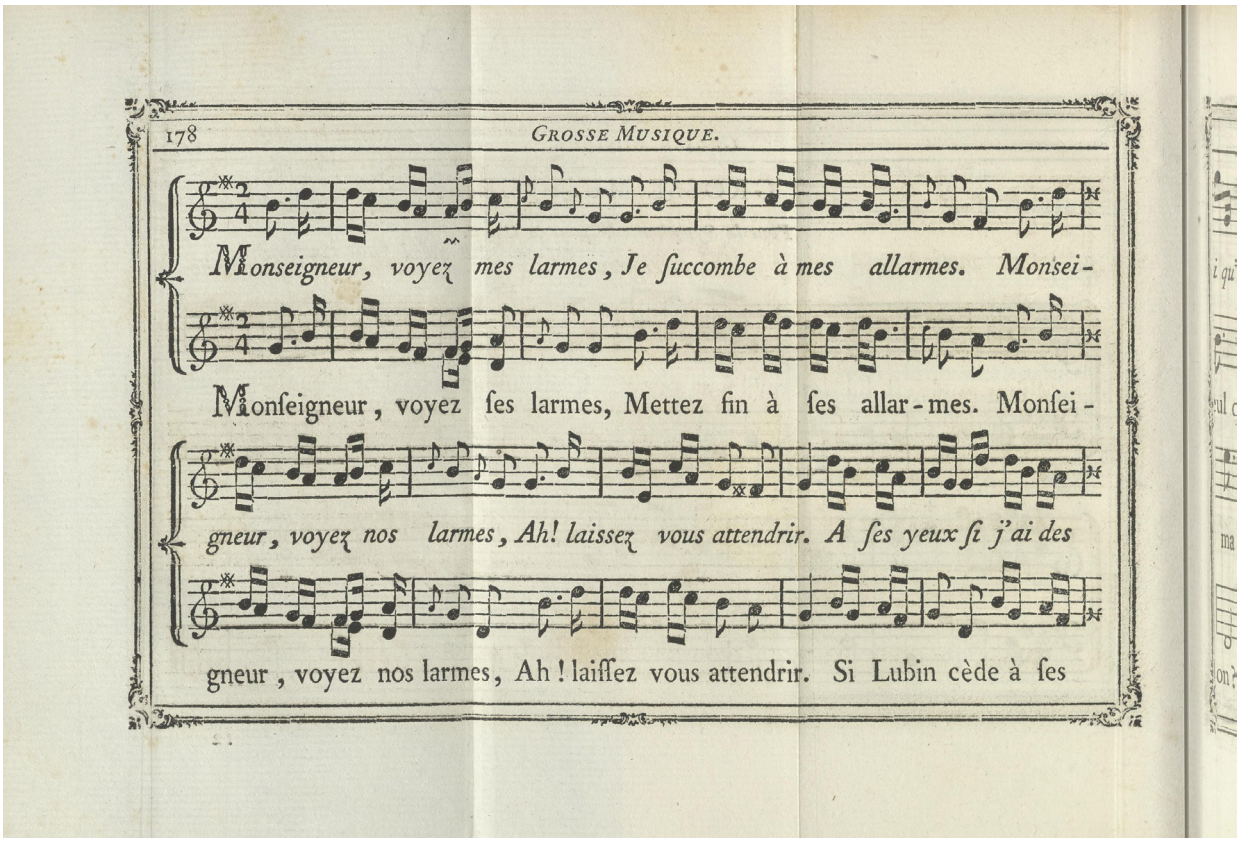
Appendix

Music movable type specimens from other printers

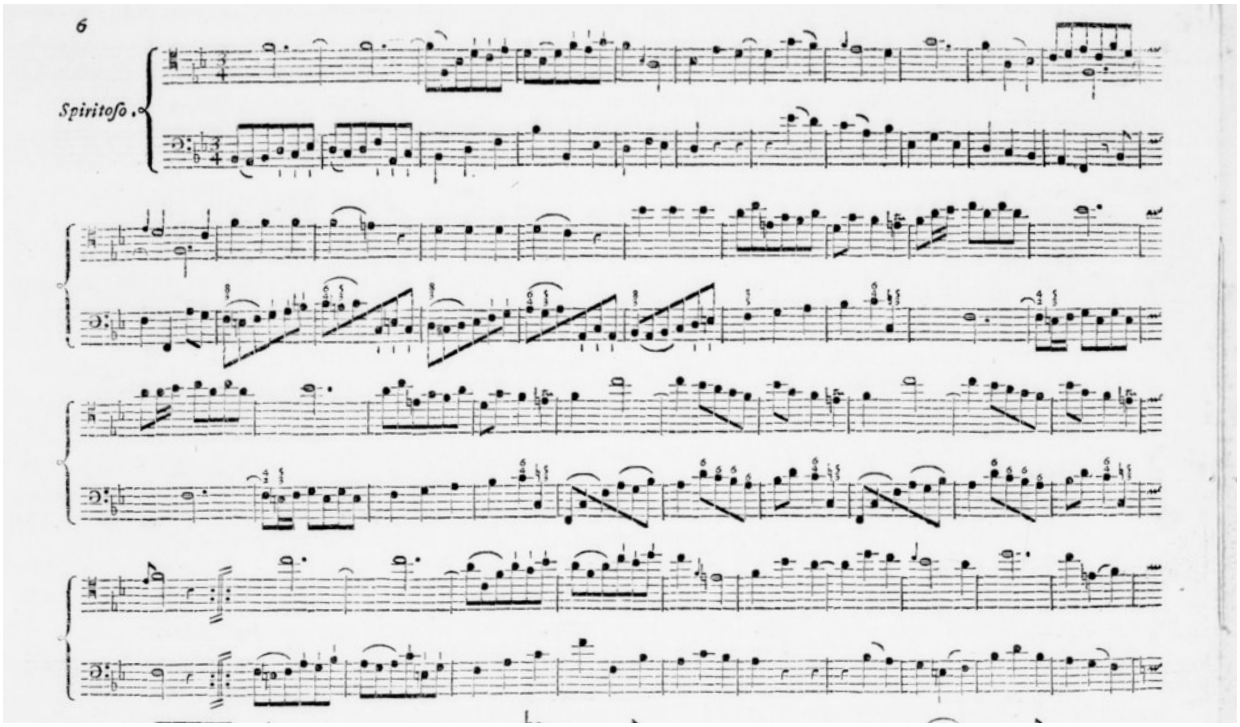
These specimens allow a comparison between Bodoni's music movable type and other contemporary font designs and typesettings.



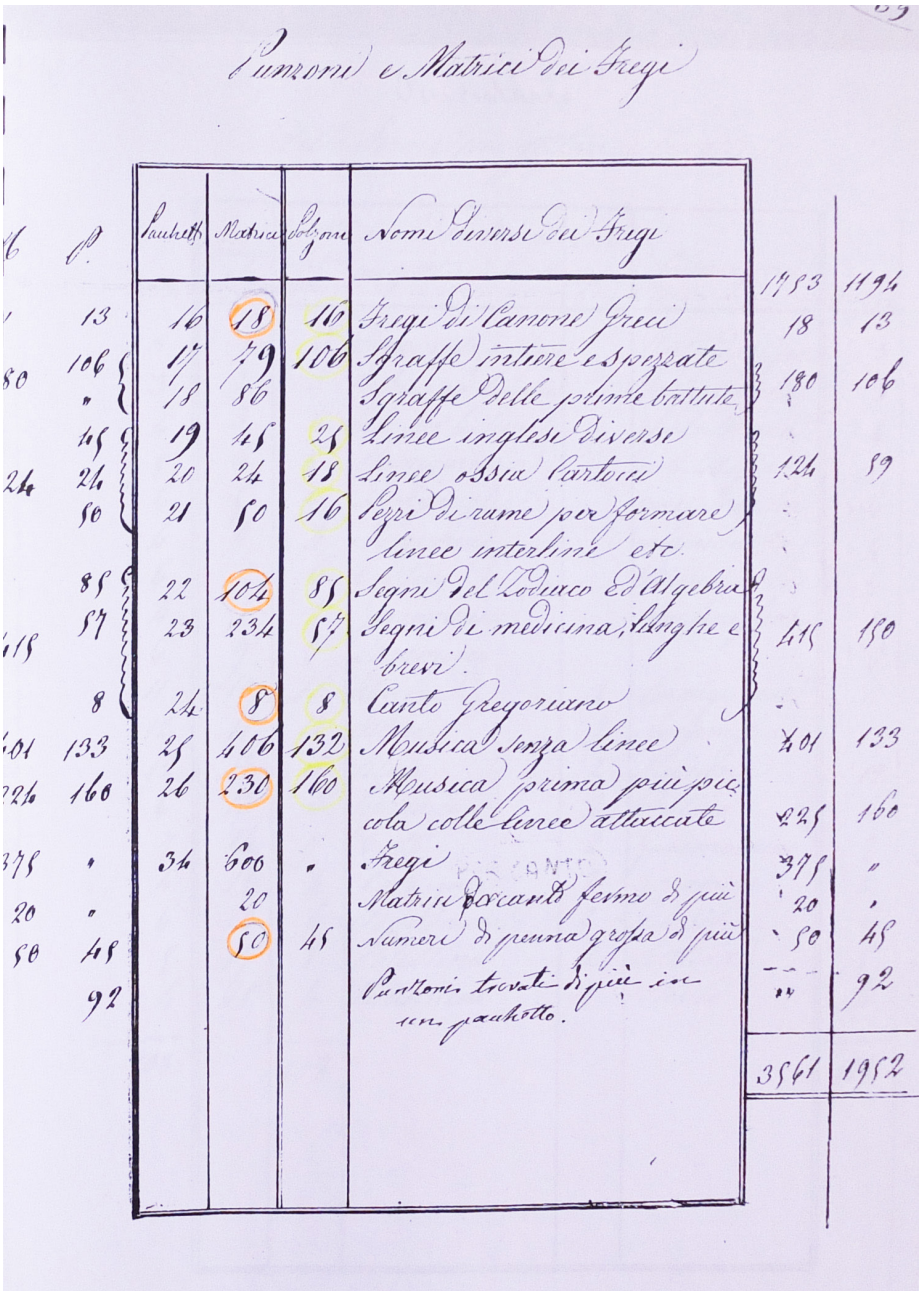
Img. 50. Page from *Il trionfo della Fedeltà* by Maria Antonia Walpurgis Symphorosa*, Dramma pastorale per Musica,* Breitkopf, Lipsia 1756, 60% reduction.
Source: Bavarian State Library: Munich.



Img. 51. Score specimen from Fournier P.S. (1766) *Manuel Typographique*, tome II, 60% reduction.



Img. 52. Detail from Pericoli, P. (1769). *Sonate a sei a violoncello e basso,* printed by Petronio dalla Volpe in Bologna.
Source: imslp.org – Public Domain.



Punzoni e Matrici dei Fregi

		Pacchetti	Matrici	Polzoni	Nomi Diversi dei Fregi		
						1783	1194
	13	16	18	16	Fregi di Canone Greci	18	13
80	106	17	79	106	Sgraffe intiere e spezzate	180	106
	"	18	86		Sgraffe delle prime battute		
	45	19	45	25	Linee inglesi diverse		
24	24	20	24	18	Linee ossia Cartoni	124	89
	50	21	50	16	Segni di rame per formare linee interlinee etc.		
	85	22	104	85	Segni del Zodiaco ed Algebra		
18	87	23	234	57	Segni di medicina, Sanghe e brevi	415	190
	8	24	8	8	Canto Gregoriano		
01	133	25	406	132	Musica senza linee	401	133
26	160	26	230	160	Musica prima più piccola colle linee attraccate	225	160
375	"	34	600	"	Fregi	375	"
20	"		20		Matrice per cavare fermo di più	20	"
50	48		50	48	Numeri di penna grossa di più	50	48
	92				Punzoni trovati di più in un pacchetto.	14	92
						3561	1952

Img. 53. Reproduction of a page from the Inventory of Bodoni's workshop tools preserved at the Biblioteca Palatina. Dall'Aglio, M. (Ed.). (1943). *Inventario della collezione dei polzoni, matrici, ed altri oggetti relativi all'arte tipografica del cavaliere Giambattista Bodoni ora appartenenti alla sig.ra vedova.* Parma.

Location of source matrices

The following tables summarize the matrices retrivered during the fielwork at the Biblioteca Palatina. The title of the table contains the location of the find. Every table row refers to the plastic package containing a list fo matrices. The package label is referred to the label inserted in the package.

D2 Cass 4

PACKAGE LABEL	TYPE	MATRICES
musica 14	nuova	15
musica 20	nuova	24
musica 17	nuova	7
musica 15	nuova	16
musica 16	nuova	20

D2 Cass 3

PACKAGE LABEL	TYPE	MATRICES
musica 13	nuova	7
musica 10	nuova	11
musica 9	nuova	11
musica 11	nuova	7
musica 12	nuova	12

D1 Penultima-basso

PACKAGE LABEL	TYPE	MATRICES
6	nuova	22
2	nuova	30
3	nuova	27
-	nuova	7
1	nuova	29
canto	canto fermo da stanza	21

D2 Cass 2

PACKAGE LABEL	TYPE	MATRICES
5	nuova	26
7	nuova	10
8	nuova	15
-	nuova	20
-	nuova	12

D2 Cass 1

PACKAGE LABEL	TYPE	MATRICES
19	nuova	2
18	nuova	11
-	nuova	13
21	nuova	3
4	nuova	29
-	nuova	6
-	nuova	7
-	nuova	13

D1 Ultima-basso

PACKAGE LABEL	TYPE	MATRICES
-	canto gregoriano	9
2	seconda	26
7	seconda	23
9	seconda	25
10	seconda	22

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