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The Sound of the *Stradivari* Violin – between Tradition and Modernism

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Abstract: *The Stradivari violin had classical instrument manufacturing reach its peak and is also a landmark for consecrated creators and performers. Reproducing the unique sound has been a challenge for luthiers all around the world. At the same time preserving the sound quality and implicitly the instruments themselves remains a difficult task especially for the Museum in Cremona which has undertaken the responsibility of keeping a history page intact. An important step in this direction was taken in 2017, with the international project of the electronic library for the original sound of the Vesuvius violin, one of Antonio Stradivari's gems. The technical team who successfully completed the project redefined high-quality sampling from a new perspective. Due to it, instrumental music composers can refine their creative discourse inspired by authentic, brilliant sonic material.*

Key-words: *electronic sound, Stradivari violin, Vesuvius, articulations*

1. Introduction

In the course of time there have been may attempts at perfecting instruments – with regards to an elegant shape, obtaining the most expressive and rich sound and also to facilitating technical execution. This pursuit is a natural response to the remarkable evolution of the music discourse along the centuries since instrument building had to answer new progressive requirements from composers and performers. The final aim has been to enable the expression of a significantly more complex musical substance, according to the historical time frame.

2. A brief history

The violin, as the representative pillar of string instruments, has been perfected over a 200 year time span, owing to the Italian luthiers who rendered the violin its

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present shape (16th -18th centuries). Instrument history goes further back in time though, and so does the origins of string and bow instruments.

An essential discovery in this sense was dated to 40 000 years back and placed the bow at the centre of magic rituals. A music scene on the wall of the Cave of the Three Brothers (France) depicts a man dressed in animal skins and wearing a mask who plays his musical bow in an attempt to lure (probably) a herd of horned animals (Chailley 1967, 75).

Considering the string instruments separately, the focus definitely lies on the *luth* which is considered the earliest string instrument, played by plucking[4] whose shape resembles present day kobza. It subsequently gave its name to instrument builders as *luthiers.*

The earliest bow and string instrument proved to be the *ravanastron*[5] (Pașcanu 1959, 11) which according to tradition was invented by king Ravanon of Ceylon. It consisted of a sound box, a bridge, pegs, a neck, strings of animal gut and a bow.

Later on the Arabs and the Persians perfected the model and produced the *rebab*[6] which arrived in Europe in the 9th century. It would spread around European countries and be known under various names – *rebec, rubeba, rubeb, rebeba, rabel, rebelani, rubible, kemence.* An earlier instrument seems to have existed on the European continent the *crwth* (year 570), a bowed and stringed instrument of Celtic origins (Gâscă 1998, 110).

The Middle Ages new requirements produced the *giga* – an instrument similar to the *rebec* which had an oval sound box – and the *vielle* which unlike the *giga*[7] had transversal lines across its neck and an oval or a figure 8 shaped body, without lateral C-bouts so that the bow had to be supported horizontally. Later on, the transformations to the *vielle* would yield the *viola* (12th-13 th century)[8] and in the 16th-17th century the *lyre*[9] was present in Italy.

The beginning of the 16th century saw the violin featured in the paintings and frescoes by Italian artist Gaudenzio Ferrarri (about 1480-1546), in the churches near Milan, which proves the instrument was used at the time (Sârbu 1994, 30). The age of glory – the Italian *lutherie* occurs in the second half of the16th century, when the types of the violin family are perfected and defined.

[4] Which yielded the guitar and the mandolin.

[5] Found in India, 5000 years BC, known as *ravana, ruana, omerti, sarinda.*

[6] Instrument with 2-3 strings and a bow named *rabab.*

[7] The Germans would later borrow this name *geige* – which still names the violin today.

[8] The first one had a flat bridge which accommodated the polyphonic execution; later on the bridge was curved, respectively there were holes for the strings made in it at different heights, to enable the execution of accompanied monody.

[9] The lire family: *lira de braccio* (soprano); *lirone de braccio* (alto); *lira de gamba* (tenor); *lirone perfetto* (bas).

The names of the most renowned violin makers are connected to the cities of Brescia – with the likes of Gasparo da Salo (1542-1609)[10], Gio Paolo Maggini (1581-1632)[11] and others, and Cremona – *the Amati dynasty:* Andrea Amati (1535-1612), Antonio Amati (1555-1640), Nicola Amati (1596-1684), and others, *the Guarneri dynasty*: Andrea Guarneri (1626-1698), Giuseppe Guarneri (1687-1742), Bartolomeo Giuseppe del Gesu (1698-1744) and others. Even if tradition includes other notable names[12], the perfection of violin building was achieved by Antonio Stradivari (1644-1737). He brought the violin to perfection and made Cremona into a notable city, one which completely mastered the craft (Grove's 1908, 707).

A disciple of Antonio Amati, Stradivari left us with some of the most valuable instruments. The more than 1000 instruments are testimonials of his genius (violins, violas, cellos). The clarity, suave sonority, the sonic power are the main characteristics which amplified the value of the instrument and ensured its popularity and immortality.

3. Cremona – Tradition and Silence

The electronic capture of the sound of the Stradivari violin represented an ambitious project which was undertaken by the entire city community inasmuch as people understood the need for special conditions to be provided and observed, in order to achieve the desired finality (Paradiso 2019, 1). Reducing the entire community, the entire city life to silence was a challenge which was to result into a culmination of acoustic engineering – by obtaining the unique sound of a Stradivari, irrespective of it being a violin, a viola or a cello.

Museo del Violino in Cremona preserves and restores the instruments under its patronage. Yet when the instrument reaches a certain age[13], its sound becomes inevitably altered so it does not meet the referential standard any longer.

To set up the data base "Stradivarius Sound Bank", Museo de Violino provided the venue – the Auditorium Giovanni Arvedi as well as the following instruments: 2 violins, 1 viola and 1 cello. 32 microphones were used to record the sounds and the process itself involved exhausting the entire range of possibilities the instrument could offer (articulations, dynamics, style, position, expression, different techniques) and storing the sounds in a data base. Moreover the process offered the option of manipulating by means of a software, any sound obtained in order that it should be used in new recordings once the original sound of the instrument would become altered.

[10] The oldest instruments belong to it.
[11] It brought about significant transformations to the shape of instrument.
[12] See *Bergonzi, Ruggieri, Rogeri, Grancino, Testore, Guadagnini, Gagliano.*
[13] decades

The procedure involved three sound engineers – Thomas Koritke from Hamburg, Germany was the project coordinator – and renowned musicians who knew the instrument well. Besides the human resource to ensure the success the acoustics of the hall was analysed, the air conditioning, elevators and even some lighting in the hall which could have made the slightest noise were turned off. For five weeks the streets around the museum were closed and the locals asked to maintain silence.

4. The Stradivari Violin as a Virtual Instrument

Native Instruments is one of the largest and most renowned contemporary sound library which focused both on the classical traditional sound and on the modern electronic one. For today's music producers it represents one of the most complex and high-quality sound packs.

Stradivari Violin is a virtual instrument which materialized as result of the recordings mentioned earlier. The sound of the real Stradivari built by Antonio Stradivari in 1727, *Vesuvius,* was used to obtain the electronic sound. The instrument uses 20 types of different articulations professionally interpreted, also it enables the use of the vibrato in an extremely realistic manner, with a technique similar to that of a professional player. At the same time, the articulations can be changed in real time without the mechanics of the person on the computer being noticed: the transition occurs naturally enabling the appearance of a real performance.

An essential feature is the fact the each sound is recorded in a chromatic progress. Consequently each content corresponds the chromatic sampling which offers a certain authenticity and certainly a high-quality material at the time of usage[14].

Back to the vibrato, its perfect authenticity is given also by the tools that enable the control of its depth and the velocity of dynamics. Thus the Rate function makes it possible to change the dynamics on a *Sin* to *Molto* axis. There is also the style function which can be used to change the style of the vibrato: *Passionate, Intense, Wide, Evolving, Narrow, Immediate.*

Stradivari Violin makes it possible to elongate, by means of the synthesizer, specific violin techniques. The result is a sound that by no means displays the pianistic performance style but on the contrary, reproduces the feel of a real performance of a violin instrument (see *Adaptive: Virtuoso*). This way the composer is enabled to using various positions – the function *Position/Preference* – which makes it possible for him to employ, within various melodic contexts, a left-hand digitation suited to the rendering of a certain sonic timbre. There are three different positions: *High-String* for obtaining a more vibrant, brighter sound, *Low String* for mellow, calm, smooth sound, and *Smart* position which combines in an

[14] See Stradivari Violin Manual.

intelligent manner proximate finger positions, depending on the pitches of the sounds which need to be played, in a way that only a violin player would execute.

Native Instruments have managed a vast range of articulations for the Stradivari violin. These fall into separate categories: *Long, Short, Expressive, Dynamic, Special, Adaptive*. Whichever category they might belong to, these articulations can be executed at a higher or a lower speed by means of the *Speed* function. There is also the possibility to simultaneously combine various types of articulations depending on the velocity, sound pitch and other parameters, respectively based on the information generated by means of the composer's performance. This is only enabled by the function of the electronic synthesizer which generates the MIDI signal.

As far as the articulation categories are concerned, these employ indicator types of performance for the instrument. Thus in the category *Long*, the following three types of articulation are available: *Sustain*[15], *Marcato*[16], *Detaché*[17]. In the category *Short*, there are the following articulations: *Sautillé Single*[18], *Spiccatissimo*, *Spiccato*[19], *Staccato*[20], *Pizzicato*[21]. In the *Expressive* category there is *Tremolo*[22] and *Trill* – by means of the *interval* function the musical interval can be edited, *Ricochet*[23], *Sautillé.* The *Dynamic* category includes *Crescendo, Diminuendo, Short/Long;* while in the *Special* category the composer is provided with articulations like: *Sul Pont*[24]*, Sul Tasto*[25]*, Harmonics*[26]*, Col Legno*[27]. For any articulations previously mentioned the composer can choose between various ways of realizing the legato, he can control the bow changes.

To complete the musical picture, a rich dynamics palette is available for use - see *Expression;* there is a dynamic range from *pp* to *ff*. Moreover, the 32 microphones used to capture the sound of the Stradivari violin recorded in such a way as to enable the composer to eventually regulate three mixing positions

[15] Long sound
[16] The attack of the stronger sound made to stand out among the proximate ones.
[17] Separate bow features for each sound; the bow does not leave the string and moves at constant pressure.
[18] Executed with the bow slightly inclined towards the fingerboard so that at the beginning and the end of the sound the hair touches the string very softly; realized under the middle part of the bow at high and medium velocities, only in *pp* or *p* nuances.
[19] Realized in the same way as the *sautillé* except that the bow leaves the string each time; with rapid movements with sounds of equal duration and nuances from *pp* to *mf.*
[20] Short sounds separated by pause.
[21] Plucking the strings with fingers.
[22] Notes repeated quickly create a feeling of tumult, of unrest.
[23] Realizing a variable number of sounds in one stroke of the bow, a single up-bow relying on the elasticity of the string, hair and stick.
[24] Producing the sounds as close to the bridge as possible.
[25] Rubbing the string above the finger-board resulting in sweet, soft sounds.
[26] Sounds generated on the harmonics.
[27] Execution with the wooden part of the bow.

(considering the distance between the microphones and the instrument at the moment of recording): close, MIDI or distant.

5. Conclusion

The quality of the instrument is sure to influence the feel of the performer and the quality of his performance. Great performers today consider they have reached the peak of their success if they have enjoyed the opportunity to perform on a Stradivari, Amati, or Guarneri violin. Their masterpieces played a decisive role in the history of music, a role no less important than that of the great composers throughout the ages.

The existence of a library which provides an inventory of the multiple possibilities yielded by the Vesuvius violin cannot but stimulate and offer new compositional perspectives to musicians today. The authenticity, the expressivity rendered, the fact that it facilitates the change of various types of articulations, and especially the minute editing and preparing of samples are essential features which define the high professional quality of the team which carried out this project.

Just as important and notable in itself is the Stradivari sound being saved and preserved. It is an essential step taken in the history of modern music which marks a cutting-edge moment in the evolution of acoustic engineering. Last but not least, this project benefits the audience, all music lovers treated to exceptional quality in all aspects.

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