Adrian von Steiger

The Preservation of Historical Brass Instruments. Developing Guidelines for Their Preventive Conservation

> "[W]hen one looks beyond the simplistic 'us and them' of museum conservation versus practically the rest of the world, a whole new picture emerges. Dissecting the rationales that underlie and drive the actions results in conclusions of a very different complexion."[1]

Brass instruments have a relatively short lifespan, mainly due to corrosion, and so wear out and have to be replaced after several decades (or even after several years). In consequence, it is mostly impermissible to play historical brass instruments belonging to collections or museums. As part of our cultural heritage, these instruments have to be preserved in the best possible way. But by playing them, we can gain more information on the instruments and on their historical and musical background. This information itself enriches our cultural heritage, it can help us to understand other aspects of historically informed performance practice, and might also help us to produce replicas. Thus, the fundamental dilemma 'to play versus to display' of historical instruments emerges (see below).

So, if we nevertheless decide to play historical brass instruments – for whatever reason – then we should do our best to protect them. Wearing gloves is a well-established means of protecting the outer surface, but there have been only rare discussions about how to protect the interior of the instrument. This system of tunnels, that can be up to over ten metres in length (tuba), with a number of crossings and sections that are normally closed (the valve tubes), is sort of a black box to conservators. This situation is unique, as research has been conducted on all the other musical instruments, some of which are much more challenging than brass instruments (for example keyboard and woodwind instruments).[2]

We evidently need to conduct research in order to acquire greater knowledge of the interior surface of brass instruments, and so that we might better protect our cultural heritage. Before a museum or collection decides whether to allow someone to play a historical brass instrument, we simply ought to know the impact that playing it can have.

1 Robert Barclay: *The Preservation and Use of Historic Musical Instruments*, London 2004, p. xi.

2 e.g. Ilona Stein: Blasfeuchte in Holzblasinstrumenten, in: *Studien zur Erhaltung von Musikinstrumenten. 1: Holzblasinstrumente, Firnisse*, ed. by Friedemann Hellwig, Munich 2004 (Kölner Beiträge zur Restaurierung und Konservierung von Kunst- und Kulturgut, Vol. 16), pp. 9–121).

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– How do brass instruments corrode on the inside?
– What are the phenomena of interior corrosion? And how do they affect the instrument?
– Can we protect the inside of brass instruments?
– Are there concepts for preventive conservation of the inside of brass instruments, and if so, can they be optimised?

These questions were among those that provided the motivation for our research project. It was conducted by four leading Swiss research institutions, and its full name is "Brass instruments of the 19th and early 20th centuries between long-term conservation and use in historically informed performance practice".[3] Our aim was to better understand corrosion phenomena on brass and its application to musical instruments in general, and to develop concepts for preventive conservation when playing historical brass instruments in particular. Our work and our results are presented in detail in this book as well as in specialised journals.[4]

To play versus to display This short formula refers to the basic dilemma of all historical instruments (and in fact, of all functional historical objects). If we play them continuously, or if we take them out of museums and play them again after a non-playing period, then there will be wear and tear, their movable parts will wear out and have to be replaced, and they risk being damaged or lost. Wind instruments suffer the most, as the moisture in the breath blown through them affects the wood and corrodes the brass. This is the reason for the relatively short lifetime of wind instruments. So it is understandable that museums and collections either do not allow anyone to play their wind instruments, or at least minimise their playing time (though in fact minimal playing results in questionable insights due to the short experience time, while the risk due to humidity is almost the same as if one were to play the instrument for a longer period).

3 See www.hkb-interpretation.ch/projekte/korrosion (all links in this article last consulted 28 July 2022). This project was funded by the Swiss National Science Foundation, interdisciplinary department CoRe.

4 Articles giving an overview of the project and its results have been published in the HBS Journal and in Glareana: Adrian von Steiger/Daniel Allenbach/Martin Ledergerber/Bernhard Elsener/David Mannes/Tiziana Lombardo/Federica Cocco/Marzia Fantauzzi/Antonella Rossi/Martin Skamletz/Martin Mürner/Marie Wörle/Emilie Cornet/Eberhard Lehmann: New Insights into the Conservation of Brass Instruments: Brass Instruments Between Preventive Conservation and Use in Historically Informed Performance, in: Historic Brass Society Journal 30 (2018), pp. 85–101, https://doi.org/10.2153/0120180077005; Adrian von Steiger/Daniel Allenbach/Bernhard Elsener/Martin Ledergerber/Tiziana Lombardi/David Mannes/Martin Mürner/Martin Skamletz/Marie Wörle: To play versus to display. Historische Blasinstrumente aus Messing im Spannungsfeld zwischen Konservierung und Nutzung, in: Glareana 64/2 (2015), pp. 4–18 (in German).

If we do not play historical instruments, however, they are reduced to just one facet of their identity: they are mere objects, a testimony of craftsmanship. We could investigate them by conducting metrical measurements, tomography and material analyses, and we could determine their manufacturing techniques. But they would lose another aspect of their identity, namely their purpose as a tool for sounds, for music. If we play them on a regular basis, however, sooner or later we will lose their material identity.

Concerts on period instruments have been successful for many years, and the early music scene is growing (regardless of whether one considers this movement to be innovative and modern, or authentic and historical[5]). In consequence, there has been a growing demand over recent decades to be allowed to play historical instruments, and the conservational aspect has become more acute than is the case for other object types in collections and museums. Furthermore, historically informed performance practice is today focussing more and more on the music of the nineteenth and twentieth centuries, so specialised musicians are demanding to be able to play period instruments from that time too. Their aim may be research, to gain experience, or to acquire the knowledge necessary to be able to build replicas. But often, these instruments are also hunted out so that they may be played 'normally' in projects or orchestras for the music of certain periods and/or regions. And as wind instruments of that time vary greatly according to their period and region of construction, it is neither worthwhile to instrument builders to produce replicas of all of them, nor would these be affordable to musicians or orchestras. So, many musicians prefer to play on originals. This situation today has only further intensified the dilemma of how to conserve our cultural heritage.

These facts should be well known to all those involved – to museums, conservators, researchers, musicians and conductors. But still we note the antagonism "'us and them' of museum conservation versus practically the rest of the world" (see the initial quote). This dilemma is by its nature impossible to solve for a single instrument, though solutions have been proposed for the entirety of our musical heritage.[6] Aspects such as rarity,

5 These contradictions were discussed in the so-called 'authenticity debate' during the pioneering phase of the early music movement. See e.g. Richard Taruskin: "The Authenticity Movement Can Become a Positivistic Purgatory, Literalistic and Dehumanizing", in: *Early Music* 12/1 (1984), pp. 3–12; id.: *Text and Act. Essays on Music and Performance*, New York 1995; Daniel Leech-Wilkinson: "What We Are Doing with Early Music Is Genuinely Authentic to Such a Small Degree That the Word Loses Most of Its Intended Meaning", in: *Early Music* 12/1 (1984), pp. 13–16; and *Authenticity and Early Music*, ed. by Nicholas Kenyon, Oxford 1988.

6 See Robert Barclay: *The Preservation and Use of Historic Musical Instruments*, London 2004; Jeremy Montagu: Should Museum Instruments be Used?, in: FoMRHI *Quarterly* 26/1 (1982), pp. 11–12; id.: The Availability of Instruments in Museums, in: *Per una carta europea del restauro. Conservazione, restauro e riuso degli strumenti musicali antichi. Atti del convegno internazionale (Venezia, 16–19 ottobre 1985)*, ed. by Elena Ferrari Barassi and Marinella Laini, Florence 1987, pp. 369–380; and Arnold Myers: The Con-

fragility and the original state of an instrument can lead to a ban on playing, or at least to restricted use by a more or less restricted group of musicians. The goal remains the conservation of a representative selection of objects of our cultural heritage in museums. But by having these instruments played by a specialist, inherent information might be gained. Thus, we come to the issue of the scientific value of the object.

To have a selection of instruments, preserved to the best of our ability in public institutions and supplemented by the greatest possible amount of information on them (including their playing characteristics), would be an exciting goal to achieve in preserving our cultural heritage. By gaining information from playing instruments in good condition, and with the help of specialists in period instruments, documented by means of video and written reports, we can enhance and preserve our knowledge of both identities of a historical instrument – the object and the tool for music. It is important in this process to carry out research to find information on appropriate interfaces (i.e. mouthpieces). This is a key issue to which up to now insufficient attention is paid. With the help of databases such as MIMO,[7] this information might also be disseminated throughout the wider community. Thus, it seems it might be possible to overcome the dilemma of 'to play versus to display', and instead end up in a situation of 'to play and to display'.

The research project The present research project was thus engaging with a new field (the interior of brass instruments) within a known landscape (the fundamental dilemma of whether or not to play historical musical instruments). I shall here name just a few of the major challenges we faced:

- How can we apply conservation measures before and after playing, so as to ensure a long life for the object?
- How can we produce replicas appropriate to today's musical and technical demands?
- What are we to do with all the special, rare models of brass instruments from the nineteenth and twentieth centuries from different cultural traditions in Germany, Austria, France, Britain, the USA, Russia and elsewhere – those models that are not considered economically interesting of being reproduced today?
- What is the best practice for recording and conserving the inherent information of the instruments?

servation of Wind Instruments, in: ibid., pp. 221–233; id.: Cataloguing Standards for Instrument Collections, in: CIMCIM *Newsletter* 14 (1989), pp. 14–28, see www.euchmi.ed.ac.uk/itnXIVc.html. See also the articles of Arnold Myers and Robert Barclay in the present volume.

7 Musical Instrument Museums Online, the searchable platform of many museums and collections and many thousands of instruments, www.mimo-international.com.

- How can we conserve and communicate the playing characteristics of an instrument, such as mouthpieces, its variety, timbre and dynamic potential, its playing pitch and the possible range of pitch variations? (Players on one and the same instrument can differ substantially in their playing pitch on account of differences in individual embouchure and technique.)
- How can we achieve a respectful, reversible restoration to 'soundability' or even to playability?
- Interfaces such as mouthpieces, reeds, sticks, strings, hammers or bows are essential parts of an instrument. We must focus on these, both from a research and a performance approach.
- We need research on musical contexts: Were the instruments played in a teaching, orchestral or military context?

Such questions have often arisen among musicians in historical performance practice and also in the course of earlier HKB research projects that have involved playing and copying historical brass instruments. We set up our research team with all these questions in mind. The variety of aspects involved meant the team had to be multidisciplinary, bringing together historians, practical musicians, conservators and natural scientists specialised in surface analysis and corrosion as well as in imaging technologies. The contributions of all the team members are presented in the present volume. Our goal was to look beyond the "'us and them' of museum conservation versus practically the rest of the world" and to leave 'to play versus to display' behind us in a search for a third way to deal with historical brass instruments.

Preliminary research on humidity inside brass instruments led us to the fundamental insight that corrosion is the main reason for their relatively short lifetime. This then led to the basic hypothesis of our research: Drying the inside of the instruments after every playing session can contribute to significantly reducing the corrosion processes in the interior of historical instruments (this also applies to modern brass instruments). Taking this hypothesis as our starting point, the project searched for solutions to drying the instrument, for means of doing this that would be practicable for musicians, and for ways of measuring its impact.

For this field test, we were on the lookout for a score that demands interesting brass instruments from a historical point of view – one that would entail playing historical instruments that are still available on the instrument market. We chose Stravinsky's *Le Sacre du Printemps*, for which our brass section would play on period instruments.

Sacre was composed in 1913 for a Parisian orchestra, so twenty-one French instruments of that period in playable condition were required. These instruments formed the

main focus of our research, under the auspices of Martin Mürner. The musicological research on the first performance of *Sacre* and its instruments was carried out by Daniel Allenbach. Our partners in the department of conservation and research at the Swiss National Museum were Marie Wörle and Tiziana Lombardo, both of whom are chemists, and Martin Ledergerber, who is a specialist in preventive conservation. They proposed electrochemistry as the most promising analytical method for monitoring the progress of corrosion. At that point, the corrosion specialist Bernhard Elsener from ETH Zurich and his colleagues Antonella Rossi and Federica Cocco of the University of Cagliari (Italy), both experts in surface analysis, joined the team. Neutron tomography is the speciality of Eberhard Lehmann and David Mannes at the Paul Scherrer Institute, and this was chosen as our second monitoring method. It was hoped that a cross-comparison of the results of electrochemistry and tomography could offer new insights into the development of corrosion in brass instruments over time. During the project, a third monitoring method was added: visual examination by endoscopy, performed by Martin Ledergerber.

Some remarks about the project's general design For the research on corrosion phenomena, we chose sixteen of the twenty-one brass instruments needed for the *Sacre* (see Figure 1). All were taken from playing collections, not from museums. The conservator of the National Museum thus had a role in the project to which he was unaccustomed. From a museum's perspective, this project would have been impossible in many ways, not only on account of lending out and playing the instruments.

The instruments used in the project are made of slightly different brass alloys. The chemical composition we measured was brass with a zinc content ranging from 25 to 35 per cent. Most of the alloys include up to one per cent of lead (the turned parts are made of other alloys, but they are not relevant for the interior corrosion). As was known from previous research, this was the normal brass used by French instrument-makers at that time.[8] Preliminary research at ETH showed that this range of difference in the chemical composition of the tubes does not affect the results of the electrochemical analysis of corrosion states and corrosion rates, and can therefore be ignored.

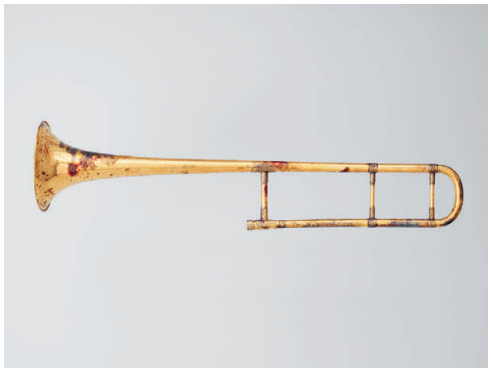
8 See Adrian von Steiger/Marianne Senn/Martin Tuchschmid/Hans J. Leber/Eberhard Lehmann/David Mannes: Can We Look over the Shoulders of Historical Brasswind Instrument Makers? Aspects of the Materiality of Nineteenth-Century Brass Instruments in France, in: *Historic Brass Society Journal* 25 (2013), pp. 21–39, https://doi.org/10.2153/0120130011002; and Marianne Senn/Hans J. Leber/Martin Tuchschmid/Naila Rizvic: Blechblasinstrumentenbau in Frankreich im 19. Jahrhundert. Analysen von Legierung und Struktur des Messings zugunsten eines historisch informierten Instrumentenbaus, in: *Romantic Brass. Französische Hornpraxis und historisch informierter Blechblasinstrumentenbau. Symposium 2*, ed. by Daniel Allenbach, Adrian von Steiger and Martin Skamletz, Schliengen 2016 (Musikforschung der Hochschule der Künste Bern, Vol. 6), pp. 398–419. For information on the project see www.hkb-interpretation.ch/projekte/blechblasinstrumentenbau.

Figure 1 The 16 instruments involved in the long-term study: 8 horns, 5 trumpets, 1 Wagner tuba, 1 trombone, 1 tuba (Photos © Schweizerisches Nationalmuseum)










The first phase of the project embraced all the basic research on corrosion and humidity as well as on the instruments to be chosen. In a second phase, a long-term study was carried out whereby the development of interior corrosion phenomena over time was monitored with the help of all three methods, namely electrochemistry, tomography and endoscopy. All the instruments were played every day for at least five minutes over fourteen months. They were investigated at the start, after seven months and at the end. Gloves were used to prevent exterior corrosion. For eight of these sixteen instruments, the players applied a protocol of preventive conservation, emptying all condensed water and drying the inside with the help of a fan after every playing session. For a second group of seven instruments, the players only did what they usually do at the end of playing, simply emptying the condensed water. One reference instrument remained unplayed. The players kept records of their playing time. This gave a total of over two thousand minutes of playing time.

Our three monitoring methods of electrochemistry, tomography and endoscopy differ in their detection size from a few millimetres up to several centimetres. But none of them can examine an entire instrument, let alone sixteen instruments. So specific hotspots were chosen to be measured by all three methods, namely the tuning slide and one valve slide of every instrument, these being areas that never dry without ventilation. For the horns and one trumpet, the crook was measured as a third hotspot. In total, thirty-four parts, slides and crooks of the sixteen instruments were monitored (see Figure 2).

While tomography made an overall 3D examination of these parts, the endoscopy took pictures of its straight tubes, and electrochemistry measured two or three spots of the same straight tubes. For example: the tuning slide and the first valve slide of a tuba were investigated (see Figures 3 and 4). Figure 5 shows photos of the latter through the endoscope. The addition of corrosive layers over time is easily visible. The tomography in Figure 6 shows similar spots of material, and the electrochemistry measured the polarisation resistance at the start, at the mid-point and at the end of the long-term study.

The analysis of the results initially gave the usual cloud of data. Every method found corrosion phenomena and its development over the period of our long-term study at certain spots, and an unclear situation at other points. Finally – in the third and final phase of the project – we found ways of better understanding the results, ranging from visual detection to statistical analysis. A cross-comparison of all three methods gave further insights, both concordances and differences.

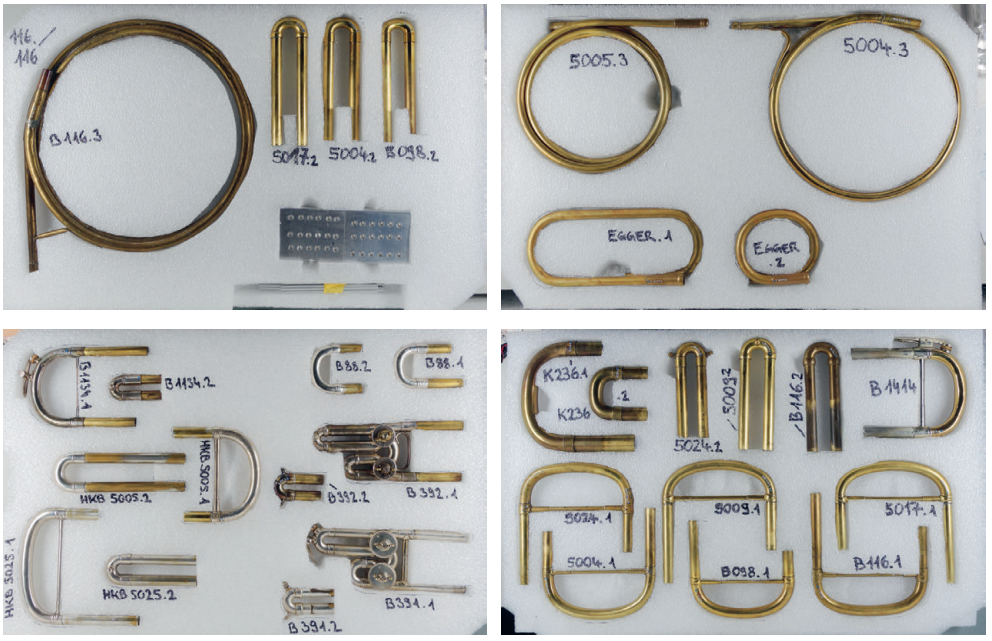


Figure 2 The 34 parts of the 16 instruments examined in detail before, at the project's mid-point, and at the end of the long-term study

Figures 3 and 4 The *tuba français à 6 pistons*, made before 1920 by J. Gras in Paris; and its valve slide of the first valve

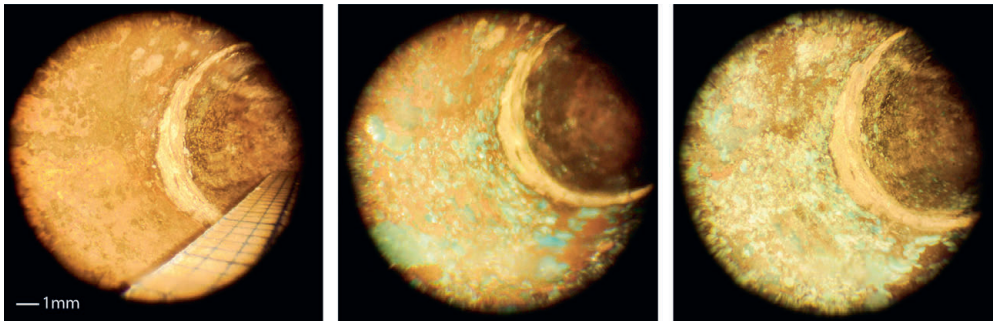


Figure 5 Endoscope photos of the inside of the first valve slide at the point where the straight tube and the bow are soldered together. Left: at the start; middle: at the mid-point of the project; right: at the end of the 14 months of playing

Figure 6 Neutron tomography, made at the end of the long-term study, of one tube of the same valve slide

From scientific results to musician's routine The following focusses on an application of the project's results in the treatment of historical brass instruments that are played.[9] Seen, that every playing situation is different and that individual corrosion phenomena and their development are not generally predictable, this cannot end up in general rules, but in guidelines for better protection of the cultural heritage objects including their inherent information.

For the sixteen 100-years-old brass instruments involved in the long-term corrosion research over fourteen months, the three examination methods electrochemistry, tomography and endoscopy in combination let us statistically conclude that drying of the instrument's inside after use reduces corrosion processes caused by the brought-in moisture. The results of endoscopy and electrochemistry are shown in Figure 7 for the detected parts of instruments with prevention (drying with the help of a fan) and without.[10] In the first group, we find only one instance of significant change in the endoscope test and only two in the electrochemical tests (Rp value much lower). Thus, circa 95 per cent of the tested tubes showed similar or unchanged corrosion phenomena in the endoscope image and similar or identical electrochemical values. In the group of instruments that were treated in accordance with common practice, not using a fan, endoscopy and electrochemistry revealed about 30 per cent of significant changes.

In conclusion, drying the inside of a brass instrument after use statistically reduces interior corrosion processes by a factor of about six, from 30 to 5 per cent. But it cannot

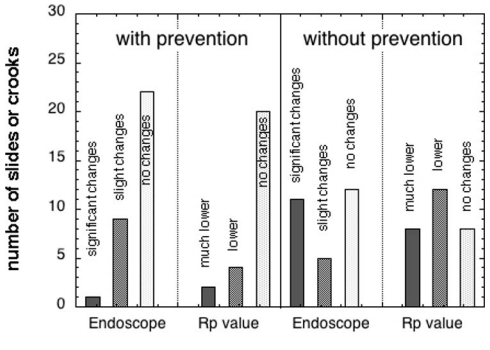


Figure 7 Extent of changes inside the inspected tubes as a result of long-term use as determined by endoscopy (visual examination) and electrochemistry (polarisation resistance Rp)

9 I am grateful to all project's collaborators for their contributions towards an interpretation of the results with regard of preventive conservation routines as well as the participants of the final discussion of the CIMCIM annual meeting and Fourth Romantic Brass Symposium in Bern in February 2017 for their inputs. The paper has been presented in the international conference "Playing and Operating. Functionality in Museum Objects and Instruments", Paris, February 2020.

10 One single instrument was not played at all. It showed no changes after the 14 months. For all details of procedure and results see the articles by Martin Ledergerber (pp. 92–96) and Bernhard Elsener et al. (pp. 61–72) in this volume.

exclude such processes. In minimum, they are activated during the 'time of wetness', that is, while playing and drying. The statistics only show an average of its preventive conservation effect. Moreover, instruments also wear and tear through use and they even can be damaged by use or transport. All these effects are the reasons for the relatively short lifespan of all wind instruments, compared to string or percussion instruments.

Consequences for instruments in museums The cultural heritage in museums and collections is preserved to maintain objects over generations. In consequence, the playing of wind instruments is not allowed in most institutions. But with the aim of gaining the inherent information such as pitch, intonation characteristics, pitch flexibility by bending the notes, sound characteristics, sound homogeneity over the range, playing characteristics, response, and ease of handling, institutions perform playing tests with experts.

For reliable results of such tests, museum instruments must be prepared to real playing condition.[11] Often, the instruments need to be brought to soundability.[12] Such interventions must not change the object in terms of restoration. Non-corrosive oil and grease must be used.[13] Appropriate period mouthpieces must be found, a challenge also for experts. Then the instrument must be prepared through playing for at least some minutes until the usual film of wetness inside the tubes is built. Even an expert needs much playing time to understand the characteristics of an instrument. The tests must be documented by video, audio and discussion protocol. Finally, all this material must be best conserved together with the instrument[14] and the instrument itself must not only be dried with the help of the fan but treated by the conservator using appropriate long-term conservational measures.

The Hochschule der Künste Bern HKB in collaboration with Klingendes Museum Bern and other collections of historical brass instruments has performed several musical projects playing historical brass instruments. The described guidelines have been

11 The following is based on experiences of the project under discussion as well as of other projects of HKB and other institutions. See e.g. Adrian von Steiger: "Agilité, homogénéité et beauté". The Saxhorn in the Context of the Opéra and Military Music, in: *Das Saxhorn. Adolphe Sax' Blechblasinstrumente im Kontext ihrer Zeit. Romantic Brass Symposium 3*, ed. by Adrian von Steiger, Daniel Allenbach and Martin Skamletz, Schliengen 2020 (Musikforschung der Hochschule der Künste Bern, Vol. 13), pp. 9–17.

12 For the terms of soundability and playability I follow the concept of Robert Barclay, in: *The Care of Historic Musical Instruments*, ed. by Robert Barclay, London 2004, pp. 6 f.

13 See Martin Ledergerber/Emilie Cornet/Erwin Hildbrand: Humidity in Regularly Played Historical Brass Instruments, pp. 48–60 in this volume.

14 See Arnold Myers: Preserving Information Relating to Instruments in Museums, pp. 120–127 in this volume.

followed. The experiences are: none of the instruments got damaged or lost; none had to be restored before use in an unjustifiable way, all were only prepared for soundability; the use of fans prevented almost all corrosion of the inner surface; and historical mouthpieces as well as replicas of such mouthpieces were used.

In conclusion, drying the inside of the instruments after every single playing session seem to be a very important guideline for these situations (beside reversable interventions of restoration, wearing gloves and use of non-corrosive oil and grease). It reduces the 'time of wetness' and therefore the time of activated corrosion to the real playing time. Although that might be many hours over many days, this is a short period compared to the months of activation when an instrument is not dried after playing – maybe after a so-called short playing session, restricted in time in order to a well-intentioned but misunderstood better protection of the instrument.

Musician's routine Beside the instruments in museums, a great number of historical brass instruments in playing condition today is in the hands of the musicians of the historical performance practice scene. A majority was built in the nineteenth and early twentieth centuries. They show a great variety of types according to history, place of origin and musical use. This leads to the variety of sound colours of orchestras and bands which is an important clue for the historical performance practice movement.[15]

In line with the principle that one should use an appropriate instrument for each work, specialised players use a large number of original instruments, changing them constantly. This is also the reason why the production of replica can hardly be affordable for the player and profitable for the maker. Therefore, originals will be used also in future. The trend to play originals will become even more widely followed as the HIP movement expands further into the repertoire of the twentieth century and draws an ever-greater number of performers and listeners into its orbit.

Therefore, it seems to be urgent that the project's insights lead to a new approach in the use especially of these instruments 'in the wild'. An occasional use or an 'only short try', as often done for tests of historical instruments, is the worst possible method. It gives musically unreliable results and ends up in the same long term of many days of humid interior surface and therefore of activated corrosion. In contrast, by drying the inside after every use with the help of the small fan, the time of wetness and thus the corrosion

15 As seen in the research project under discussion, the sound of period French brass instruments for Stravinsky's *Le Sacre du Printemps* differs enormously in immediate comparison to modern instruments. And as seen in a former project, a French military brass band of the 1860s using period saxhorns, cornets, trombones and percussion create an unexpected sound quality, see www.hkb-interpretation.ch/projekte/saxhorn/article-142.

loss can be reduced significantly. Testing and recording these instruments in playing condition, in combination with a careful handling and transport, these historical objects 'in the wild' can even give information which cannot be provided by silent or unplayable instruments in museums and therefore contribute to their safeguard.

Scientific point of view Questions about playing historical brass instruments arise not only from the ethical side of conservation, but from the scientific side: What are the insights of such playing of historical brass instruments? What can end up in misunderstandings?[16]

- Our museum objects are old, they differ, to an unknown extent, from their state when they were new. Therefore, the golden road is the production of faithful replica. Faithfull in terms of material properties as well as of manufacturing techniques, not only in terms of geometry. But, to achieve this, we need in turn to play historical models for comparison, as a compass for replica production.
- Originals may be restored to soundability without any changing or replacing of parts. This intervention differs basically to a restoration to playability in concert. If an instrument does not work properly, only a restorer should be allowed to fix them in line with the ethics of preventive conservation. This is not a solid basis for a public concert, when the instrument must work properly in that very moment.
- We mostly do not know from which context our historical instruments originate. Brass instruments approximately 80 per cent originate from the military context. These are suitable for HIP of military music but in most cases not for the symphonic or operatic repertoire. Here, often other models of brass instruments were in use.[17]
- A good instrument normally is played until it falls apart and get thrown away. It does not end up in a museum. Typical backgrounds of museum's instruments in contrast are, for example, that they were representative instruments, or shelf warmers because they did not work properly, or they were outdated, or they were special instruments such as prototypes that remained in the workshop and ended in the workshop's

16 I concentrate here on the technical side of the instruments, the much broader musical side is known under the term "Authenticity discussion", for a compilation see John Butt: Authenticity, in: *Grove Music Online*, https://doi.org/10.1093/gmo/9781561592630.article.46587.

17 An estimation of a ratio of instruments for military band use vs pedagogical use vs symphonic use has never been properly made. The ratio for the nineteenth century of 80 per cent production for military use is a guess, discussed with participants of the Fourth Romantic Brass Symposium in February 2017. See also Trevor Herbert: Selling Brass Instruments. The Commercial Imaging of Brass Instruments (1830–1930) and Its Cultural Messages, in: Music in Art 29/1–2 (2004), pp. 213–226.

museum or depot. In consequence, museum objects often are not the really played instruments, they are not the front side of the coin, but its reverse.[18]

– We must question, who is playing these historical instruments. There are musicians with a great talent to adapt their playing technique to an instrument and therefore to understand historical instruments (not immediately but after a while). They may then understand the features such as which interface to use, what could have been the pitch of an instrument and they are able to adapt their articulation to the instrument not vice versa.

In conclusion: A permission to play an instrument should not be naive, neither from the perspective of ethical standards nor from the scientific point of view. The goal must be the gain of information in a research context or in order to conceive replica. Otherwise it ends up in misunderstandings. But then, acknowledging the questionable points, the gain of playing historical wind instruments in a controlled and research-based framework can be more important than its risks.

18 An estimation of the survival rate of historical musical instruments is possible in rare cases, when the production figures are known. This is the case for the production of the Salvation Army, see Arnold Myers: Instrument Making of the Salvation Army, in: *The Galpin Society Journal* 73 (2020), pp. 30–59; and for Adolphe Sax, see Adrian von Steiger: Sax Figures. Can We Deduce Details of Adolphe Sax's Instrument Production from the Sources?, in: *Revue Belge de Musicologie* 70 (2016), pp. 129–148.

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To Play or Not to Play

Corrosion of Historic Brass Instruments

Romantic Brass Symposium 4 • Edited by Adrian von Steiger, Daniel Allenbach and Martin Skamletz

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