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The appeal of the genre of 'hidden writing' (writings in tombs, on talismans, and so on) has endured for a long time. Concealed to the sight of most readers, such writings have a paradoxical relationship to the most common role of writing as a communication tool. Among these writings, this article aims to reveal the existence of the textual contents found in musical instruments as a specific subgenre of hidden writing.

String musical instruments such as guitars, lutes, citterns, viola da gamba, and violins are constituted on a similar structure: a neck is fitted to a sounding box (or 'resonator'), strings are fitted on this structure, put in tension and tuned. The strings are then put in vibration by plucking (guitar, lute, cittern) or rubbing with a bow (violin, viola da gamba).

The sounding box of such instruments, when made between the sixteenth and the eighteenth century, sometimes used strips of waste materials to reinforce their structure.[1] Various types of materials were used, from thinly cut wood pieces to fabrics, and included waste paper and parchment with writing. This makes of the sounding box a container for material texts.

This article considers the technical, historical and anthropological implications of the presence of those texts within the sounding boxes of musical instruments. These implications will be introduced and discussed using a series of studies of seven musical instruments now in the collection of the musée de la Musique in Paris: a sixteenth-century *vihuela de mano* (an instrument shaped like a guitar but tuned like a lute); two theorbos (lute-type instruments) respectively made by Georg Aman in Regensburg in 1739 and by Matteo Sellas in Venice in 1626; a bass violin made by Andrea Amati in Cremona in 1572 and later restored in France; an anonymous seventeenth-century Italian colachon

(a lute-type instrument); a guitar made by Antonio Stradivari in Cremona *c.* 1680; and a lute made in Bologna by the maker Laux Maler between 1526 and 1552.

The Sounding Box as a Container for Material Texts

An important early example of the use of the sounding box as a container for material texts can be identified in an artefact made in the sixteenth century in the Iberic peninsula, one of the three surviving *vihuelas de mano* to date.[2] The soundboard is preserved detached from the rest of the instrument. For this reason, it is possible to have a direct view of the assembly of the wooden boards forming the back and the sides of the sounding box. The boards are curved and lined with small rectangles of parchment, glued at the joint between each board, and also diagonally, in the middle area of each curved board.

It indicates that the instrument maker – their identity now unknown – was aware of the physical properties of parchment: its lightness, flexibility, resistance to traction/pulling, high level of stickiness with hide glue. This maker used it to strengthen the joint between two boards by applying it to the surface at the joint, and the areas of the boards with the most pronounced curvatures. Close examination has led us to identify a series of a few letters, written in red. Our use of a UV-rich light source (a light source used to enhance the contrast based on the fluorescence of materials) has made it possible to identify other letters, written with black pigment ink. Those letters form the Latin: 'fratres, fructus, instit[uen]dum suff.' Escudier dated the script to 1240–1280.[3] This discovery connected the *vihuela de mano* to a handwritten document, whose making is dated three centuries earlier than the making of the *vihuela* itself.

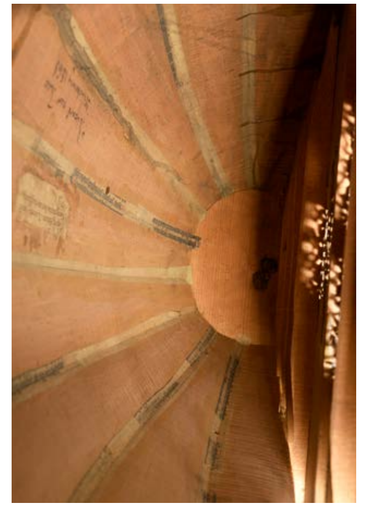
1. The technique of using waste paper in the repair of musical instruments can be observed on occasions after this period, but becomes mostly obsolete towards the end of the eighteenth century, together with the instrumental typologies at stake here.

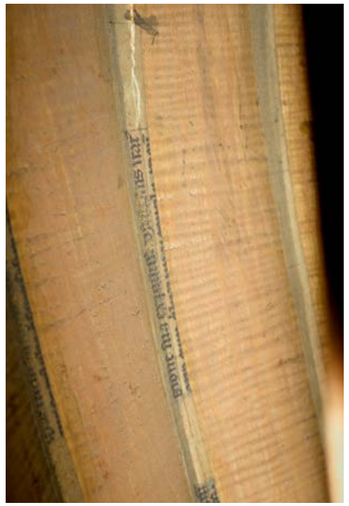
2. Collection musée de la Musique, Paris, inv. E.0748. Joël Dugot, *Aux Origines de La Guitare : La vihuela de mano* (Paris: Cité de la musique, 2004). The *vihuela de mano* was of major importance in the Iberic and Italian peninsulas during the sixteenth and seventeenth century.

3. This paleographic study by Denis Escudier (Institut de Recherche et d'Histoire des Textes), dating 1999, is the earliest example of such an approach on the collection of the musée de la Musique in Paris.

4. Collection musée de la Musique, Paris, inv. E.2346.

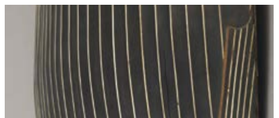
The next example illustrates that the use of waste parchment strips was still ongoing as late as 1739. In this year Georg Aman, a maker established in Regensburg, Germany, assembled nine maple thin wooden boards (1–3 mm thick, named 'ribs') to make the bowl of the sounding box of a large lute named 'theorbo'. He simply glued thin parchment strips cutout from a waste folio (or several folios) of a manuscript, written in black pigment ink with blue and red initials.[4]





5. Theorbo, Giorgio Sellas, Venice, 1626, collection musée de la Musique, Paris, inv. E.1556.

6. The meaning of the term 'fragment' here is the one in use in the community of book historians, and may originally reflects on the fragmentation of the text. Shifting perspective, these strips, carefully cut in pieces of specific shapes and dimensions to be used in the making of an instrument, could also be named 'parts' when prepared and used by the instrument maker.

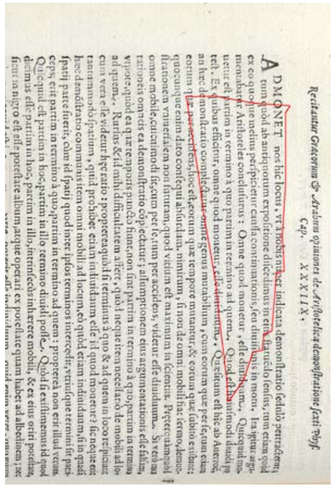


7. Published by Bartolomeo Sermartelli. <echo-old.mpiwg-berlin.mpg.de/ECHOdocuView?tocMode=concordance&start=131&viewMode=text_image&mode=texttool&url=/mpiwg/online/permanent/archimedes/buona_demot_014_la_1591&pn=228&ww=0.5102&wh=0.5102> [accessed 7 September 2024].

A similar process, but using paper instead of parchment, can be evidenced inside another theorbo, made in 1626 by the celebrated Venetian maker Giorgio Sellas. Its sounding box is made of forty-three ribs of ebony, with thin purfling of ivory inserted at each joint between adjacent ribs.[5]

In the theorbo, lining strips of paper can be found glued at all the joints. The waste paper used in this instance seems to originate from the same handwritten document. This document appears to be a draft, due to how fast and free the writing seems to be. The numbers at the end of some of the lines would suggest this document is an accounting document.

The Sellas theorbo also contains other fragments with text printed on paper.[6] The text on two of those fragments links their origin to two folios of a copy of the *De motu Libri X* by Francesco Buonamici, published in 1591 in Firenze.[7] Their respective locations in the textblock of this book – the beginning of Chapter XVI, on page 73, and the beginning of Chapter XXXIIX on page 208 – are quite far apart.



In red, exact positions of the two fragments on the corresponding pages (respectively p. 73 and p. 208) of Buonamici's *De motu*.

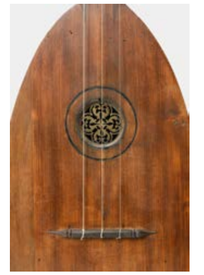
The latter example brings to the fore several questions. For instance, where did Georgio Sellas find the waste accounting documents: from the paperwork produced in his own workshop/house, or from outside? Were the fragments from the *De motu Libri X* applied by Georgio Sellas at the time of the making – that is, 37 years after the publication of the book? Or were they placed here during a later undocumented repair? Is the remainder of this book located inside the sounding box of other instruments made by Sellas or his contemporaries? The question of later additions of waste writing materials, related to the repairs and modifications of the instrument between the time of its making and the present time, is also exemplified in the following instrument.

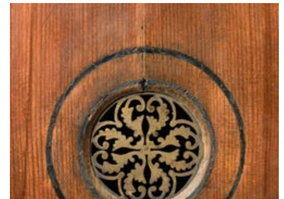
A bass violin which was played at the French court since 1572 displays on the inside of its sounding box a quite large piece of thick parchment. This parchment is used to consolidate a damaged area at the bottom part of the back of the sounding box.[8]

On this parchment there is a large and balanced handwritten inscription which reads as follows: 'Jean […] au Roy […] ce qui […] neuf octobre 1677 […]'. The writing style as well as the date inscribed indicate that this piece of parchment was possibly an administrative document written around 1677, perhaps a notary document. Next to the large fragment of parchment, glued on the wood, there is a smaller piece of paper, rectangular in shape, and with the words 'voir, Nou' printed in black carbon pigment ink. The latter fragment is still unidentified, but is possibly more recent than the parchment one.

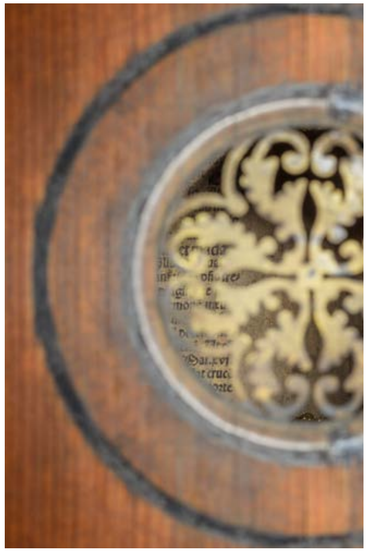
The various instruments presented indicate that the use of fragments in sounding boxes is not only linked to the making of the instruments, but also to the material history of those artefacts. The fragments were excerpted, pulled out and recycled from former handwritten and printed, bound and unbound documents made of paper and parchment. This selection of case studies is an attempt to illustrate the diversity of types of material text and document which can be encountered in musical instruments. They range from medieval manuscript on parchment to more recent handwritten and printed text on paper. They are not only fragmentary parts of books, but they are also cutouts from administrative documents, letters and drafts documents.

8. Bass violin later cut-down to a cello, Andrea Amati, Cremona, 1572, collection musée de la Musique, Paris, inv. E.2020.1.1.





Having a peek inside the sound box of a seventeenth-century Italian colachon through its rosette.[9]



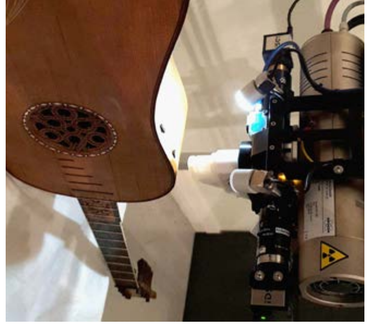
Opening the sounding box and (re)reading the text

The sounding box is a container that is mostly sealed but that contains several fragments of texts and documents, possibly from various sources, inside the same instrument. The sounding box preserves material texts from decay and the passage of time, similarly to the Dead Sea scrolls jars, which contained the oldest surviving manuscripts of biblical books and preserved them for almost two millennia. This certainly was not the intention of the instrument maker, but the written content lining a sounding box was thus preserved by being forgotten and/or neglected over the course of many centuries.

The direct access to most of these fragments has long been lost to us due to their location inside the sounding box. The sounding box's only openings are small holes whose purpose is to make the air cavity formed by the sounding box resonate. But this architecture of the sounding box makes it very difficult to look inside it. The circular sound holes of the lutes, citterns and guitars are indeed generally fitted with rosettes (a rosette is a form of sound hole decoration, either carved directly into the wood of the soundboard, or made from carved wood or parchment inserted and glued on the back of the soundboard). Viola da gamba and violins have a pair of C-shaped or *f*-shaped sound holes which are larger than the ones in the rosettes. They also permit better viewing of a part of the inner surface

of the back and ribs of the sounding box. Violins and some guitars may have another hole to fit the end-button to attach a strap, at the bottom of the sounding box.

Today's code of ethics in the conservation of cultural heritage artefacts would make it unacceptable to disassemble musical instruments for the sole purpose of accessing the fragments located inside a sounding box. Thus, this container of texts does not make it possible for readers to do what they usually do with texts: use them to read. But today's progress in conservation science also offers us other 'opening' technique to read the fragments. Since it is impossible to 'look at' the texts – that is by definition to 'use one's sight' – why not imagine mediated access to the fragments lining the opaque wooden walls of the sounding boxes, which makes it impossible to see through them with the naked eye? Using optical and imaging scientific techniques, this research provided access to the inside of some of these concealed historical containers while at the same time preserving them. One example of this approach of peering inside instruments is illustrated below by the study of the inside of one of the rare guitars made by Antonio Stradivari.[10]



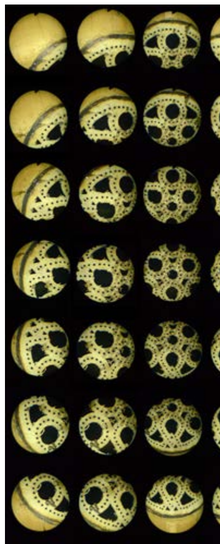
Endoscopic (above) and X-ray fluorescence (XRF) spectroscopy (below) imaging of the Stradivari guitar.

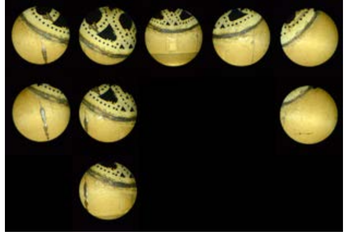
First, an endoscopic camera is introduced in a small hole located at the bottom of the sounding box. This endoscopic camera is our remote eye looking at the interior of the guitar's sounding box. Alongside the side ribs of the sounding box, the camera-eye shows us long and thin vertical rectangular pieces of paper, extending from the soundboard to the back of the sounding box. The remote eye of the camera shows that there are a series of handwritings on the pieces of paper. By having the camera-eye looking up, a parchment piece becomes visible under the rosette. The piece is glued on the verso of the rosette to reinforce the thin work of art that constitutes the rosette. The fragment of parchment bears several lines of writing in black pigment ink and some blue and red capital letters. Only one side of the documents is visible with the camera-eye. What the endoscopic technique does not let us see is the text that one might hypothesise is also written on the other side of all these paper and parchment fragments, the side glued to the side ribs and to the rosette. The well-known ability of X-rays to go through many materials is then applied to the guitar to attempt to overcome this limitation.

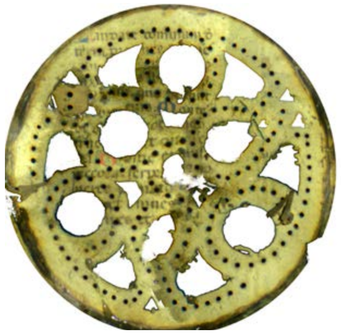
9. Collection, musée de la Musique, Paris, inv. E.1429. The text printed on the paper strips is from Hugues de Saint-Cher, his *Postillae on the Gospels, in the Koberger Biblia latina (cum postillis Hugonis de Sancto Caro),* Basel, *c.*1501–1502, from part 6. ISTC number: ib00610000. The fragment glued inside the colachon is showing this page in the orignal book. <www.digitale-sammlungen.de/en/view/bsb00026104?page=746> [accessed 17 February 2025].

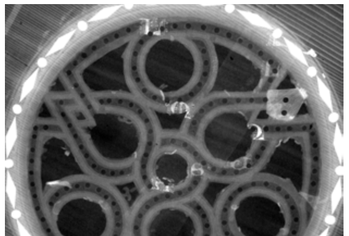
10. The *c.*1680 'Vuillaume' guitar, collection musée de la Musique, Paris, inv. E.904.

Digital reconstruction of the bass side from endoscopic images of the Stradivari guitar.

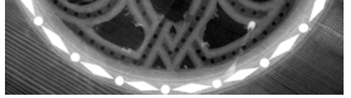


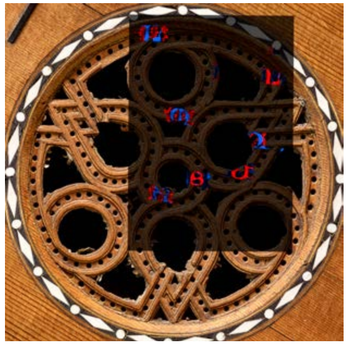






Endoscopic images and reconstruction of the fragment visible on the inside of the rosette (top and middle), X-radiography and XRF mapping of copper (blue) and mercury (red) of the rosette (bottom).





11. The instruments are the 1683 'Cipriani Potter' violin and the 1688 'Hill' guitar (Ashmolean Museum, Oxford, inv. WA1946.272 and WA1939.32 respectively). Jean-Philippe Échard and Laura Albiero 'Identifying Medieval Fragments in Three Musical Instruments Made by Antonio Stradivari', *Fragmentology*, 4 (2021), 3–28.

X-ray-based imaging techniques improve depth of vision by revealing internal structures invisible to the naked eye, such as the skeleton inside a human body. X-ray enhances the contrast between organic matters (wood, paper and parchment) and more dense materials such as mineral pigments. Applying this technique to the rosette area, additional initials painted on the invisible side of the parchment, which were not detected by the camera-eye of the endoscope, become visible. X-ray fluorescence (XRF) spectroscopy and imaging further enhances the contrast by locating the presence of specific chemical elements. In the rosette area, the XRF maps of mercury and copper identify vermillion (red pigment, mercury sulphide compound) and azurite (blue pigment, copper-based compound) as the pigments used to produce capital letters in this manuscript. These images allowed us to identify the manuscript as originating from a Book of Hours made in Italy in the first half of the fifteenth century. Also, endoscopy of two other musical instruments made by Antonio Stradivari revealed that the fragments of parchment used to line the interior of their sounding box had an identical provenance. The three instruments altogether contain fragments of three bifolia from the same Book of Hours.[11]

Returning to the sides of the guitar, and looking through their wooden ribs at the written paper rectangles glued on those ribs: XRF detected and located iron where the paper rectangles were inscribed in ink. It allowed us to identify this as iron-gall ink, and to image the writings on both the recto and verso of the fragments of glued paper. Via XRF imaging, the writings located on the glued side of paper and parchment can now

be seen, read and studied. Thanks to these imaging techniques, we can document the presence of fragments; we can catalogue the fragments and we can produce digital facsimiles of them. Such conservation science practices allow us to attempt to reconstruct, digitally, what the text might have looked like when it was part of a book or leaf. This renewed and widened accessibility to fragments opens new avenues for researching newly recovered texts, for the history of instrument making, and for the history of the reuse of waste documents.

Revealing the writings inside the Stradivari guitar. Iron (Fe) XRF maps of the fragments on the bass side of the guitar.

Afterlives and Forelives, Multiple Temporalities

These methods and ways of viewing change conceptions of the temporal span of an artefact's life.[12] To think about the instrument as the 'artefact' enables us to think of the lifetime of the instrument, from the date of its creation to its destruction (or survival, to date). To think of the written document inside the instrument as the 'artefact' brings to consideration the lifetime of the document, from the date it was written to its destruction (or survival, to date). By taking books apart and reusing parts of books as waste documents, the books have survived in fragmented and incomplete form. Those fragments became themselves artefacts of their own, apart from their previous container. This is the afterlife of the fragments according to book historians. The incorporation of those fragments, following an unknown period of time, in other artefacts such as musical instruments is also part of their afterlife. When they were integrated as lining support and repairs to the sounding box of musical instruments, the fragments lost their own 'oneness' as much as they were forgotten.

Historians of musical instruments are accustomed to record the origins and date of some of the materials used in instrument making. With dendrochronology (the scientific method of dating tree rings) they may determine the *terminus post quem* – the earliest possible felling date – of the tree used in the making of a sound board. They can also identify the area where the tree grew from chrono-ecological data. For such wood, historians may thus consider the forelife of the wood as a living and growing tree. This is similar to how lithographers may consider the sedimentation process at the origin of the limestone they used to make print.[13] Book historians may also consider the forelife of paper or parchment as living fibrous plants or livestock. But the case of the fragments found in musical instruments is not a forelife similar to that of wood, stone, paper or parchment: it is not a biological forelife, but a different life. These are man-made artefacts used by human writers and readers. The temporality of the instrument as artefact is intertwined with the temporality of the document as artefact: both artefacts extend each other's temporality: the instrument is an artefact that points to the future of the document, and the document is an artefact that points to the past of the instrument. This suggests that the historicity of these objects should be thought of beyond the timeframe usually considered as their lifetime. The way in which the various parts of the instrument are assembled makes it a fundamentally anachronistic, or perhaps more accurately polychronic, object – as if it were a sort of time capsule.[14]

The implications of this reflection also have an effect in the case when fragments have been used later in the life of the instrument, when the instrument needed to be repaired or altered to prolong its musical lifetime, that is its use as a musical instrument, played by a musician. The striking case of a lute, bearing the marks of many of such later repairs, is discussed in the following paragraphs.

The remaining nine-ribs ashwood bowl of one of the oldest surviving lutes, made in Bologna in the second quarter of the sixteenth century, is a fascinating case study of how lining materials inside the container was accumulated over the past five hundred years.[15] In this instrument there are nine different types of reinforcing material. Those materials were added and often superimposed on top of each other during the long and eventful life of the instrument. Similarly to the result of a geological process, the superimposition of layers of different materials inside the sounding box equate to different times in the life of the instrument.

The most recent layers of materials – located on top – do not consist of written documents, but of cloth or wood. Below these recent layers there are small fragments of printed paper, located lower in the stratigraphy, constitutive of older layers of repairs. The two layers of fragments that form the very beginning of the layering of materials in the sounding box are also the closest to the wooden ribs. They are the only layers made from parchment with writing. The border between the second and third layer of document may thus constitute a chronological milestone for the instrument. It corresponds to the end of the main period when the parchment was used as waste material in the lute. The fragments of parchment located on the second layer bears handwriting with red and blue initials, but it has unfortunately not been possible to identify the text so far.

Focussing on the deepest first layer, dating from the making of the lute in the workshop of Laux Maler, was more fruitful at this stage. The nineteen observed strips are made of very thin leaves of parchment. Eighteen of them are cut into strips of 10–13 mm wide and up to 250 mm long. They are glued either along the rib joints or perpendicular to the rib joints, following the circumference of the bowl.

12. Arjun Appadurai (ed.), *The Social Life of Things. Commodities in Cultural Perspective* (London-New York, Cambridge University Press, 1986).

13. See Serena Smith 'On Stone', in *Inscription* issue 1, (York: Information as Material, 2020), 7–16.

14. Georges Didi-Huberman, *Devant le temps: histoire de l'art et anachronisme des images* (Paris: Minuit, 2000); Alexander Nagel and Christopher S. Woods, *Anachronic Renaissance* (Princeton: Princeton University Press, 2010).

15. Lute, Laux Maler, Bologna, between 1529 and 1552, collection musée de la Musique, Paris, inv. E.2005.3.1. This section is based on the remarkable though yet unpublished work, 'Étude des

renforts dans le luth de Laux Maler (coll. musée de la Musique, E.2005.3.1) et documentation des fragments porteurs d'inscriptions' by Salomé Bloedé in 2021, then a master's student at the École du Louvre, Paris, under the supervision of J.-P. Échard.

Localisation of visible fragments from the first (deepest) layer (blue) and the second layer (red) inside the Laux Maler lute.

By examining all the visible writings on these fragments in the first (deepest) layer, is it possible to retrieve more information on the original document they have been cut from. The handwritten texts (line height: 2.5 mm) in black ink with initials highlighted in red are organised into up to four textblocks by strips. Many of those text fragments were identified by Salomé Bloedé, and they all point to verses from Biblical texts from the books of Isaiah, Sirach, Proverbs. Bloedé's virtual 'recollation' of those fragments indicates that they all come from

Examples of texts visible on fragments.

Texts (book from the Bible, chapter:verses) identified on fragments in the first (deepest) layer, as well as dimensions corresponding to the positions of the text blocks on the bifolia. Each fragment is represented as a yellow rectangle, each textblock on a fragment is represented as a white rectangle with a dashed black line.

a number of different bifolia of the same small-size format 'pocket' Bible (the width of the textblock is 36–37 mm and the minimum width of the folio is 99 mm). Two of these fragments have been identified as coming from adjacent folios within the same gathering. What is most remarkable is that the strips are cut following the lines that were traced for writing. This results in strips being cut from one edge to the other edge of each bifolium.

In this Laux Maler lute, the nineteen visible fragments of the earliest layer of strips glued to the sounding box form a total surface of 231 square centimetres (37% of the surface of an A4 sheet of paper). This data significantly underestimates the total quantity necessary, because it leaves out all the areas of the sounding box which are hidden by later lining materials. From the inventory of his workshop at Maler's death, it is known that there were 1,100 finished lutes, ready to be sold, and 1,300 others in the process of being made. The minimal surface of parchment to make these 2,400 lutes would equate to the surface of about 900 sheets of A4 format. If materials such as wood, metals and varnish have been extensively studied in the field of organology, our research highlights the importance of paper and parchment in musical instruments. The documentation of the fragments would provide new insights in the technique of the instrument makers: what types of material did they use? What are the dimensions of the strips of fragments? And what are their locations in the sounding box?

As demonstrated with the Stradivari guitar example, further study of these fragments could give very precise information about the *modus operandi* of making an instrument. More expansively, this could contribute to cross-referencing the date and attribution of the instrument. The date of the document from which the fragment is excerpted constitutes a *terminus post quem* in terms of its use in the instrument. Similarly, fragments used for repair can help with narrowing the date of making and the attribution of such treatments. One could even imagine a typology of the fragments that

would be related to the area of production, by city or even workshop. This would give first elements/facts to represent the channels borrowed by the documents, fragments and instruments, and the network of agents of the second-hand market of waste materials (from book owners and documents producers, to the instrument makers). Each place or workshop may have a different use for the strips, which can provide an additional clue to authentication and dating. Such kinds of evidence, as in Carlo Ginzburg's paradigm, are relevant as they are non-apparent and partly unintentional.[16]

A Contemporaneous Change in the Practice of Instrument-making and Choice of Supports for Writing

The construction technique of the sounding box for string instruments changed during the second half of the 15th century and the first half of the 16th century. This was true across Europe, and especially in the Lombard-Venetian area, in cities such as Venice, Brescia, Cremona, Padua. The case once carved out of a large single piece of wood was replaced by an assembly of several separate thin boards of wood. This change in the making process of the sounding box resulted in the body of the instrument being lighter. This mechanical structure also favoured the vibration of the strings and the emission of sounds by the instrument.[17] With the new making process, thin wooden boards (the ribs) had to be glued next to one another, and the surface of wood on which the glue was applied between each board (the 'joint') was very small, weakening the mechanical stability of the whole sounding box. It was necessary to reinforce the interior of the sounding box with strips of lightweight flexible materials. Parchment and paper were two materials whose physical properties suited this purpose. To date, strips of parchment and paper can be found glued inside the sounding box of most of the surviving string instruments made between the first half of the sixteenth century and throughout the eighteenth century. It is still too soon, though, to provide an estimate of how much paper or parchment was used.

16. Carlo Ginzburg, 'Clues: Roots of a Scientific Paradigm', *Theory and Society*, 7:3 (1979) 273–288. More precisely, the maker intentionally applies strips in the sounding box of an instrument, but they probably do not select one strip or another according to the text, to the production context to the type of the document.

17. Renato Meucci, *Strumentaio – Il costruttore di strumenti musicali nella tradizione occidentale* (Venezia: Marsilio, 2008), pp. 63–64.

18. Roger Chartier, *Culture écrite et société. L'ordre des livres (XIVe–XVIIIe s.)* (Paris: Albin Michel, 1996); Frédéric Barbier, *L'Europe de Gutenberg. Le livre et l'invention de la modernité occidentale (XIIIe–XVIe s.)* (Paris: Belin, 2006); Catherine Kikuchi, *La Venise des livres 1469–1530* (Paris: Champ Vallon, 2018); Christine Bénévent, *Abécédaire insolite du livre ancien* (Paris: École nationale des chartes, 2023).

19. Orietta Da Rold, *Paper in Medieval England* (Cambridge: Cambridge University Press, 2020).

20. Collection Museo Correr, Venice. Emanuele Marconi and Jean-Philippe Échard, 'The Organ with Paper Pipes of the Correr Museum in Venice: a Review and New Insights', *Journal of the American Musical Instrument Society* 39 (2013), 89–142. In particular the pipes were identified made from sheets of paper at least 59 cm long, corresponding to the royal ('realle') format. All the fourteen observed watermarks showed an anchor with bilateral flukes in a double outline. It is documented that Isabella d'Este considered, at some point, buying the organ.

The instruments that are preserved at the musée de la Musique and other cultural heritage institutions worldwide are just a mere sample of the entire corpus of instruments with sounding boxes made with lining materials such as paper and parchment in the Early Modern period. But it is now clear that both paper and parchment were important, perhaps as important as wood, in the making of artefacts (such as lutes, guitars, citterns) for which the demand was high at the time. It implies that their makers had to set up strong enough supply chains to have access to these materials. Is this dual presence of paper and parchment a simple question of what supply was available to instrument makers or is there also a change depending mostly on the period? Are the properties, strengths and weaknesses, of parchment and paper to be considered?

Parchment may indeed be more resistant to traction. But parchment – which is animal skin – is prone to shrinking according to changes in relative humidity. Such deformation of parchment strips can cause damages to the overall structure of the sounding box (loosening of the joints, cracks in the ribs, and so on). In the Early Modern period, paper became more readily accessible and more commonly used than parchment.

At the same time as this major change in the making process of instruments, another change in the making process of writing supports was ongoing.[18] The rise of paper as the main support material for writing across Europe is contemporary to the use of parchment and paper for sounding boxes. The ever-growing quantities in which paper was being produced from the fourteenth century followed in particular the increasing use of paper, for example for accounting books, then driven by bureaucracy. A novel additional use of paper to appear in the second half of the fifteenth century was printing.

Historians of paper have also demonstrated that paper was used as a primary or secondary material with other uses apart from the production of texts – such as wrapping for wounds, in medical practices; wrapping to protect and secure valuable objects; supports for creating painted decorative badges such as escutcheons, table/food decorations, and so on.[19] The advent of paper can also be seen in the *organo di carta* – an organ made of paper pipes – dated from 1494, now in the collection of the Museo Correr in Venice. This instrument is unique due to its age and provenance: it was made in Venice by Lorenzo Gusnasco, a man in the circle of the Italian printer and humanist Aldo Manuzio, and the mentor of the Marchioness of Mantua Isabella d'Este.[20] The pipes of this organ are made from large blank sheets of paper. The sheets of paper are very visible, as if they were exhibited, because the

pipes are the most striking visual elements in the instrument. The case of the organ with visible paper pipes is a standalone among instruments where parchment or paper can be identified. Indeed, strips reinforcing the sounding box are invisible, and do not need to be made of a product with a specific visual appearance.

Because of the accrued demand on papermakers to produce paper for writing and printing, one may wonder if it proved more difficult, or onerous, to purchase newly-made paper rather than waste paper from written documents to use as lining materials in musical instruments. However, other parameters beyond relative costs should be considered: in particular the mechanical properties/qualities of the lining material. The growth of the papermaking industry between the fourteenth and the seventeenth centuries may have led to a change of the mechanical properties of the papers produced.

Simultaneously, the economy of parchment started decreasing as of 1450 following the emergence of print and the progressive decline of parchment as a writing material. This is why it became more difficult for instrument makers to gain access to new arrivals of parchment. At the same time as the rising use of paper as writing and printing material, and the declining use of parchment, an increasing number of texts on parchment (including Book of Hours) were available for sale on the second-hand market.

The reuse of texts on parchment known as palimpsest is a well-known practice. While the production of palimpsests was driven by the obsolescence of its initial text, and by the scarcity of available writing leaves, the reuse in musical instruments is of a different kind. Similarly to the way which, in bookbinding, former parts of bound material texts can be found as a material lining in the spine of a more recent book (often in religious and academic settings such as monastic or university libraries and archives), the use of parchment in instrument making is linked to the decline of parchment as a writing material.[21] The use of parchment waste in the making process of daily life artefacts, other than books and bookbindings, during the Early Modern period is documented for example lampshades, shoes, gloves, and more.[22] One of the challenges for such research is that the use of parchment or paper to make such objects was occasional. To date, these remaining objects survive in very limited number, and are disseminated across many collections worldwide. This article identifies instrument making as a craft where the reuse of large quantities of parchment (and later, of paper) is almost mandatory from the fifteenth century onwards. Parchment and paper appear as the most efficient materials to create a sounding box that would be both strong and light, providing that such reinforcing material is available.

We suggest indeed that the shift in the materiality of writing supports contributed to the connection or relationship between two closely interlinked socio-technological networks within the urban craft industry of *Ancien Régime* Europe. A first socio-technological network is the new economy of the written word and the book; the second network is the new production of musical instruments. Both networks can be identified as existing concomitantly

and having the strongest connections in sixteenth-century Europe, and in particular in the Lombard-Venetian world, an area central to both these two networks in the period.

About sixty lutes, five citterns, one *vihuela de mano*, several viola da gamba, Baroque guitars and hurdy-gurdies in the collection of the musée de la Musique in Paris are known to contain fragments of texts. Based on our observations, it is estimated that there are at least several hundred, if not thousands, of instruments, where waste paper and parchment is to be found. We foresee that a study of the entire corpus of Early Modern instruments, whose sounding box contains fragmentary texts on paper and parchment, would provide fruitful results and compelling prospects.

An Extensive Corpus of Fragments is a Treasure Trove for Fragmentology

In the end, it is an unexpected use of fragmentology – the field of study of surviving fragments of manuscripts and printed texts. The ongoing research in this field points to an increase in the numbers of known fragments.[23] This research demonstrates that most of the lutes, citterns, guitars, viola da gamba and da braccio, were made using waste parchment and paper. When those instruments have been preserved to date it means that material texts, which were previously unknown to the (book) historians, have also been preserved, even partially as fragments in these musical instruments. But in the case of musical instruments, it is to be expected that most of those texts are already known. The most relevant information that arises from this study is rather to understand what kind of texts could be used as waste material. For example, as we have seen, the Bible: is there a particular potency in the use of Bible fragments? Does their presence suggest popularity or availability? Do they still possess any signifying power – in particular if we notice that the strips have usually been cut so as to preserve the lines of text? Does the use of fragments outline a coherent cultural practice?

The fragments may originate from several documents in each instrument. We see each of these sounding boxes (or 'sounding containers') as a potential analogue to an archival box in an archive or a conservation centre. This box which has never been opened since its making, or the box that was put on a bookshelf in a library and then forgotten, or the book that has not been requested and read by anyone since its arrival on this bookshelf. In the case of such libraries and archives, the books, documents, texts, authors, and dates are completely unknown and uncatalogued. One needs to identify them one by one in order to compile a catalogue of such a forgotten library or to create an index of this buried archive.

Each of the sounding-box instruments could also be seen as an archaeological site (a container with stratigraphically organized

objects in it). The case studies described in this article indeed 'excavate' fragmentary material texts from a few sounding boxes, as 'sites' which we have now identified, located, and searched. The whole corpus of such sounding-box instruments could be properly and systematically mapped, excavated and studied. The fragments are certainly not as ancient as the ones found on the Oxyrhynchus site or the Genizah fragments,[24] but one might find among the thousands of fragments evidence of a few individual texts considered to have an intellectually or historically important meaning. As we document, catalogue and eventually produce digital facsimiles of those fragments as well as provide digital reconstructions of the documents from which they were excerpted, the number of fragments available for the discipline of fragmentology increases.[25] This research project provides new access to texts, previously forgotten in musical instruments, for book historians, palaeographers, and codicologists.

The main contribution to fragments that arises from this study lies elsewhere. In general, fragments are the result of random alteration or even accidental destruction. In the case of those strips of lining materials inside sounding boxes, fragments are the result of a deliberate act of craftmanship similar to that of bookbinding. This activity falls within the remit of a recycling/upcycling process: it transforms an artefact (a written document) to make a different artefact (lining material made of waste paper of parchment excerpted from this document). Folios are deliberately pulled apart, detached from their gatherings, and the material form of the written fragment is not random. It is no longer determined by a semantic unit but by a mechanical unit intended for a precise craft: instrument making.

Exposed Writing, Concealed Writing

The writings on fragments described in this article are only one of the many types of inscriptions that can be found in musical instruments. Some of the inscriptions are fully exposed, in plain sight. These are the brand of a maker on a guitar, a lute or a cittern, or the name of the maker on the name board on a harpsichord. There are also painted mottos of owners (like the emblems of Charles IX, King of France and his wife Elisabeth, on the above-mentioned bass violin by Amati), or even names or initials of owners written in ink or as a graffiti.[26] Some inscriptions are visible even when they are not in plain sight: the label, the equivalent of the artist's signature on a painting, is glued on the inner side of the back of the sounding box, positioned below one sound hole to be read from the outside. Some other inscriptions are intentionally hidden (texts in places visible only to the restorer who would open the sounding box). The presence of such a variety of texts on the outside and the inside of an instrument is intentional, and the inscription itself is meaningful to the person inscribing it.

With this research what is brought to the fore is not only a new variety of written fragments, but also a new variety of concealed writing, as opposed to the kind of exposed writing analysed by Armando Petrucci or Béatrice Fraenkel. Béatrice Fraenkel discusses the paradoxical relationship between the readability and visibility of exposed writings in public spaces.[27] Hidden writing also exists in many cultures, such as

21. Lucie Moruzzis, *Les écrits restent : stratégies et pratiques de conservation matérielle des documents reliés depuis le XV^e siècle*, Ph.D Thesis, École des chartes-PSL, Paris, dir. Christine Bénévent and Malcolm Walsby, 2023; Hannah Ryley, *Re-using Manuscripts in Late Medieval England* (Boydell and Brewer: Suffolk, 2022).

22. Michael Durrant, 'Old Books, New Beginnings: Recovering Lost Pages', *Inscription*, issue 1 (2020), 50–63, Fig. 6 p. 57; Ryley *Re-using*, pp. 63–65.

23. William Duba and Christoph Flüeler, 'Fragments and Fragmentology', *Fragmentology*, 1 (2018), 2–5.

24. <www.lib.cam.ac.uk/genizah-fragments> [accessed 15 September 2024].

25. For instance with the Fragmentarium Laboratory for Medieval Manuscript Fragments, <fragmentarium.ms/>. A remarkable earlier initiative is the project *Lost Manuscripts*, led by Dr David Rundle of the Centre for Medieval and Early Modern Studies at the University of Kent, which aims in a series of stages to build a union catalogue of manuscript fragments in the British Isles. <www.lostmss.org.uk/project> [accessed 15 September 2024].

26. For a comparison regarding the same period, Charlotte Guichard, *Graffitis. Inscrire son nom à Rome (XVI^e–XIX^e s.)* (Paris: Le Seuil, 2014).

27. Béatrice Fraenkel, 'Les Écritures Exposées', *Linx*, 31 (1994), 99–110. See also Armando Petrucci, *Jeux de lettres. Formes et usages de l'inscription en Italie, XI^e–XX^e siècles* (Paris: Éditions de l'EHESS, 1993).

28. Cécile Treffort, 'Une écriture cachée aux yeux des hommes. Quelques réflexions autour des «endotaphes» médiévales', in *La mémoire des pierres : mélanges d'archéologie, d'art et d'histoire en l'honneur de Christian Sapin*, (Turnhout: Brepols, 2016), pp. 39–45.

29. Thomas Wyatt, 'My lute, awake!', *c.*1538, <www.poetryfoundation.org/poems/45585/my-lute-awake> [accessed 28 June 2024].

30. Many poems of the period, addressed to a lute, are in this case, e.g., Louise Labé, 'Luth, compagnon de ma calamité', *Sonnets* (1555).

31. Adam Smyth, 'Little Clippings: Cutting and Pasting Bibles in the 1630s', *Journal of Medieval and Early Modern Studies*, 45:3 (2015), 595–613, and Adam Smyth, *Material Texts in Early Modern England* (Cambridge University Press, 2018), pp. 17–54.

32. Gallimard, 1961. Discussed in Gill Partington and Adam Smyth, 'Folds – dog ears – creases – pleats – kinks – pranks – convolutions', *Inscription*, 3 (2022), 1–4.

endotaphs – writings discovered by archaeologists inside tombs.[28] These hidden texts are usually intended to perform an operation: prayers or texts accompanying the dead, or sacred inscriptions on stones or frescoes in churches, impossible to read except by God. In the case of the fragments within the sounding box, the meaning is different. The texts on the fragments are probably not intended to perform any votive operation in the instrument and they are mostly invisible. But the writings on the fragments are neither exposed, nor are they intentionally hidden.

Parchment and paper, which were once containers for writing, gain a new status as lining materials. And the instrument in turn becomes a container for these materials, which themselves contain writing – as if it were a clandestine traveller. Only when peeping through a hole can a viewer guess their presence. Were we to be able to enter it, each sounding box would be like a room where the floor and the walls are partially wallpapered with pieces of parchment and paper, where the pattern for the wallpaper would be letters and words; or the space would be like a room in a museum gallery, where the paintings on the walls would be the fragments.

The text written on the side of the fragments that are glued to the wood remain completely inaccessible to the eye. Most of those texts have been unintentionally hidden, because the texts of the fragments were not what mattered the most to the instrument maker. They used the strips for the physical properties of the parchment and paper and these properties are not influenced by the media on it such as ink or pigment. And when the maker closed the sounding box by gluing the sides of the soundboard, the fragments fell into the shadow of the box.

But it is essential to note that without the presence of ink as medium for the written text on the fragments, those strips would not have been destined for this use: it is the written word that, by its presence, transformed the paper or parchment into potential strips. The writing continues to make sense, even after it has lost its original meaning and functionality in a bound or unbound document. The hidden writing in musical instruments tells us something about the reuse and second-hand market of books and archives. This would be part of the cultural history of waste, of so far neglected objects, and of a scrap economy.

The meaning of these strips also reveals another hidden aspect of the literacy and culture of writing that developed in Europe since the Middle Ages. What characterises those strips of fragments is both a mechanical and an economic criterion, for the making of a sounding box depends on the fact that those strips were already used by their users.

What to do with those inscriptions? They were probably not intended for us. A strip carrying writing in a musical instrument is not exactly a message in a bottle. We cannot assume that the luthiers who glued those strips inside the instruments were aware of what they were doing with written words. Those fragments are similar to the newspapers used for packaging, where what was written once as news on paper is not read anymore. The writing on all these reused documents circulates and can be read. Were early musicians who owned and played the instruments interested in the incidental preservation

of the texts? Did they notice the texts? We do not know but what is certain is that the reemploying of text as lining or consolidating material in sounding boxes contributed to widespread practices of writing. This dissemination of writing comes perhaps with a lesser value of the written word but – and this is a case in point with the sounding box – it is also the symbol of a pervasive presence of this written word within every nook and cranny of European society.

Temporary End

The poet Thomas Wyatt wrote 'My lute, awake!' about 1538, around the same time that the Maler lute was made. The first stanza of the poem by Wyatt reads as follows:

> My lute awake! perform the last
> Labour that thou and I shall waste,
> And end that I have now begun;
> For when this song is sung and past,
> My lute be still, for I have done.[29]

It is fascinating to think that if the lute in Wyatt's poem were to waste away (or need repairs), it could have been repaired with waste made of paper similar to the paper on which the poem was first written.[30]

The history of these containers reflects the destruction of Medieval and Early Modern documents and their dissemination into one or more instruments. Most of these documents may not be of the highest interest for the history of texts. So far, no document bearing the evidence of a lost important piece of writing has been discovered in a musical instrument. But this does not mean it will never happen.

Such a novel and large corpus of fragments, each of them associated with 'metadata' (the historical information coming from the musical instruments themselves, associating each fragment to a later material history), is interesting in itself for mapping the supply channel and timeline of the waste materials. The date of making (or repairing) the instrument is the most recent possible time when the writing or the document have lost their primary use: to be read as text.

The exploration and cataloguing of the fragments at an even larger scale – among all relevant musical instruments still extant – would provide powerful data on the economy (circulation, trade, transformation, cutting, displacement) of leaves from a certain type of artefact (written document, book) to another (musical instrument). The study of book-bindings into which there is waste parchment sheds light on the circulation of the waste materials in a semi-closed system, around bookmaking and the use of books, mostly in libraries of monasteries and scholarly centres. The study of waste materials in musical instruments opens larger and different socio-economical circles, and significantly broadens the diversity of the typologies of documents to be rediscovered.

Considering the materiality of the instruments down to the scale of written fragments creates a link between organology (the history of musical instruments and their makers) and the history of texts and books, through the intermission of materiality of texts. With this research a whole field of investigation and research has been opened, and the hope is to gather around the authors of this paper a community to share and experiment with specific methods to find fragments, document them and make them accessible to researchers. It is an invitation to interdisciplinary research, connecting scholars from a variety of disciplines.

As this article sheds light on the texts on the fragments, the status of the fragments evolves from forgotten/neglected/non-existing to known/interesting/existing. Our agency changes how much knowledge has been gathered on the fragments *and* on the instruments. As we proceed to unveil information on the materiality of the texts – type of paper, parchment, type of ink, and so on – the fragments reveal to be containers of material texts themselves located within another form of container: the musical instrument, itself contained within a museum collection.

Each museum of musical instruments can then be considered as a cultural heritage container for musical containers of textual containers. This *mise en abyme* modifies the cultural and heritage values associated with the instruments. Material texts become known artefacts held in the collections of the museum. The museum curator in charge of preserving instruments with sounding boxes (such as one of the authors of the present article) sees their collection expand as each of the instrument containing fragments forms an augmented artefact: the instrument made of fragments of previous documents. Not only do they remain the curator of musical instruments, but they are also becoming the curator of remains of material texts. Perception of time, longer and intertwined temporalities, opens the way for new narratives to recount the history of both the texts and their instrument-containers.

Finally, one may describe the destruction of the earlier spatial organisation of the writing on the page and the unity of the text as a form of editing. The original texts are reshaped and significantly shortened – edited – by the instrument makers when they 'cut and paste', following the traditional practice of manuscript editing.[31] The instrument makers do not arrange the strips of fragmented text according to the text and the ways in which it is displayed on the page, but according to the mechanical properties of the strips and how they interact with the physical properties of the wooden boards forming the sounding box. This organisation of the text in the sounding box invites readers to renew their relationship to a text now available. The sounding box can be seen as a support of reading different from the analogue codex-form book. The renewed relationship between the act of writing and the act of reading the texts that emerges from the collage of strips inside the sounding box questions both authorship and readership. The myriad of potential arrangements of the fragments is similar to the one emerging from *cadavres exquis*, as can be seen in Raymond Queneau's work: *Cent milliards de poèmes*[32] or in the 1964 musical piece *In C* by Terry Riley.

Acknowledgements

Justine Provino put J.-P.É. on the fragmentology path in the beginning of 2018. Her insightful presence accompanied the authors since, until finding the title of this very article. On November 16th, 2021, during a session of the seminar she co-chaired with Siddarth Soni (Digital Afterlives Research Network, Cambridge Digital Humanities) and where J.-P.É. and Oulfa Belhadj presented the first steps of this research, one of the participants used the term 'container' as a potential path for further research for the authors. The authors are also very grateful to Laura Albiero, William Duba (in particular for the identification of the Hugues de Saint-Cher text and edition), the participants to the Fragmentarium seminar (15 December 2021, <www.youtube.com/watch?v=MOVcZivf-aU>), as well as to Oulfa Belhadj, Marco d'Agostino, Alexandre Gillon, Salomé Blœdé for the excellent research on the Laux Maler lute, Thaïs Wuillemin for the image treatment on the Stradivari paper fragments, and Julie Toupance for the photographs of the Aman theorbo and the colachon. The authors also invited Sebastian Kirsch to the collective elaboration of this research, he attended from 2020 to 2022.

Pierre Chastang, Marie Fontaine-Gastan, Lucie Moruzzis, Justine Provino, Catherine Rideau-Kikuchi, Lise Saussus, and Valérie Theis, for their careful comments and suggestions on the manuscript.

Finally, the authors thank the two anonymous referees for their enthusiastic and insightful comments, leading us to greatly improve our initial manuscript.