Conservation Issues on Historical Pedal Harps: Preserving Tangible and Intangible Properties

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Abstract

This paper presents the results of interdisciplinary research aiming to document, classify and preserve the features of historical pedal harps, while discussing issues of conservation and restoration. The focus of this study is an early double-action harp by Erard in the Deutsches Museum. Because little is known about the manufacture and use of this harp, the instrument is initially investigated with several analytical techniques in order to identify its original construction materials and to detect any additions or modifications. Additionally, due to its fragility this historically important instrument is not in playing condition, and thus non-invasive tests are employed to obtain information about its vibratory behaviour. The data collected from the examination of this harp are compared to data from four similar Erard harps in private and public collections with the intention to expand the knowledge on the design of these instruments. Moreover, since one of these harps has been restored to playing condition with the addition of a new soundboard, the comparison between the five harps also allows to observe the impact of the different conservation and restoration approaches on the vibratory behaviour as well as on the authenticity of the instruments.

1. Introduction: The Shift from Material to Immaterial

Until recently the conservation of historical musical instruments in museums focused mainly on the documentation and preservation of their construction materials. However, in the last years the attention of researchers and conservators has shifted towards the immaterial characteristics, which are considered equally significant for the comprehensive study of such artefacts [2]. Because of the double role of musical instruments as cultural objects and functioning devices designed to produce sounds, it has become increasingly important to preserve not only their substance, but also the information they contain [3]. An example that demonstrates the above mentioned issues in the conservation of musical instruments concerns historical pedal harps from the late eighteenth and early nineteenth centuries. These instruments, which are built and decorated with various materials, including wood, metal, ivory, bone, textile, paper, etc., typically include numerous delicate functioning components controlled by pedals [4]. With the

passing of time and due to the physical and chemical degradation of their materials, many of these harps have become fragile and unplayable [10]. Apart from any aesthetical, mechanical or statical issues, this fact also creates issues of interpretation and contextualisation of these instruments.

2. Case Study: Object-based Research on Erard Harps

This situation can be observed on an early double-action harp by Erard N° 2631 (London, 1818) in the Deutsches Museum (Inv. No.: 16147). This harp will be displayed in the new permanent exhibition of musical instruments and therefore a thorough examination of its tangible and intangible properties is crucial for its preservation and future display. Because little is known about the manufacture and use of this harp, the instrument is initially investigated with various analytical techniques (e.g. SEM-EDX, FT-IR, GC-MS, fibre analysis, endoscopy, radiography) in order to identify its original construction and decoration materials, and also to detect later additions or modifications [7]. This material analysis enhances the results of earlier scientific research [8], assisting the harp's forthcoming conservation. For instance, radiography reveals hidden details of the harp's internal structure (**figure 1**), while allowing useful comparisons to extant Erard patents [9].

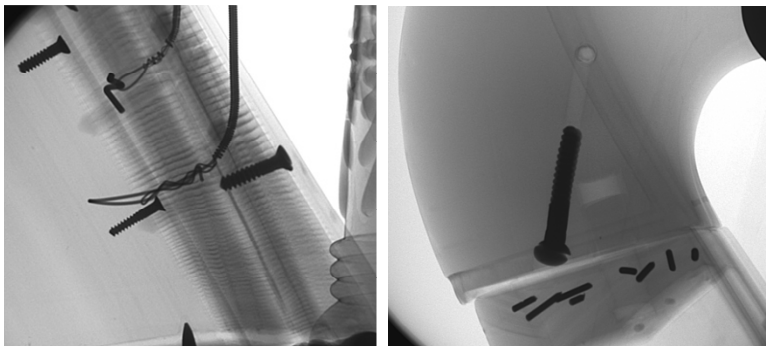

Figure 1: X-ray photographs revealing the use of screws for the attachment of the soundboard to the soundbox (left) and inside the shoulder (right) of the harp N°2631.

However, due to its fragility this historically important instrument is currently not in playing condition. Therefore, in order to examine the vibroacoustic behaviour of the harp N° 2631 the methodology proposed in a recent study of historical harps [6] is applied. Using a simple setup with a piezoelectric sensor and impact hammer (**figure 2**), mechanical mobilities are measured for the soundboard and for two symmetrical positions at the soundbox, and mean values of mobility are calculated. This method of excitation is commonly utilised on modern instruments, but on historical instruments it has certain limitations. For example, the pointed metal tip of the used impact hammer can leave visible dents on the soundboard wood and therefore low-strength adhesive tape should be used to protect the soundboard, resulting unavoidably in a smaller observable frequency range due to a softer contact surface. Furthermore, fixing the acceleration sensor on the harp with synthetic wax can cause abrasion, stains or loss of paint and thus pre-

liminary tests should be performed on unobtrusive areas of the instrument to examine if there is any surface damage. Also to avoid any risk of mechanical damage from tension, the strings of the harp N° 2631 are not tuned to playing pitch.

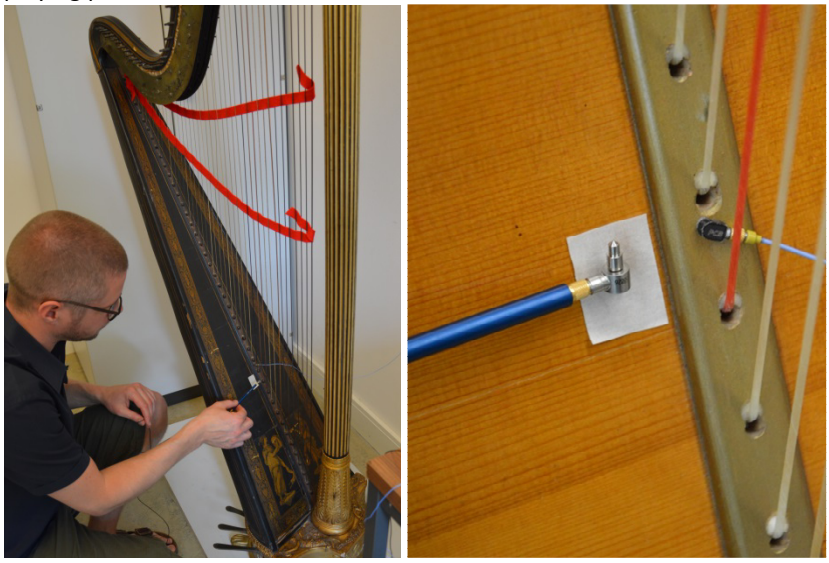

Figure 2: The setup for the vibroacoustic examination on the harp N°2631 (left) and detail of the sensor and hammer used for the mobility measurements on the soundboard of a similar Erard harp N°4534 (right). Note that the harp strings are damped with felt and that low-strength adhesive tape is used to prevent any dents from the sharp hammer tip.

The results for harp N° 2631 are compared to results obtained from a similar Erard harp in private collection. This harp was restored in the late 1980s; during this work, the original soundboard was removed and a new soundboard was installed. The data from these two harps are then compared to data from three other Erard harps in the Musée de la musique [6]. **Table 1** presents the main reference details of the five Erard harps.

Table 1: Main reference details of the five Erard harps.

Serial No.	Place	Date	Collection	Inv. No.	Strings tensioned
2631	London	1818	Deutsches Museum, Munich	16147	No
3006	London	1820	Musée de la musique, Paris	E.991.14.1	No
3070	London	1821	Musée de la musique, Paris	E.0997	No
3830	London	1826	Musée de la musique, Paris	E.2003.5.8	Yes
4534	London	1832	Private collection, Germany	NA	Yes

The organological documentation and comparison of the harp N° 2631 to the other four harps shows that Erard double-action harps manufactured in London during the early nineteenth century demonstrate a relatively uniform and stable design regarding their overall dimensions, geometry, scaling, weight, etc., as well as a similar vibratory behaviour (**figure 3**), reflecting the standardisation of their production. In addition, the low mobility value

for the soundboard of the harp N° 4534 can be attributed to its new soundboard, which is considerably thicker and heavier than that of N° 2631, an instrument that retains its original soundboard.

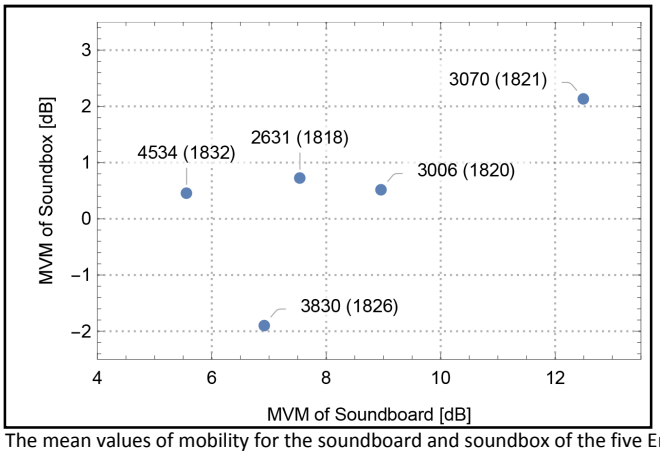

Figure 3: The mean values of mobility for the soundboard and soundbox of the five Erard harps listed in Table 2.

3. Conclusions

Object-based research on surviving Erard harps is essential for the better understanding of these instruments, complementing existing archival research on the Erard firm [1]. However, when dealing with historical instruments there is often a conflict of approaches, since by obtaining information on intangible values (e.g. sound) there is always a risk of losing tangible values (e.g. materials) [5]. For example, the return to playing condition with extensive restoration measures (e.g. new soundboard) can distort the original features of a harp. Furthermore, the vibroacoustic study of the harps proves that there are conservation issues even for methods that are usually described in the literature as 'non-invasive' or 'reversible' and thus a risk management plan is necessary to prevent damage.

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