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The correspondence between keyboard instruments of the 18th and 19th century – historical perspective and practical approach

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Contents

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Introduction

I chose this exciting topic that is particularly important to me, based on my personal experiences as well as the sources and data I used in the past for my performance and study practice. As the main goal of my thesis I would like to show the mutually constructive relationship between different keyboard instruments and through this also the beneficial effect of the use of these instruments in the artist's practicing process. I will try to see the topic of this thesis as a phenomenon regardless of specialization – both from the artist's technical and later performance point of view.

The enormous diversity of keyboard instruments gives the musician of today the opportunity to present an original, even historical instrument, where the work of the composer of the given era sounds in – perhaps – most natural way, so that the performer can strive for a very 'authentic' performance. There are many resources within keyboard instruments to help us achieve this goal, whether it is clavichord, harpsichord, fortepiano, organ or even hybrid instruments.

The purpose of this thesis is finally also to highlight the diversity of instruments, the fact that it is worthwhile to broaden our horizons and take these other keyboard instruments into consideration while working on our repertoire. I played almost all kinds of keyboard instruments, initially piano, then harpsichord, clavichord, finally the organ. In the phase of getting to know the instrument I considered it particularly important to play the instrument properly on the technical level, and to develop a kind of respect for the tone as well as to understand the nature of the way to press and release the key. This problematic is strongly connected to the problem of musical articulation which appears to be especially crucial in the Baroque era. In this epoch the aesthetic requirements of the music have much to do with the elements of the speech – in this case the articulation, like spoken language, provides structures, almost creates 'words' and meanings within the music.

The performers of our present day have been trying to decipher the essence of the playing styles, identify and describe them, but they are also not free from certain questions – should one strive for the historical performance entirely or should certain aspects be modernized? Of course, we try to answer these questions not only from the purely theoretical perspective but we also try to find various technical solutions. Within this process one can identify many advantages of playing different keyboard

instruments. For me this task provides also a constant motivation, since I'm not only looking for a path towards a high quality, clean performance but also hope to encourage the performers to practice on multiple instruments in order to create an advanced, multilayered presentation.

In order to create a certain uniformity of the layout of this paper I decided to write all the citations from the original sources in italics.

I. Brief history of the most important keyboard instruments of the 18th and 19th century, principles of construction

In this chapter, I would like to provide a brief insight into the development of the given instruments with a selection of the most important historical and technical information, in order to be able to authentically represent and prove the differences, advantages, or even disadvantages of playing them simultaneously. Even if the keyboard idiom would be common to all of them, there are significant differences in their sound, construction and approach necessary to master them. In order to broaden musical horizons, one would eventually need to know more than one keyboard instrument. In a short summary I will now compare several keyboard instruments. The choice of the instruments and historical data presented below is subjective, based on my personal experiences, opinions and tastes, could surely be disputed and shows my own perspective.

I.1. Clavichord

One of the earliest keyboard instruments is the clavichord. Due to the rather small dynamic range of its sound it was more suitable for playing music at home, learning and practicing, than for playing together with other instruments or vocalists. In the case of this instrument a metal plaque (tangent) strikes the string[1]. The keys of the clavichord are much smaller than those of a modern piano. The working principle of the clavichord is very simple: the only moving part is the lightweight key. If one pushes one end down, the other end goes up. The small brass blade sticking out of the end of the key is called the tangent, and when one of the keys is pressed, the tangent hits a pair of strings[2]. With this technique not only *forte* and *piano* are available, but also vibrato (shaking or *Bebung*), which the player can achieve by special kind of touch. If one looks into a clavichord one can see that the strings run horizontally to the keys, the strings have felt interwoven through them[3]. Without it, the strings would

[1] Hekkelman Instrumentenbouw, *Clavichords* [https://hekkelman.net/clavichord/ 31.03.2023].
[2] https://pdf4pro.com/view/a-brief-history-of-the-keyboard-24da1b.html [01.04.2023].
[3] https://mynewmicrophone.com/what-are-the-differences-between-pianos-clavichords [31.03.2023].

vibrate on both sides, giving each key two pitches[4]. The clavichord was probably first built in the 14th century and has gone through several centuries of technical experimentation. Clavichords from the earliest period (1440-1540) are only known from documents and were built based on the monochord and polychord models[5]. The earliest clavichords had two or three keys for each string. The fifteenth-century instruments were usually quite small and pitched about an octave higher than modern examples[6]. At that time the approximately three-octave keyboard dominated and up to four keys struck the same pair of strings. Later the size of the soundboard began to increase. By the turn of the 15th and 16th centuries, the keyboard received more chromatic keys. The oldest clavichord preserved in the Leipzig Musical Instrument Museum was built by Domenico Pisaurensis in 1543[7]. In their early history, clavichords were generally small and soft sounding instruments. The instrument changed constantly, by the 16th century the compass ranged from over three octaves to four and a half octaves. During the seventeenth century, the clavichord makers experimented a lot and tried new technical developments. The lower part of the soundboard was divided and the standard instrument already has 45 keys. Later in the seventeenth century the classic double fretting became the most widespread instead of triple fretting. During the 18th century, the 45-key compass constantly changed and grew, sometimes even reaching five octaves. In 1725 the German instrument maker Daniel Faber (1667-1744) created probably one of the first clavichords that already had one string for each key. As the instruments changed, so did the tastes of the musicians, showing that from about 1730 fretless instruments became increasingly popular[8]. By the 19th century, the size of the clavichord keyboard reached six full octaves on some instruments[9]. All in all the history of instrument building showed continuous change, with many different highlights.

Due to the construction of the clavichord the player's fingers are in direct contact with the instrument and its sound as long as the string corresponding to the sound continues to vibrate. This situation enabled a unique effect, *Bebung*, which is an effect similar to the *vibrato* of a stringed instrument. It also allowed for a special shading

[4] http://www.piano.instruments.edu.pl/en/history/gravicembalo-col-piano-e-forte [01.04.2023].
[5] Betty Shuttleworth, *A Study of the Development of Stringed Keyboard Instruments With Special Reference to Popularity Trends*, Rhodes University, Grahamstown 1971, p. 2-3.
[6] https://www.fabiusgargazonensis.com/en/clavichord-2/history-of-the-clavichord/ [31.03.2023].
[7] https://pdf4pro.com/view/a-brief-history-of-the-keyboard-24da1b.html [01.04.2023].
[8] Ibidem.
[9] Ibidem.

of the variable dynamic sounds, which in turn opened up the musician's horizons in the performance of certain music pieces. The clavichord in the early eighteenth century was mostly still constructed with frets[10]. A fretted (*gebunden*[11]) and double fretted clavichord has separate strings for all of the natural notes. Although the strings in such case are independent of each other, by hitting a string in different places their lengths become different so that one string can produce several notes. Other than in case of the fret-free clavichords at least some keys share the same pair of strings with other keys, which limits the performance of more distant keys (lots of flats and sharps) and implies certain types of articulation. Natural and sharp notes are often coming from the same strings. On a fretted clavichord, unlimited *legato* was not yet possible. Unfretted or (*bundfrei*[12]) clavichords have the same key mechanism as fretted clavichords. In their case however each note has a separate set of strings. Because of these properties the choice of reperoitre played on such an instrument has less limitations. Clavichords were sometimes equipped with a pedalboard and two manuals. This development made the clavichord one of the main practicing instruments for organists. The instrument was constantly changing and developing – gradually more and more instruments included more than one string for a single key. It was mainly thanks to these changes that the clavichord started changing its status from a mostly practice keyboard with limited functionality to a solo instrument. A great range of nuances, especially typical for the sensitive style (*Empfindsamer Stil*), was now possible which in turn lead to the creation of an individual, unique and intimate atmosphere around the clavichord[13]. Without any doubt it is a very practical instrument for all keyboard players, especially for practicing at home.

[10] https://www.britannica.com/art/monochord/ [31.03.2023].
[11] Betty Shuttleworth, *A Study of the Decvelopement...*, p. 5.
[12] Ibidem, p. 6.
[13] Peter Sykes, *Fretted and Unfretted Clavichords*, a YouTube film, https://www.youtube.com/watch?v=AlH_ny3-BG8/ [30.03.2023].

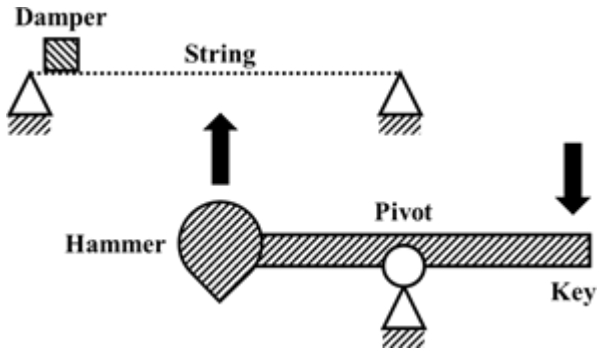

Plate 1. Matteo Russo and Jose A. Robles-Linares,

A brief history of piano action mechanics,

A simplified kinematic scheme of the historical key action of the clavichord.

The table below compares the stringed keyboard instruments mentioned in the thesis from a dynamic point of view, which makes the understanding transparent for the reader. The organ – described in the later part of the thesis – would be capable of all the dynamic shadings.

ppp	**pp**	**p**	**mp**	**mf**	**f**	**ff**
CLAVICHORD						
		HARPSICHORD				
FORTEPIANO						
MODERN PIANO						

Plate 2. Dynamic possibilities of keyboard instruments.

Because of the fact that most preserved clavichords created in the period relevant to the subject of this paper were created within the German school I will now concentrate on clavichord makers from the German circle. Important clavichord builders in Germany should be highlighted such as: Johann Heinrich Gräbner (1665-1739) from Dresden. Gräbner built mostly unfretted clavichords[14].

[14] https://www.jph.us/instruments/german-harpsichords/ [31.03.2023].

Plate 3. Clavichord from the school of Johann Heinrich Gräbner (1665-1739) (German, Dresden ca. 1700–ca. 1777 Dresden)[15].

Johann Christoph Jesse (1705-1787) was also a master clavichord builder in Germany, resposible for certain innovations and refinements in the construction of a large, full-scale instruments.

Plate 4. Clavichord built by Johann Christoph Jesse, Halberstadt, 1765[16].

This five-octave instrument made by Jesse, organist of St. Martini in Halberstadt and was probably mainly used for teaching. Faintly written letters can be read on keys, which serve as a guide for an inexperienced player[17]. Another example, built in the workshop of Johann Conrad Speisegger (1699-1781), shows smaller dimensions and a smaller range of the keyboard – this compact instrument could easily be transported and used for many purposes.

[15] Photograph: https://www.metmuseum.org/art/collection/search/503896 [01.04.2023].
[16] Photograph: https://www.metmuseum.org/art/collection/search/501778 [01.04.2023].
[17] Laurence Libin, *Keyboard Instruments*, „The Metropolitan Museum of Art Bulletin", New Series, Vol. 47, No. 1., Metropolitan Museum of Art 1989, (pp. 1-56), p. 13.

Plate 5. Clavichord built by Johann Conrad Speisegger, Schaffhausen (Switzerland), 1725[19].

A late example from the workshop of Johann David Schiedmayer (1753-1805), a clavichord and piano maker first in Erlagen and later in Nuremberg, shows certain develompents characteristic for the late 18th and early 19th century[20]. The keyboard has an unusually large compass, the decoration of the case is already very much in the classicist style.

Plate 6. Clavichord, Johann David Schiedmayer, Erlagen, Haus der Musik (Fruchtkasten), Landesmuseum Württemberg, Stuttgart, 1791[21].

[18] Photograph: https://mimo-international.com/MIMO/doc/IFD/OAI_ULEI_M0002661 [24.05.2023].
[19] Photograph: https://mimo-international.com/MIMO/detailstatic.aspx?RSC_BASE=IFD&RSC_DOCID=OAI_ULEI_M0002661&TITLE=%2Fgebundenes-clavichord&_lg=es-ES [01.04.2023].
[20] Latcham Michael, *The Pianos of Johann David Schiedmayer*, „Early Keyboard Journal", Vol. 23 (2005), Ramsey, 2005, (pp. 7-31), p. 7.
[21]Photograph:https://commons.wikimedia.org/wiki/File:Schiedmayer_Clavichord.jpg#/media/File:Schiedmayer_Clavichord.jpg [24.05.2023].

I.2. Harpsichord

In this chapter, I mainly focus on the history of the development of the harpsichord – one of the leading keyboard instruments of the Baroque era. In addition to the harpsichord I also mention other closely related instruments such as the virginal, spinet, and lautenwerk.

The harpsichord is a keyboard instrument[22] in which the strings are made to vibrate by plucking. The tone of the harpsichord is transmitted and intensified by a soundboard placed below the horizontal plane of the strings. On the far end of the harpsichord key rests a jack, which is a vertically placed piece of wood. Its top is level with the strings. The plectrum, which is made of feathers or leather, rests under the strings. When a key is pressed by the player, the plectrum and the riser rise, the string is vibrated by the plectrum, producing the sound and conversely – when the player releases the key, the jack returns to its original position. In the upper part of the jack there is a piece of felt, which dampens the string, thus silencing the sound when the key is released. With this type of plucking, a noticeably louder, brighter sound is produced than that created with the tangent of the clavichord[23]. The player does not have direct contact with the vibrating string – as in the case of the clavichord – because after the string has been plucked by the plectrum the mechanics has no contact with the string itself. This illustration attached above shows the working principle of the harpsichord in a simple way.

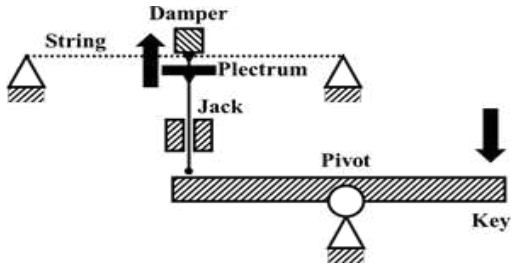

Plate 7. Matteo Russo and Jose A. Robles-Linares,
A brief history of piano action mechanics, simplified kinematic schemes of historical key action of Harpsichord [24]

[22] Michael Ray, The Editors of Encyclopaedia Britannica, *Harpsichord musical Instrument*, https://www.britannica.com/art/harpsichord [31.03.2023].

[23] Howard Ferguson, *Keyboard Interpretation from the 14th to the 19th century*, Oxford University Press, New York 1975, p. 6.

The harpsichord was first mentioned in 1397, when a certain Hermann Poll made an instrument called *clavicembalum*[25]. The first form of this instrument consisted of straightened metal strings on a sound plate and the strings were plucked directly with the player's the hand. In the following centuries until the 16th century, the harpsichord went through an effective development. The shape we know today was created by the Italians around 1500. In the beginning the compass of the harpsichord was only one or two octaves. Most sixteenth-century Italian instruments usually had only one manual[26]. In the following centuries the range of the keyboard increased to five octaves. The use of the harpsichord gradually declined in the 1800s, but interest in the new type of keyboard instruments, as invented by Bartolomeo di Francesco Cristofori (1655-1731) and later developed, increased strongly[27]. From the 16th century to the first half of the 18th century harpsichord was withouth doubt one of the most important keyboard instruments in the European music. The standard range of the harpsichord strings is called the 8' stop, while the 4' register sounds one octave higher. In the 18th century, perhaps even earlier, a 16' register was added. A harpsichord created by Hieronymus Albrecht Hass (1689-1752) in Hamburg, made in 1734, also has the 16' register built in. However, the expressiveness of the harpsichord is limited compared to the clavichord, since the difference in volume is much more difficult to achieve and possible to a lesser extent, and vibrato is not at all achievable on the harpsichord. Some of Hass's 18th century instruments already have not only 16' but also 2' foot registers, other examples have added lute registers[28].

Plate 8. Harpsichord by Hieronymus Albrecht Hass, currently in Belgium, 1734[29].

[24] Photograph: https://www.scirp.org/journal/paperinformation.aspx?paperid=104674 [24.05.2023].
[25]https://www.historymuseum.ca/cmc/exhibitions/tresors/treasure/126eng.html [01.04.2023].
[26] John Koster, *History and Construction of the harpsichord*, „The Cambridge Companion to the harpsichord", Boston University 2019 (pp. 2-30).
[27] Betty Shuttleworth, *A Study of the Development...*, s.27.
[28] Michael Ray, The Editors of Encyclopaedia Britannica, *The harpsichord Principle of operation* https://www.britannica.com/art/keyboard-instrument/Special-effects [31.03.2023].

In the following lines I will briefly describe the major differences between harpsichords from different countries, focusing on chosen examples built in Germany, France, England, Flanders and Italy. Each national school produced a different kind of haprischord, one can also speak of a geographical differentiation. There is also a chronological aspect to the development of the instrument – Renaissance haprsichords are for instance obviuosly very much different than later ones. One of the oldest depictions of a harpsichord can be found on an altarpiece made in Germany, which dates from 1425. Over the next 100 years, the instrument went through a lot of development. The earliest harpsichords from the 1500s are derived from Italy. Those early Italian harpsichords had often a lively sound which was the result of the use of copper strings. Those single-manual instruments were often adorned only very simply but their outer cases could be heavily decorated, contrary to the simplicity of the interior. Thus, the instruments had two cases: the so-called inner and the outer case. The inner part of the harpsichord was light, equipped mostly with 8' pitch strings of relatively low tension. Some of those instruments had a so-called short octave. In addition to or instead of the short octave, split keys were also sometimes used. In such case, the front and back parts of the key are dedicated to different string. Over time, the instrument grew from its original size of some four octaves to about five octaves in the 18th century and sometimes included a second manual[30]. The Italian harpsichord is excellent for playing basso continuo, as it fits well with chamber music. Thanks to its clear, sharp sound, it can positively stand out in polyphonic music[31]. It is important to mention the deservedly famous Italian harpsichord maker Girolamo Zenti (1609-1666) who probably was the inventor of the bent spinet[32].

Plate 9.

Harpsichord by Girolamo Zenti (1609-1666), 1666.

[29]Photograph:https://en.wikipedia.org/wiki/Hieronymus_Albrecht_Hass#/media/File:Hieronymus_Albrecht_Hass,_Hamburg,_1734_-_clavecin_-_IMG_3894.JPG [24.05.2023].
[30] https://www.youtube.com/watch?v=wz4PJml8Jts [01.04.2023].
[31] Cyntia A. Hoover, *Harpsichords and Clavichords*, Washington 1969, s.14.
[32] Edwin M. Ripin, *The Surviving Oeuvre of Girolamo Zenti*, in: „Metropolitan Museum Journal", Vol. 7, New York 1973, (71-87), p.75-77.

The harpsichord was restored by Hieronymus Zenti, 1666, by Giovanni Ferrini, I755. The Metropolitan Art Museum, Crosby Brown Collection, inventory number: 1220.4.89[33].

On the inscription on the instrument depicted on plate 8. one can read: *HIERONYMUS ZENTI FECIT ROMAE AS MDCLXVI/ JOANNES FERRINI FLORENTINVS RESTAVRAVIT MDCCLV*. This inscription on the single-manual instrument explains that it was restored in 1755 by Giovanni Ferrini (1700-1758), who replaced Bartolomeo Cristofori (1655-1731) as the Medici court harpsichord maker[34]. Giovanni Ferrini (1700-1758)[35] worked as Cristofori's assistant, and after his death he produced his own instruments. Many surviving instruments are unsigned.

Parallely to and partly after the development of the Italian harpsichord the instrument's transformations continued in Flanders and can be linked to the name of Hans Ruckers the elder (ca. 1555-ca. 1623). His instruments typically had a compass of CDEFGA-c^3 (with a short bass octave)[36]. Hans Ruckers and his generation of instrument makers built instruments with heavier cases compared to Italian harpsichords and used iron wire instead of brass ones, which brought a significant change to the sound. Spruce was used for the soundboard of those instruments, in contrast to the cypress wood popular in Italy. Around 1600 the Flemish harpsichord makers built their first double manual harpsichords, in which the upper manual could be used for transposing. Regarding the stoplist of standard Flemish instruments, they had both 8' and 4' string sets[37].

The Couchet family, also of Flemish origin, was closely related to the Ruckers dynasty. Joannes Couchet (1615-1655) was the grandson of Hans Ruckers (1555-1623) and his instruments were in certain aspects very similar to the harpsichords of the Ruckers family. Presumably, some of the instruments made during his student years were made by Couchet not under his own name, but under the name of Ruckers. He made many improvements to the Ruckers harpsichords and built two-manual instruments with a keyboard compass from FF to d^3, extending the then 8'–8' stoplist to

[33] Ibidem, p. 82.
[34] Ibidem, p. 81.
[35] Denzil Wraight, *Christofori's piano workshop and Giovanni Ferrini*, in: „Il cembalo a Martelli da Bartolomeo Cristofori a Giovanni Ferrini Atti del convegno internazionale di organologia in ricordo di Luigi Ferdinando Tagliavini Bolognia 21-22 ottobre 2017", Bologna 2019, (p. 107-115), p. 109.
[36] Dr. Alice M. Chuaqui Baldwin, *The Differences between Harpsichords from Different Countries*, a YouTube film: https://www.youtube.com/watch?v=wz4PJml8Jts&t=328s [01.04.2023].
[37] Betty Shuttleworth, *A Study of the* ..., s.10.

8'–8'–4'. Another Flemish harpsichord-making family, the Dulcken harpsichord builders, is also worth mentioning. Their standard instruments are usually one- or two-manual harpsichords with a keyboard of five octaves and three registers: two 8' and one 4'. Their soundboards are decorated with flowers, with the family's initials in the rose. In terms of size, Dulcken harpsichords have a wider keyboard compass than those made by the Ruckers family[38].

Plate 10. 1745, Johannes Daniel Dulcken (1706- after 1793), Neue Burg[39].

Plate 11. ca.1650, Jan Couchet the Elder (1615-1655), Antwerp[40].

Flemish instruments had a great influence on French harpsichord builders, as shown by the further developments. Seventeenth-century two-manual French harpsichord's standard stoplist includes two 8' and one 4' stops as well as a shove coupler that allows many interesting registrations. In terms of the dimensions

[38] Cyntia A. Hoover, *Harpsichords and Clavichords*, Washington 1969, s. 9-10.
[39]Photograph: https://www.khm.at/en/objectdb/detail/85228/ [24.05.2023].
[40]Photograph: https://www.metmuseum.org/art/collection/search/503614 [01.04.2023].

of the keys, compared to instruments of the Flemish and Italian schools, French harpsichord keyboards are narrower, especially on the upper manual. A typical 18th-century French harpsichord has a highly decorated appearance, often using gilded ornaments. The Ruckers and Couchet dynasties had a great influence on their contemporaries. French workshops often rebuilt older Flemish instruments[41]. In order to modernize the harpsichords of Hans Ruckers, the keyboard range was extended downwards. This process is called *ravalement*[42]. In fact, the French harpsichord was in the core of its concept actually partly a traditional Flemish instrument and partly a new creation with certain innovations. The tone was extremely colorful and with a deep resonance, the pitch standards varied and in France often a^1=392 Hz was used[43].

In the German-speaking culture circle harpsichords had special sound resources. During Johann Sebastian Bach's (1685-1750) time in Leipzig, concerts were held at Zimmermann's Coffee House sometimes several times a week. For those occasions Bach had installed there a double manual harpsichord (16', 3x8', 4') and a pedal harpsichord (2x16', 3x8') made by harpsichord and organ builder Zacharias Hildebrandt (1688-1757), educated in the workshop of Gottfried Silbermann (1683-1753)[44]. The tendency towards more gravity (*Gravität*) in the sound can clearly be seen also in instruments from the shop of the Hamburg builder Hieronymus Albrecht Hass (1689-1752). Hass occasionally used a set of 16' strings and a 2' set for part of the keyboard. It was important for Bach that the music should have a good bass foundation. So he would probably have used the 16' registers for the bass line when playing continuo or even solo harpsichord music[45]. Compared to the French and Flemish harpsichords, the baroque German harpsichord is more solid in structure. Through their rather dark, mellow sound, the Baroque German harpsichors reflect to a certain degree the tendencies visible also in German organs of that era[46].

In Germany the pedal harpsichord was also quite popular, especially among the organists. The reason for this was that practicing on the organ in the churches could

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[41] http://collections.nmmusd.org/Keyboards/RuckersHarpsichord10000/Ruckers1643.html [01.04.2023].
[42] Betty Shuttleworth, *A Study of the Development...*, p.10.
[43] Ruta Bloomfield, *Overview of the French Harpsichord History and Performance*, an article from 2016, p. 1-2, published on http://rutabloomfield.com/site/wp-content/uploads/2016/01/Overview_French_Harpsichord_Bloomfield.pdf [01.04.2023.].
[44] https://www.baroquemusic.org/bargerhpschd.html/ [01.04.2023].
[45]https://www.jc-neupert.de/en/component/virtuemart/new-instruments/harpsichord/harpsichord-double-manual/neupert-harpsichord-hass-detail [01.04.2023], https://www.baroquemusic.org/bargerhpschd.html [01.04.2023].
[46] https://www.baroquemusic.org/bargerhpschd.html/ [01.04.2023].

be difficult, due to the necessity of employing staff for operating the bellows, not to mention the winter weather conditions in unheated churches[47]. Bach probably liked to hear the soft and rich sound of his harpsichords, which is perhaps also confirmed by his interest in the *Lautenwerk* (lute harpsichord), able to produce a soft but at the same time intense sound. Johann Sebastian even developed his own specifications for the same type of harpsichord that Hildebrandt would build for him[48].

Plate 12. Pedal-harpsichord by J.C.Neupert (1842-1921)[49].

In England, by the end of the 17th century virginals, which were excellent for playing the works of William Byrd, John Bull or Orlando Gibbons even in a short octave, were replaced by bentside spinet. The virginal differs from the harpsichord and spinet in that its single set of strings runs almost parallel to the keyboard. Different tone colours can be achieved, if the instrument is built with a keyboard on one or the other side of the front panel of the rectangular case, the plucking point of the string changes. Around 1690 the one-manual harpsichord with only two 8' stops came into fashion. Instead of the colorful three registers of earlier English harpsichords (in most cases two 8' and one 4' stop). The classic English disposition was 8' and 4' foot on the lower manual, an 8' on both manuals, and an 8' nose register on the upper manual[50]. Burkat Shudi (1702–1773) and Jacob Kirckman (1710–1792) had a strong influence on English harpsichord making in the 18th century[51]. Their instruments had more impressive power and timbre than those of the French.

Most English harpsichords of the late eighteenth century had a pedal, the so-called *machine stop*, which, when pressed, resulted in a *decrescendo* on the lower manual. Harpsichord maker Burkat Shudi created another innovation, a set of louvers

[47] www.baroquemusic.org/pedalharpsichord.html/ [30.03.2023].
[48] www.baroquemusic.org/bargerhpschd.html/ [30.03.2023].
[49]Photograph:https://www.jc-neupert.de/en/instrumente/neue-instrumente/pedalcembali/new-instruments/pedal-harpsichord-1/neupert-pedal-harpsichord-incl-bench-detail [24.05.2023].
[50] John Koster: *Reflections on Historical Harpsichord Registration,* „Keyboard Perspectives VIII" (2015), p.107.
[51] Betty Shuttleworth, *A Study of the Development...*, p. 14-15.

over the strings that could be opened by a pedal which created a rather smooth *crescendo* effect[52].

Plate 13. Double-manual harpsichord by Burkat Shudi (1702-1773), London, 1766[53].

Plate 14. Single-manual harpsichord by Jacob and Abraham Kirckman, (1737-1794) London, 1773[54].

By the 19th century, interest in the harpsichord gradually disappeared. The old harpsichords were not appreciated, people were much more interested in the piano. The development of keyboard music and a wish for a more voluminous and dynamically versatile sound resulted in the increasing popularity of the piano.

After the Second World War, it can be observed that instruments with a similar structure to their historical harpsichords were built. This new stream resulted in great interest for the revival of historic instruments and historically informed performance practice. In the past half century, it can also be said that most new harpsichords were built on the basis of historical instruments from the 17th and 18th centuries[55].

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[52] John Koster: *History and Construction of the Harpsichord*, 2019, https://www.cambridge.org/core/books/cambridge-companion-to-the-harpsichord/history-and-construction-of-the-harpsichord/3A52A2F5D80CF9382932EF6E1024EA02?fbclid=IwAR2u42ELJzOSkG2pYawRGwNWb-v_6NWbs2gcYRboo22lyt5G62pxCr8QCms/ [01.04.2023].
[53] Photograph: https://collections.ed.ac.uk/stcecilias/record/96088 [24.05.2023].
[54] Photograph: https://www.hpschd.nu/index.html?nav/nav-1.html&t/welcome.html&https://www.hpschd.nu/cln/kirckman.html [24.05.2023].
[55] Ibidem.

I.3. Organ

In order to adequately illuminate the 18th and 19th century instruments highlighted in my thesis, I consider it important to learn about the organ's long journey from the very beginning. From the starting point of the crystallisation of the different national schools of the organbuilding art the developments in the individual European countries had similar shape. Especially in the 18th and 19th common tendiencies were present in France, Italy, Germany, England and other organ landscapes of Europe. Since describing of all the schools of the Baroque and Romantic period would go far beyond the frame of this paper, in my thesis I will focus on the development of German organs, highlighting some well-known instrument builders. I also briefly sketch the ancient history of the organ, concentrating on the the *hydraulis*, probably the earliest instrument that could be played with the help of its keys.

The ancient Alexandrian engineer Ctesibius invented the water organ around 250 BC. This one register organ had just a few pipes. A more advanced form of the ancient instrument is the Aquincum organ.

Plate 26. Aquincum organ, Aquincum Museum, Budapest[56].

This instrument is known as the only relatively well-preserved antique organ[57]. In terms of size, the Aquincum organ is quite small and portable. Made of wood, leather and metals (bronze, copper), it contained 52 pipes arranged in four rows[58]. The history of the instrument can be reconstructed based on a dedication plaque placed on the

[56] Photograph: https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRIi8Rqv-hCjCNOnH3Q82PU41GqVRsMLNxHcT9NlHjNcGpGll2kQrMQUQ-oLRzqZHZPXxA&usqp=CAU [01.04.2023.].
[57] Kaba Melinda, *Az aquinqumi orgona (Kr. u. 228)*, Budapest, 2001, p. 13, 15-16.
[58] Ibidem, p. 20.

organ. In 228 AD, Gaius Iulius Viatorinus, who was an official of a city called Aquincum, presented a portable organ to the college of textile merchants (collegium centonariorum). The text of the table is as follows:

G[aius] *IVL*[ius] *VIATORINVS*
DEC[urio] *COL*[oniae] *AQ*[uinci] *AEDI*
LICIVS PRAEF[ectus] *COLL*[egii]
CENT[onariorum] *HYDRAM COLL*[egio]
S[upra] *S*[cripto] *DE SUO D*[onum]
D[edit] *MODESTO ET PROBO CO*[n]*S*[ulibus][59]

Plate 27. Copper plate found above the aquinqum organ ac. 228**.** Aquincum Museum, Budapest[60].

In the Middle Ages, the keys of the so-called Blockwerk organ type could only be played with the fist or palm. It is worth saying a few words about about three main types of small organs built in that time. The first of them – the *portative organ* (the portable organ) – had a short range of its keyboard and a row or two of flues. While the player played with one hand, he could operate the bellows with the other. It was used for secular purposes and then completely disappeared in the 16th century[61]. The second one was the so called positive organ, larger than the portative, one of the advantages of the positive organ was that it was easy to move due to its small size. It was also used for church and home music. It could be transported and placed anywhere, so according to Kilián Szigeti's assumption[62], it comes from the word *ponere* (to place).

[59] Ibidem, p. 11.
[60] Photograph: from the collection of the Aquincum Museum.
[61] Katalin Mali, *Orgona története*,//http://www.myorganmusic.com/Orgona_hangszer/Orgona_tortenete.html/ [01.04.2023].
[62] Ibidem.

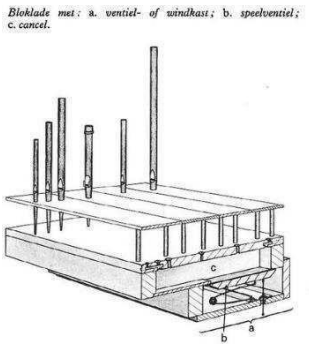


Plate 28. Blockwerk wind chest[63].

Plate 29. Regal, c. 1600, from Frauenfeld Abbey, Switzerland[64].

The third type is the *regal*. This instrument was made with a set of reeds (shallots with their metal tongues), mostly also with very short resonators, it was also small in size and therefore easy to carry, and it was well suited for playing music in church and at home.

Up from the 4th century, the mechanism that in the ancient time used water to provide the appropriate wind pressure was replaced by a purely pneumatic mechanism (bellows). As the size of the organ increased, the physical effort required for the performance also changed[65]. On one hand early examples of larger organs were

[63] Figure: https://www.researchgate.net/figure/A-blokwerk-wind-chest-on-the-left-and-a-sleeplade-slider-chest-on-the-right-Source_fig1_308010050 [01.04.2023].
[64] Photograph: https://en.wikipedia.org/wiki/File:Frauenfield_Abbey,_Switzerland,_ca_1600_-_regal_organ_-_IMG_3904.JPG [01.04.2023].
[65] Jenő Szonntagh, *Neuere Angaben zum Druckluftregler der Orgel von Aquinqum*, „Budapest Régiségei 28.”, Budapest, 1991, p. 284-286.

heavy to play, on the other their mechanics was gradually perfected. The pedal board was probably first made in the 14th century. With the improvement of the windbox, bellows and action, the organ gradually developed and became a more and more easily playable instrument[66]. Between 1500 and 1800 Germany was one of the leaders in the world of organ composition and construction. The 16th and 17th century brought the discovery of different tonal colors among the organ stops. This was possible due to the construction of different pipe forms and improved windchests[67]. In the North the peak of development in the Baroque era was seen around 1700 in the work of Arp Schnitger (1648-1719). He built around 170 high-quality organs with, of which 30 remain in more or less original condition. Several of his instruments have four manuals, most of his organs are also equipped with large pedal divisions[68].

The preromantic repertoire was very well compatible with these instruments[69]. Schnitger's organs usually have distinct pedal towers and very clear visual division of all their sections. Schnitger's greatest work in Hamburg, St. Nikolai (1682-87, IV/67, destroyed by fire in 1842) established his reputation. This instrument had three 16' Hauptwerk stops, sixteen independent pedal stops, including seven reeds and two 32' registers. All its sections were equipped with multiple stops, with a wide variety of flutes and reeds, almost a full bass octave, there were two manualcouplers, three tremolos and sixteen large wedge bellows[70]. Schnitger's largest organ in St. Nikolai in Hamburg had the following stoplist[71]:

Werck (manual II)		**Oberpositiv (anmual III)**		**Brustpositiv (manual IV)**	
[C, D – c^3]		**[C, D – c^3]**		**[C, D – c^3]**	
Principal	16'	Holzflöte	8'	Blockflöt	8'
Quintadena	16'	Rohrflöte	8'	Principal	4'
Rohrflöte	16'	Weidte Flöte	8'	Rohrflöte	4'
Octav	8'	Quintadena	8'	Quinte	2Ç’
Spitzflöte	8'	Octav	4'	Waldfltöe	2'

[66] Gesztesi-Tóth László, *Isten, Ember és Természet harmóniája a barokk orgonaépítészetben – az orgona mellékregiszterei,* Budapest, 2009, p. 18.
[67] Michael Ray, The Editors of Encyclopaedia Britannica, *History of the organ to 1800,* https://www.britannica.com/art/keyboard-instrument/History-of-the-organ-to-1800/ [03.04.2023].
[68] Michael Ray, The Editors of Encyclopaedia Britannica, *Arp Schnitger,* https://www.britannica.com/biography/Arp-Schnitger/ [03.04.2023].
[69] Ibidem.
[70] Douglas E. Bush and Richard Kassel, *The Organ an Encyclopedia,* 2006, New York, p. 496.
[71] https://www.arpschnitger.nl/shamb04.html [03.04.2023].

Saltzianell	8'	Spielflöte	4'	Nasat	1w̄'
Quintpfeiffe	5w̄'	Nasat	2Ç’	Tertian	II
Octav	4'	Gemshorn	2'	Scharff	IV-VI
Superoctav	2'	Scharff	V-VII	Baarpfeife	8'
Flachflöht	2'	Zimbel	III	Dulcian	8'
Rauschpfeiffe	III	Tromett	8'	[Tremulant?]	
Mixtur	VII-X	Krummhorn	8'		
Scharff	III	Vox Humana	8'		
Trommet	16'	Tromett	4'		
shove coupler	III/II	shove coupler	IV/III		
shove coupler	IV/II	[Tremulant?]			

Rückpositif (manual I)		**Pedal**		
[C, D – c^3]		**[C – d^1]**		
Bordun	16'	Principal	32'	[Sperrventile?]
Principal	8'	Octav	16'	
Gedackt	8'	Subbas	16'	
Quintadena	8'	Octav	8'	
Octav	4'	Saltzianell	8'	
Blockflöte	4'	Octav	4'	
Querflöte	2'	Nachthorn	2'	
Sifflöte	1w̄'	Rauschpfeiff	III	
Sesquialtera	II	Mixtur	VI-X	
Scharff	VI-IX	Posaunen	32'	
Dulcian	16'	Posaunen	16'	
Trecht Regal	8'	Dulcian	16'	
Schalmey	8' [4'?]	Tromett	8'	
		Crumphorn	8'	
		Trommet	4'	
		Cornet	2'	

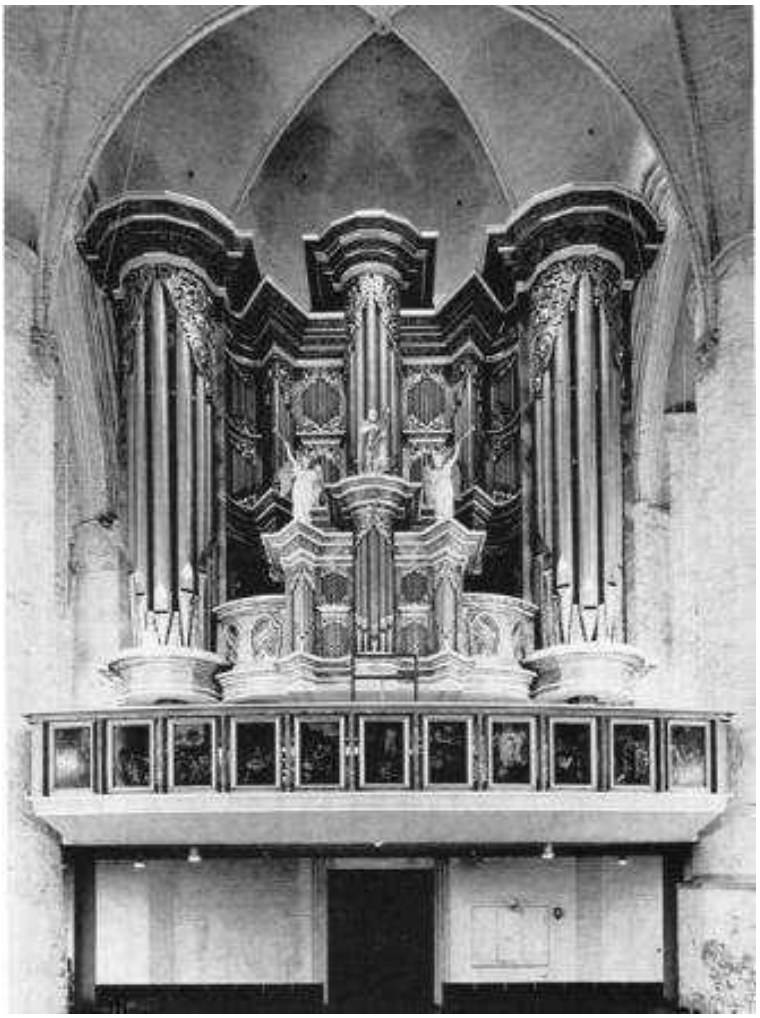


Plate 30. Arp Schnitger Organ Hamburg, St. Jacobi[72].

Other important instrument builders such as Gottfried Silbermann in the 18th century produced organs with different families of stops, on which there were several 8' stops on a single manual. The Silbermann family started with Michael Silbermann (b. 1650) and his two sons, Andreas (André) Silbermann (1678-1734) and Gottfried Silbermann (1683-1753). From the workshop of Andreas's older son, Johann Andreas (Jean-André) Silbermann (1712-1783), a number of instruments have survived. Andreas Silbermann had his main seat in Strasbourg, where thirty-five organs were made, the sound effect of these instruments is quite "cosmopolitan".

The main model was based on François Thierry's (1677–1749) mid-baroque French classical style. As for the famous Gottfried Silbermann little is known about his early life. In 1702, he traveled to Strasbourg and studied the instrument's architecture with his

[72] https://www.arpschnitger.nl/shamb.html [03.04.2023].

brother for several years. Together they built an organ in 1707 but this instrument did not survive. In 1710 Gottfried set up his first workshop in Freiberg, where his life was full of successes. Like Johann Sebastian Bach, Silbermann stayed close to home and in his later years he did not accept invitations to build instruments in Copenhagen, Moscow and St. Petersburg, as at that point he no longer needed those commissions to make a living. His most important student was Zacharias Hildebrandt (1688-1757)[73]. Of Gottfried Silbermann's 46 known organs, forty-one were built in Saxony, and five others were built in Thuringia and Brandenburg. Four of his organs had three manuals, while twenty-two had two manuals. Eleven of his organs had one manual and were equipped with pedals[74]. His largest and last organ, preserved in Hofkirche in Dresden, has the following stoplist:

Hauptwerk (manual II)		**Oberwerk (manual III)**		**Brustwerk (manual I)**	
C, D – d^3		**C, D – d^3**		**C, D – d^3**	
Principal	16'	Quintadehn	16'	Gedackt	8'
Bordun	16'	Principal	8'	Principal	4'
Principal	8'	Gedackt	8'	Rohrflöt	4'
Viol di Gamba	8'	Quintadehn	8'	Nassat	3'
Rohrflöt	8'	Unda Maris	8'	Octava	2'
Octava	4'	Octava	4'	Quinta	1⅓'
Spitzflöt	4'	Rohrflöt	4'	Sufflöt	1'
Quinta	3'	Nassat	3'	Sesquialtera	⅘'–1⅗'
Octava	2'	Octava	2'	Mixtur	III
Tertia	1⅗'	Tertia	1⅗'	Chalumeaux	from g
Cornet	V	Flaschflöt	1'		
Mixtur	VI	Echo Cornet	V		
Zimbeln	III	Mixtur	IV		
Fagott	16'	Vox Humana	8'		
Trompet	8'				

[73] Douglas E. Bush and Richard Kassel, *The Organ an Encyclopedia*, 2006, New York, p. 496.
[74] Ibidem.

Pedal

C, D – d^1

Untersatz	32'	Tremulant (II)	
Principalbass	16'	Schwebung (III)	
Octavbass	8'	shove coupler	III/II
Octavbass	4'	shove coupler	I/II
Ped. Mixtur	VI	Bassventil	II/P
Posaunbass	16'		
Trompetbass	8'		
Clarinbass	4'		

Plate 31. 1755 Silbermann organ at the Hofkirche, Dresden, Germany[75].

Later developments in the German speaking circle included a tendency for more and more monumental designs. As the number of stops grew, so did also the compasses – gradually including all the chromatic notes in the bass octave and the highest notes of the treble range. With the increasing number of stops the size of the tone pallets grew, creating much heavier working actions. The organs started to include a swellbox, allowing for gradual and smooth changes of dynamics. A good example of such an instrument is the restored organ from 1841 at St. Nikolai in Stralsund

[75] https://www.pipedreams.org/profile/dresden-hofkirche-silbermann [03.04.2023].

– a work of Carl August Buchholz (1796-1884), a late descendand – via tradition of the workshop of Joachim Wagner (1690-1749) – of the Silbermann school[76]:

Hauptwerk (manual II)		**Unterwerk (manual III)**		**Schwellwerk (manual I)**	
C – g³		**C – g³**		**C – g³**	
Principal	16'	Bourdon	16'	Principal	16'
Quintatön	16'	Principal	8'	Praestant	8'
Principal	8'	Salicional	8'	Viola di Gamba	8'
Gemshorn	8'	Gedackt	8'	Piffaro	8'
Rohrflöte	8'	Octave	4'	Gedackt	8'
Nasard	5⅓'	Rohrflöte	4'	Flauto traverso	8'
Octave	4'	Gemshornquinte	2⅔'	Octave	4'
Spitzflöte	4'	Superoctave	2'	Rohrflöte	4'
Quinte	2⅔'	Mixtur	IV	Viole d'amour	4'
Decima quinta	2'	Progressio Harm.	II-V	Nasard	2⅔'
Cornett	V	Fagott/Hautbois	8'	Superoctave	2'
Scharff	V	Tremolo		Mixtur	IV
Cymbel	III	Ventil Obermanual		Vox angelica	8'
Progressio Harm.	II-V			Ventil Untermanual	
Trompete	8'				
III/II					
I/II					
Ventil Hauptmanual					

Pedal		
C – d¹		
Violon	32'	Evacuant
Untersatz	32'	Tremolo [entire organ]
Principal	16'	Calcantenglocke
Violon	16'	
Subbaß	16'	
Nasard	10⅔'	

[76] https://de.wikipedia.org/wiki/Orgel_der_St.-Nikolai-Kirche_(Stralsund) [03.04.2023].

Principal	8'
Violon	8'
Baßflöte	8'
Nasard	5w̄'
Octave	4'
Baßflöte	4'
Mixtur	VI
Contraposaune	32'
Posaune	16'
Trompete	8'
Clairon	4'
II/P	
Ventil Großpedal	
Ventil Kleinpedal	

Plate 32. 1841 Buchholz organ in Stralsund, St. Nikolai, Germany[77].

[77]https://upload.wikimedia.org/wikipedia/commons/3/36/Buchholz-Orgel_Stralsund_%282007-06-11%29.JPG [03.04.2023].

Even later tendencies increased the number of the deep-sounding stops (16', 8') to such an extent that they very much dominated the entire stoplist and created a challenge for the construction of the mechanics since the provision of sufficient volume of wind became crucial for the technical and tonal success of the instrument. New technical solutions became necessary to make the realisation of new musical aspirations possible. The Barker machine and new systems of register combinations became popular and enabled quick changes of timbres as well as use of multiple coupled manuals. Overblowing stops and free reeds became gradually a speciality of many organbuilders and introduced orchestral sounds to the organ world more and more. An example of a monumental organ from this later period is the famous instrument at the Schwerin cathedral built by Friedrich Ladegast (1818-1905) between 1868 and 1871. The stoplist of this splendid instrument is as follows[78]:

I. Manual		**II. Manual**		**III. Manual**	
C – f³		**C – f³**		**C – f³**	
Principal	16'	Principal	16'	Geigenprinzipal	8'
Bordun (tenor c)	32'	Quintadena	16'	Gedackt	16'
Bordun	16'	Principal	8'	Doppelflöte	8'
Principal	8'	Bordunalflöte	8'	Flauto traverso	8'
Doppelgedackt	8'	Rohrflöte	8'	Salicional	8'
Flaute major	8'	Quintatön	8'	Gedackt	4'
Gemshorn	8'	Fugara	8'	Fugara	4'
Gambe	8'	Piffaro	8'	Piffaro	4'
Rohrquinte	5⅓'	Oktave	4'	Nassat	2⅔'
Oktave	4'	Flautino	4'	Piccolo	2'
Rohrflöte	4'	Flöte	4'	Progr.-Harm.	II-IV 2'
Spitzflöte	4'	Quintatön	4'	Clarinette	8'
Terzflöte	3⅕'	Quinte	2⅔'	Glockenspiel [cis^{1}-cis^{3}]	
Quinte	2⅔'	Oktave	2'		
Oktave	2'	Cornett	II 2⅔'		
Cornett	IV 4'	Progr.-Harm.	III-IV 2'		

[78] https://de.wikipedia.org/wiki/Schweriner_Dom#Orgel [03.04.2023] and https://www.schuke.de/projects-archive/schwerin-dom-ladegast-orgel/ [03.04.2023].

Cornett	I-II 2⅔'	Scharff	IV
Mixtur	IV 2⅔'	Fagott	16'
Cymbel	II-III 2'	Oboe	8'
Trombone	16'	Tremulant	
Trompete	8'		
II/I			
III/I			
IV/I			
Pneumat. Werk	I/III		

IV. Manual		**Pedal**		
C – f³		**C – f¹**		
Viola	16'	Violon	32'	I Manual. Abteilung 1 [*forte*]
Lieblich Gedackt	8'	Untersatz	32'	I Manual. Abt. 2 [*piano*]
Zartflöte	8'	Principalbaß	16'	II Manual. Abt. 1 [*forte*]
Viola d'amour	8'	Oktavbaß	16'	II Manual. Abt. 2 [*piano*]
Unda maris	8'	Violon	16'	Pedal *forte*
Flauto dolce	4'	Subbaß	16'	I Man. Combination
Salicional	4'	Salicetbaß	16'	II Man. Comb.
Flautino	2'	Terz	10⅗'	III Man. Comb.
Violine [vacant]	*2'*	Nassat	10⅔'	IV Man. Comb.
Waldflöte [vacant]	*2'*	Principal	8'	Ped. Comb.
Harmonia aeth.	III 2'	Cello [strong]	8'	*Crescendo*
Aeoline	16'	Cello [soft]	8'	*Decrescendo*
		Bassflöte	8'	Schweller-Ventil zu Man. III
		Nassat	5⅓'	u. IV.
		Oktave	4'	
		Flötenbaß	4'	
		Cornett	IV 2⅔'	
		Posaune	32'	
		Posaune	16'	
		Dulcian	16'	
		Trompete	8'	

Trompete 4'

I/P [C-es[1]]

Ventil zu den starken Bässen

Ventil zu den Piano-Bässen

The final stage of the development of the 19th century was the introduction of the socalled tubular-pneumatic action which allowed exceptionally large organs to be constructed while maintaining very light touch. *Rollschweller* (crescendo roller) and a sophisticated system of free combinations allowed almost limitless possibilities in terms of the registration. This style of organ, with a plethora of foundation stops in almost every possible dynamic shades, implied special ways of regsitration and creating of new sound by combining different 8' timbres.

Plate 33. 1871 Ladegast organ at the Schwerin cathedral, Germany[79]

[79] https://upload.wikimedia.org/wikipedia/commons/9/9c/Schwerin_Ladegast-Orgel.jpg [03.04.2023].

I.4. Fortepiano and the modern piano

After stringed and plucked instruments, Bartolomeo Cristofori's creation of an instrument called *Gravicembalo col piano e forte* (1655-1731) brought an extraordinary change to the musical life[80]. Cristori's instrument had thinner strings than the modern piano. The kind of strings and soundboard caused the sound of the fortepiano to loose its resonance more quickly, while the modern piano with its thicker strings is capable of creating a much greater and longer tone – after pressing the key one gets an audibly longer sound than on a fortepiano. One of the biggest differences between the two instruments is the mechanical transmission of key movement to the hammer[81]. The mechanical development of the fortepiano went in two directions: one became known as the simpler Viennese mechanics, and the other became known as the English mechanics. With very different mechanisms, Viennese and English pianos were quite different. Instruments with a range of 4 octaves had already reached five octaves (FF-f’’’) by 1800.

Due to a special damping system, when the player releases the key, a hardened block of felt falls on the string and, in cooperation with the hammer head covered with multiple layers of leather, mutes the sound. Due to these properties of the Viennese grand piano its tone is rather short. The sustain function (removal of all the dampers) could often be activated in the middle or side of the instrument, with a hand stop above the keyboard, or with a knee spacer placed below the keyboard[82]. Mechanics and hammers are independent in English mechanics. Viennese mechanics are relatively simple but they enable a much less sensitive instrument handling than that of the English instruments. After a period of certain popularity of the difficult-to-use Viennese mechanics, English mechanics became widespread as it allows for much more sensitive sound production. William Adam Stodart through his invention (controllability of the trigger point) made the repetition ability of the instrument increase significantly and since then the mechanics follows the movements of the player's hand much more

[80] Betty Shuttleworth, *A Study of the Development...*, p. 26.
[81] Garyfallia Katsimiga, *Interpretation of the music of the late 18th/early 19th centuries on the modern piano*, Hanze Prince Claus Conservatoire 2015, p. 17-18.
[82] Petra Somlai, *Two Viennese piano schools: Beethoven and Hummel*, Royal Conservatory, The Hague, 2019.

sensitively. This is one of the reasons why the English type is much preferred even today[83].

Hans Nepomuk Hummel (1778-1837) writes the following words about historical pianos comparing the two types of mechanics: *There is no denying that each of the two mechanisms has its own advantage. Even for the gentlest hands the Viennese keyboards are easy to play* [...], *they sound well and clear, they give off a round flute-like sound* […]. *These pianos are durable and cost almost half as much they have an English keyboard* [...] *There is* [a certain] *stability in its voice compared to the English mechanism*[, and the English system] *should be commended for its conciseness. However, these instruments don't allow the fast play* [like] *that of the Viennese mechanism, because playing requires significantly more force* [...]. *In the case of fast repetition, it does not happen fast enough* [...]. *With this on the other hand, the melody on these instruments is specific, due to the fullness of the sound it has a pleasant and harmonic sound* [...][84].

Plate 15. Bartolomeo Cristofori's piano, 1720, in an Italian collection (Florence)[85].

Let us now devote a few words the the Vienna type of action invented around 1773 by Johann Andreas Stein. Due to the growing size and weight of the piano and its strings, this mechanism was not suitable for fast repetitions[86]. In Robert Palmieri's book *Encyclopedia of Keyboard Instruments* this type is defined as follows:
In this type of action the hammer is connected directly to the key lever with a parchment hinge, a common axle or Kapsel (a kind of fork with beds for the hammer's axle). When pressed, the key lever goes up and simultaneously the hammer's tail stopped by a fixed

[83] Dr. Mihály Duffek, *Zongoratörténeti áttekintés a párhuzamosok találkozásáról*, p. 10.
[84] Ibidem, p. 10-11.
[85] Photograph: https://www.metmuseum.org/art/collection/search/501788 [01.04.2023].
[86] Robert Palmieri, *Encyclopedia of keyboard instruments Vol. I: The Piano*, New Your & London 2003, p. 13.

rail, thus flipping the hammer head to the string. This kind of action was used in the German-speaking world from about the middle of the eighteenth century[87].

The English mechanics works differently:

The English action had immovable jacks and no escape. The more advanced single and double actions, a movable lift and a single escape were made at the same time[88]. The single English action was used until the end of the nineteenth century.

In the 19th century, the piano already had a variety of sound possibilities. Piano builders were expected to meet criteria such as that the player should be able to "sing" on the piano and should be able to create any illusion that many other instruments are capable of in reality (playing *legato* melodies, imitating different non-piano sounds, imitating the sounds of nature). By the 20th century, pianos with English mechanics – equipped with Sébastian Erard's (1752-1831) inventions, who in 1808 and then in 1821 perfected the English mechanics[89] – already had such a sensitive structure that opened up the possibilities of performance on pianos[90].

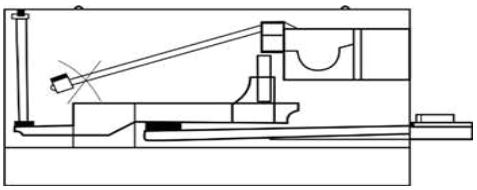


Plate 16. Fortepiano key action [91].

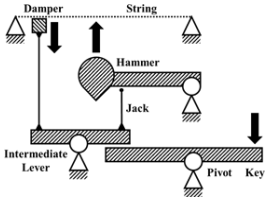


Plate 17. Fortepiano key action – a simplified technical drawing[92].

The sound-rich, stable and more sensitive pianos became the most sought-after instruments in the late 18th and early 19th centuries. Thanks to the fortepiano's key action the instrument evolved during the 18th and 19th centuries to such an extent that today's pianos also benefit from it. The main operating principle of the fortepiano remained preserved in modern pianos, its evolution improved the sound quality and had implications for the performance. As it can be observed, when comparing the harpsichord and the clavichord, the clavichord functioned more as a home practicing

[87] Robert Palmieri, *Encyclopedia*…, p. 18-19.
[88] Ibidem, p. 13.
[89] Ibidem.
[90] Duffek Mihály, *Párhuzamok találkozása, a zongora hangszertörténetének funkcionális áttekintése*, Debrecen, 2019, p.159-167.
[91] Figure: https://www.scirp.org/journal/paperinformation.aspx?paperid=104674 [24.05.2023].
[92] Ibidem.

instrument. A similar situation occured between the *grand piano* and the *upright piano*. The *upright piano* was originally called a *pyramid piano*, later it became the *pianino* and is still in use today. This new type of piano is associated with the name of Eduard Seuffert (1829-1855)[93].

Pianos with larger soundboards and brighter sound are more suitable for the performance venues and concert halls and are called grand pianos[94]. The grand piano has the largest and brightest sound of all the pianos. Its horizontal outer case is usually covered with an ebony-coloured black finish. Today's pianos can have several names, depending of their size: *Concert Grand*, *Living-room Grand*, *Parlor Grand*, *Boudoir Grand*, or *Baby Grand*. Grand pianos have three different pedal mechanisms. On the right side there is *the Damper pedal* or *Sustaining-pedal* that holds all the shock absorbers up at the same time so that every pressed key can continue to sound, even if the player releases the key. This pedal makes many pianists' performances easier, as *legato* playing is not always feasible without this pedal, especially if the player's fingers are not very long. By using the middle *(sostenuto)* pedal, the *sostenuto* mechanism is activated. It sustains the notes pressed when the pedal is pressed, so that all notes pressed later remain intact, regardless of the position of the pedal, since the use of the other two pedals do not affect the position of the note held with the middle pedal. This special effect is not usually found on European pianos, unlike American ones.

The far left pedal – *Una Corda* – moves the keyboard to the right. The contact between the hammer and the string takes place in the part of the hammer where the felt is smaller, this results not only in a change of the sound volume, but also the timbre[95]. This pedal dampens and makes the sound softer. It was my favorite pedal as a pianist. It was possible to achieve such an effect within the pieces as if one were hearing a voice coming from far away.

[93] Robert Palmieri, *Encyclopedia...*, p. 30.
[94] Benjamin Vogel, *The Piano of the First Half of the Nineteenth Century*, http://www.piano.instruments.edu.pl/en/history/the-piano-in-the-1st-half-of-the-19th-century/ [02.04.2023].
[95] Robert Palmieri, *Encyclopedia...*, p. 155.

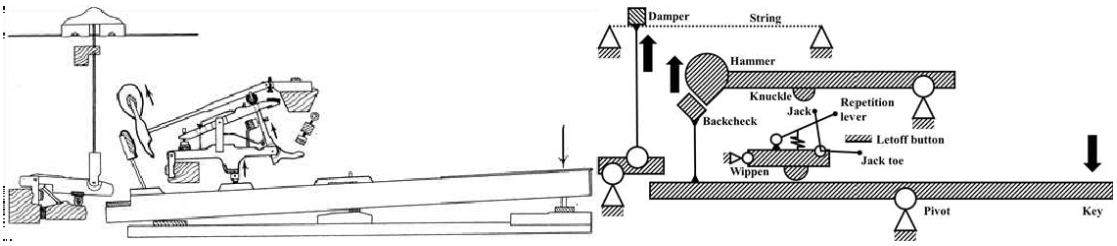
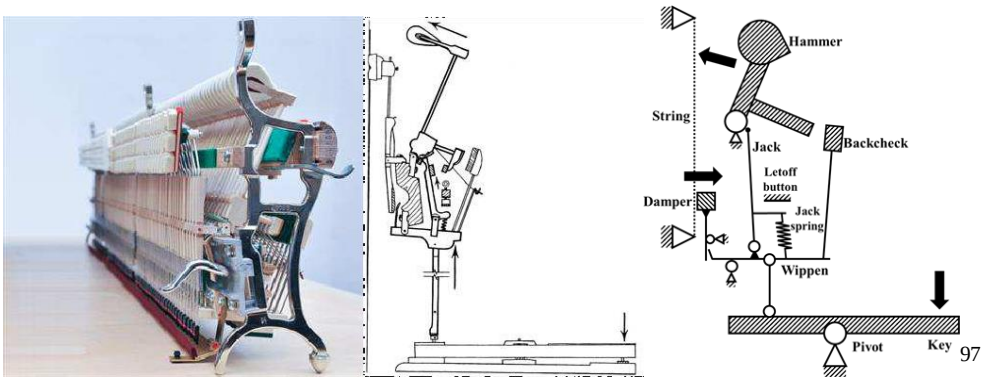


Plate 18. Grand piano key action[96].



97

Plate 19. Upright piano action[98].

Now I will list some the most significant makers and briefly describe their instruments. Gottfried Silbermann (1683-1753) was an excellent builder of pianoforte instruments in what is today East Germany. He probably already experimented with various hammer actions already early in his career. Between 1733 and 1740 Johann Sebastian Bach deservedly recognized Silbermann's pianos, played them and perhaps even had an instrument from Silbermann's workshop. Based on the hammer action of the original Cristofori's *cembalo con martelli* in 1732 he built his first piano, called this *Piano-Forte*[99]. There are still three Silbermann pianos in existence today (two in Potsdam and one in Nuremberg). These instruments are in many aspects similar to those by Cristofori. The difference between them is that Cristofori's pianos do not have a mechanism for lifting all shock absorbers, a device already present in Silbermann's instruments. Thus, Silbermann was often referred to as the inventor of the modern piano[100]. Silbermann also invented mutational stops. One such stop

[96] Figure: https://www.scirp.org/journal/paperinformation.aspx?paperid=104674 [24.05.2023].
[97] Matteo Russo, Jose A. Robles-Linares, *A Brief History of Piano Action Mechanisms*, 2020, // https://www.scirp.org/journal/paperinformation.aspx?paperid=104674 [01.04.2023].
[98] Figure: https://www.scirp.org/journal/paperinformation.aspx?paperid=104674 [24.05.2023].
[99] Robert Palmieri, *Encyclopedia...*, p. 345.
[100] Ibidem.

consists of a series of ivory plates. When the hammers touch the strings, a bright, almost harpsichord-like sound is produced[101].

Stein pianos from the end of the 18th century were probably the most sought-after instruments in Central Europe. They had and elegant, almost silvery tone and were equipped with the Viennese action. Some of the German-Austrian most outstanding musicians were inspired by these pianos, among them Joseph Haydn (1732-1809), Wolfgang Amadeus Mozart (1756-1791) and Johann Nepomuk Hummel (1778-1837)[102]. The family's first talented piano builder was Johann (Georg) Andreas Stein (1728–1792). In his youth he worked for Johann Daniel Silberman (1717-1766) and then

for Franz Jakob Späth (1714-1786). He lived his life as a permanent resident of Augsburg and for a long time was active as an organ builder After his last major organ building project in the Holy Cross church in 1766, he dedicated his life to piano building. In 1763 the Mozart family visited him in Augsburg and bought a portable practice keyboard instrument from Stein. Stein's pianos had a *prell-mechanics*, similar to that in Silbermann's instruments but allowed faster repetition. Stein's action made the touch lighter and more responsive, he also constructed round, hollow hammers. His pianos were often made of walnut, while the conical hammers of the bass were of solid of pear wood[103]. Stein experimented with various register combinations, resulting in a *Poli-Toni-Clavichordium*. A harpsichord and piano combined in a rectangular case, with keyboards at each end that could be coupled. The other instrument he invented is the *Melodica*, which combined a set of pipes with a three-and-a-half-octave compass[104].

[101] Ibidem.
[102] Ibidem, p. 363.
[103] Robert Palmieri, *Encyclopedia...*, p. 364.
[104] Ibidem.

Plate 20. Pianoforte Andreas Stein (1728-1792), Augsburg, 1786[105].

Sébastian Érard (1752-1831) was born in Strasbourg and is the founder of the company Erard. His career began as a harpsichord maker. Later he became interested in pianos. The modern piano action can be traced back to Erard who patented it in 1808. By 1855 Erard was the leading piano maker in the world[106]. As a result of the use of the so-called Erard action, piano hammers became larger and thus the touch became more demanding but at the same time lighter than the touch of the previous English mechanics. The Erard action alleviated the difficulty of repetition. Erard's pianos were beautifully made, their tone was clear and powerful, and thus excellent for concert use.

Plate 21. Sebastian Erard fortepiano Paris, 1837[107].

Ignace-Joseph Pleyel (1757–1831) was active in Paris as a music publisher and piano maker from 1795 until his death. In 1807 he founded a piano company

[105] Photograph: https://www.fortepiano.fr/stein/ [24.05.2023].
[106] Ibidem, p. 143-144.
[107] Photograph: https://www.fortepiano.nl/erard-1837/ [24.05.2023].

in Paris. Pianinos were also made in his company from 1811 to 1815. Chopin highly valued Pleyel's work and commented on it with the following words: “When I feel out of sorts, I play on an Erard piano where I easily find a ready-made tone. But when I feel in good form and strong enough to find my own individual sound, then I need a Pleyel piano” (Eigeldinger)[108]. Three important developments of the Erard pianos should be mentioned here: hardened brass and steel strings (1810), manufacture of pianinos (1815), and a patent for a cast-iron frame (1825)[109].

Plate 22. Ignace Pleyel fortepiano, Paris, 1842[110].

Louis Constantin Boisselot (1809-1850) was also one of the most famous and active piano builders of the 19th century. As a result of his friendship with Ferenc Liszt (1811-1886), the pianist composed some of his late pieces on this piano[111].

Plate 23. Louis Constantin Boisselot fortepiano, 1846[112].

An English piano has large strings and heavy hammers that require a heavier touch to achieve a strong sound. Bass usually sounds louder than treble. It was difficult

[108] Ibidem, p. 296.
[109] Ibidem.
[110] Photograph: https://www.fortepiano.nl/pleyel-1842/ [02.04.2023].
[111] Paul Mc Nulty, *Fortepianos*, https://www.fortepiano.eu/materials-boisselot-1846/ [02.04.2023].
[112] Photograph: https://www.fortepiano.eu/materials-boisselot-1846/ [01.04.2023].

to play fast passages on it due to the low drop of the mallet[113]. Clavichord-shaped *square pianos* of the London harpsichord maker Burkhardt Tschudi (1702-1773) became popular with the English single action (which lacked the escape movement). Some other notable eighteenth-century piano builders in England were Boyer & Buntebart, Johannes Pohlmann (1767-1793), Thomas Culliford, Robert Stodart (1748-1831)

and William Stodart (1787 or 1795-1838?), John Geib (1744-1818), Christopher Ganer (1774-1800), Americus Backers (1763-1778), Jacob Kirkman (1710-1792) and John Broadwood (1732-1812)[114]. John Broadwood took over the business in 1771, transforming into John Broadwood (1732-1812) & Sons. The company created innovations that played an important role in the development of the modern piano. The earliest surviving Broadwood piano is from 1774, modeled after Johann Christoph Zumpe (1726-1790). Over the time Broadwood created new innovations in his pianos, moving the fingerboard (*Pin Block*) from right to back and replaced the knee levers with foot pedals[115].

By 1777, Broadwood's collaboration with Robert Stodart and Americus Backers produced the first grand piano incorporating the improved English action featured adjustable regulating screws. Broadwood also introduced a split brigde to improve the sound of the bass range. By 1784 Broadwood made 38 harpsichords and 133 pianos. The last harpsichord was made by him in 1793[116]. Another giant of the English piano industry was Muzio Clementi (1752-1832) composer, teacher, piano maker, music publisher and promoter of the piano. Longman, Clementi & Company by 1850 was second only to Broadwood in terms of the scale of production. The company was taken over by Chappell (now called Kemble) in 1929[117]. Clementi contributed to the further development of the English piano industry by, for example, using paired strings.

By 1851 almost all pianos made in England were upright[118]. The already mentioned Johann Christoph Zumpe worked with the harpsichord maker Burkat Shudi, but started his career as an independent instrument maker in 1761. Zumpe introduced and popularized the square pianoforte in England. He was also probably London's first

[113] Margaret Deebenham and Michael Cole, *Pioneer Piano Makers in London, 1737-74: Newly Discovered Documentary Sources*, Cambridge University Press 2020, p. 56.
[114] Robert Palmieri, *Encyclopedia...*, p. 124.
[115] Ibidem.
[116] Ibidem.
[117] Ibidem, p. 125.
[118] Ibidem.

piano maker. In the years that followed Zumpe became a major figure in the world of instrument manufacturers. Zumpe brought many improvements into the development and then perfecting of the piano-forte action.

In addition to his many technical innovations Zumpe built an instrument that soon became very popular in London, Paris and then throughout the world and remained fashionable for many years[119]. The Stodart piano-making family worked in London between 1775-1862. Its founder was Robert (1748–1831), who was joined by his brother Matthew (fl. 1822), together with his sons Vilmos (fl. 1792-ca. 1838) and Vilmos's son, Malcolm. Robert Stodart (1748-1831) made a grand fortepiano between 1775 and 1796. Stodarts have made some great instruments, including a large number of square pianos or table pianos[120]. Later the business ceased with the death of Malcolm Stodart (†1861)[121].

Plate 24. Fortepiano by Johannes Broadwood (1732-1812), London, 1807[122].

The model below is a special model of the *Compensator Frame* series, with harpsichord-shaped case made of mahogany and rosewood and decorated with bronzes.

Plate 25. William Stodart c. London, 1823 – Compensator Frame[123].

[119] Ibidem, p. 444.
[120] Ibidem.
[121] Ibidem.
[122] Photograph: https://www.fortepiano.nl/broadwood-1807/ [25.05.2023].

II. Sound

In this chapter, I write about the quality of the sound created by the quality of the touch, referring to the sound created in acoustically rich or less rich places, in comparison with the sounds created in this way by the keyboard instruments mentioned so far.

II.1. Clavichord

In my opinion, if the clavichord were to be distinguished – in terms of its sound – from other keyboard instruments, I would best compare it to the piano due to its dynamic possibilities. This small instrument, which was mainly designed for home use, is smaller in size than the harpsichord, both in terms of aesthetics and sound. As a small instrument, from a dynamic point of view, the most expressive dynamic contrasts and effects can be achieved with the appropriate touch. Since it is an instrument used mostly at home – usually a space with short acoustics – the creation of a voluminous sound requires much more effort than on an instrument like the organ, which in most cases is found in the church, in more impressive acoustics, or like the piano, on which the pedal use can create a feeling of certain grandeur and at the same time safety for the player. Despite all the difficulties, it is worth experimenting and getting to know the instrument until one gets used to it. It is important to distinguish the clavichord from the harpsichord because of its sound: the harpsichord is more a chamber music instrument while the clavichord works more like a solo instrument. Based on several music recordings, I can say that the clavichord works well in certain kinds chamber music. It is for example perfectly compatible with the baroque flute in the sonatas of Carl Philipp Emanuel Bach (1714-1788). In terms of expressiveness the sound of the clavichord can also be very satysfying when used together with the voice.

[123] Photograph: https://www.ericfeller.de/en/instrumente/william-stodart-c-1823-compensator-frame/ [25.05.2023].

II.2. Harpsichord

During my previous years as a harpsichordist I had the opportunity to get acquainted with several harpsichords, including Italian, French and German instruments. One could describe the sound of the harpsichord as silvery and metallic. The harpsichord is also a very sensitive instrument – it can react to the player's touch but differently than the clavichord or the piano since it is lacking the possibility of the dynamic shaping of the sound through changes of the touch. Changes of dynamics are possible but they are achieved but different means, mainly through changes of the stops or articulation, including the overlegato, and clever playing with the time. Players of Baroque music must be aware that all musical articulation stems from rhetorical elements and affects. Whether it's about the weight (strong or weak notes), ending notes or the very first note of the piece, it's worth thinking back on the importance of rhetoric: just like the sound of human speech – one can never speak constantly at the same pitch because then it becomes boring and sometimes incomprehensible. The commentary below gives a good glimpse into the sound of the French harpsichords – by many considered to be the epitomy of the harpsichord sonority:

By the time of the 1730 Blanchet instrument, French harpsichords had achieved a sweetness in sound very unlike the direct, punchy quality of their 17th-century forebears. The trebles sustain longer, the basses are less percussive and the initial attack given to each note by the quill is less assertive. By mid-century this tendency towards smoothness and sweetness of tone was even more pronounced, and French harpsichord sound acquired a caressing quality unknown in the instruments of other nations. There is a continuous gentle change in tone-color from treble to bass in each of the registers, and the overall tone quality is reminiscent of a woodwind ensemble of the Classical period – colorful and transparent. In Taskin's instruments, the treble became even sweeter and more caressing, the bass even more sonorous and velvety, and . . . there are more subtly different tone-colors, each of great beauty, than in the instruments of any other maker[124].

[124] Edwin M. Ripin and Howard Schott (with John Barnes and G. Grant O'Brien), *Harpsichord*, „The New Grove Dictionary of Music and Musicians", vol. 8, ed. Stanley Sadie, London 1980, p. 254.

II.3. Organ

It is difficult to write a comprehensive description of the sound of the organ, because in fact each instrument is unique and unrepeatable. Every organbuilding tradition will have instruments with their own distict sound character. Generally, the most characteristic aspect of the organ sound is its ability to last as long as the key is pressed. The organ's colour and dynamic possibilities surpass other keyboard instruments but the the instrument does not react on the changes of touch as directly as it is in case of the clavichord and fortepiano. Organs of the 18th century have usually a brilliant and penetrant sound, resulting from the many high-pitched stops. The changes of dynamics on them would be rather not very smooth since usually no swellbox would be available. Later organs would tend towards a more monumental sound on one side and more *piano* possibilities of the other allowing for a greater choice and dramaturgy of the chosen registrations. The rather instable wind situation of Baroque organs, originating from their wedge bellows, would result in a flexible sound and very direct reaction of the instrument on the quality of the player's touch. Romantic organs would have larger magazine bellows that make the sound very stable even in complicated textures, also with quickly repeated chords. The initial sound of the pipes – the so called speech – would also differ between Baroque and Romantic organs. The intense, almost percussive speech, of many older organs was the result of special kind of voicing, mostly on socalled open feet. Romantic organs would tend towards a much more smooth speech of their pipes[125].

II.4. Fortepiano and the modern piano

The piano is the keyboard instrument on which you can achieve very audible and effective dynamic changes. Variable touch displays a lot of effects on the instrument. The sound of the historic fortepiano will generally be more subtle than that of its modern equivalents. While the modern piano will have a very grand and impressive dynamic range, the historic fortepiano will rather have a chamber-music-like character in all its dynamic shades. On the other hand, the modern piano will have a tendency to allow for a heavier touch and smoother legato lines that it is in case

[125] http://www.colinpykett.org.uk/physics-of-voicing-organ-flue-pipes.htm [03.04.2023].

of the fortepiano where a more differentiated arcitulation will be welcome. In terms of the lenght of the sound the modern piano will have certain advantages since its soundboards will allow for a much longer duration and depth of the notes. A personal touch to the sound is possible here as much as on the clavichord and certainly both the fortepiano and the modern piano will present be able to present the refinement of a musician's touch in a more obvious way than it is in case of the organ or harpsichord. The sound of both the modern piano and the historic pianoforte seems rather dry in a rooms with smaller acoustics, but by using the right pedal properly a nice, round sounds can be achieved.

III. Playing technique

In this chapter I will present my remarks about the problematics and development of the playing technique and put it into the context of different keyboard instruments. The technical possibilities available to the player on one instrument are often not accessible on the other so that one has to search for alternative solutions in order to achieve a comparable effect. On the other side the differences originating from the construction and tonal qualities of the individual instruments provide unique values to the performance. With his in mind I will try to equip the reader with certain practical remarks which will hopefully inspire him to investigate in practice the expression of the variety of keyboard instrument.

III.1. Clavichord

The clavichord is the only keyboard instrument where one can actually change the pitch of a note after one has started it – if one presses the key harder, the pitch gets sharper. Touching the clavichord demands a certain degree of fine and precise technique, because if one just hits the key, it results in a kind of blow with an unsatisfactory sound. Because of this, one has to be careful when pressing the keys and dispose of a kind of elegance and delicacy in playing. Johann Sebastian Bach had withouth any doubt a singnificant influence on keyboard technique in 18th century German circle. In the second half of the 18th century, the most outstanding representatives of the German clavichord can rightfully be considered to be all relatives

of the *Bach-Schule*. He was the 'father' of the new developments in the clavichord playing in the era of the high baroque. As a result of the touch developed and taught by J.S. Bach many players could play the clavichord using all its subtleties. Bach's touch was apparently extremely different from that of his contemporaries – a timeless truth that experimentation with a good clavichord is essential. The Bach school certainly demands from the player a precision and a certain freedom, which can be achieved through the method of touch taught by Bach himself[126]. In this context the words of Miklós Spányi seem especially interesting:

The mechanism of the hand is intended for gripping. On gripping, all fingers with the thumb bend towards the inside of the hand, and express within this movement all the strength and steadiness which may be present. Every other kind of finger movement is either unnatural or leaves a large part of the muscles involved unused, as, for example, the depressing of the finger without a simultaneous bending of it[127].

For this reason, in all such movements, hand movement must be ensured easily and safely, in accordance with its natural purpose. It is no coincidence that Bach gave lessons to his pupils on the clavichord. During the lessons they apparently didn't bother the neighbors and sometimes there would be perhaps more than one student playing a clavichord in one room. Because of the pleasant sound of the clavichord they could practice even into the night and – because of the sensitivity of the instrument's action – the advantages of playing the clavichord could be for the students even greater than in case of the harpsichord or the organ. Someone who has learnt to play the clavichord can also use other keyboard instruments more easily.

Based on my experiences I can state that the clavichord is one of the most delicate keyboard instruments. Of course, each type of musical instrument has its own difficulty and will only be able to sound beautifully after a certain amount of time has been invested into practicing and getting to know the instrument thoroughly.

Carl Philipp Emmanuel Bach conveys an important message in the quote below: *A good clavichords makes an accomplished harpsichordist, but not the reverse* and he continues: *those who only concentrate on the harpsichord grow accustomed to play in only one colour, and the varied touch which the competent clavichordist brings to the*

[126] Miklós Spányi, *Johann Sebastian Bach's clavichord technique described by Griepenkerl*, originally in „Clavichord International", 2000, nr. 2, online version: https://wwkbank.harpsichord.be/Griepenkerl.pdf, p.2 -4, [31.03.2023].
[127] Ibidem.

harpsichord remains hidden from them. Since one would think that all performers can express only one kind of tone on each harpsichord. To test its truth ask two people – one a good clavichord player, the other a harpsichordist – to play the same piece on the latter instrument containing varied embellishments, and then decide whether both have produced the same effect[128].

Several players sitting at the same instrument can produce different qualities. Based on Carl Philipp's writing I was strengthened in the view that all good keyboard technique can start from the clavichord. On this instrument the relaxed position of the hand and good finger technique are really the foundation which we can use with the same repertoire on the harpsichord, perhaps also on the organ or on other keyboard instruments. The clavichord will clearly communicate the player's ideas. I consider it a delicate, sensitive, pure and honest instrument that should only be approached with respect. The dynamics, the true length of the sound, be it *legato* or any other means of musical expression, can be profoundly understood after practicing on the clavichord. Carl Philipp Emmanuel Bach comments on *legato* playing and structuring the weight of individual notes with the following remarks:

Notes that are to be played legato must be held for their full length. A slur is placed above them. The slur applies to all the notes included beneath the mark. Patterns of two and four slurred notes are played with a slight, scarcely noticeable increase of pressure on the first and third. The same applies to the first tones of a group of third. The same applies to the first tones of a group of three. In other cases only the first of the slurred tones is played in this manner[129]. Johann Nikolaus Forkel (1749-1818) also has his opinion on the question of the instrument that should be practiced first: *Moreover, to begin with, the clavier (clavichord) is better by far than the forte-piano, since one hears every error of touch more easily, and more depends upon the player than on the instrument"*[130]. The clavichord is the kind of instrument where you can't "lie". It will accurately transmit the music in the way and quality that the player wants or is able to provide and if he makes a mistake it will be probably much more audible than it would the case in the performance of the pianist, who can eventually partly cover it up with the use of pedals, or the organist, for whom the room acoustics are the "pedal of the piano".

[128] c, s.70.
[129] Ibidem, s.72.
[130] Ibidem, s.73.

Carl Philipp Emmanuel Bach suggests that one should play first on the clavichord and then interchangeably on the harpsichord. Such an idea would certainly also work in case of the fortepiano and the organ. But still it is the clavichord that indeed demands a very complex touch with the result, that the transition to other historical keyboard instruments and the organ present no difficulties, since the touch and technique as learnt on the clavichord can remain almost the same on other keyboard instruments and will need relatively small adjustments. Carl Philipp also suggested expressing strong emotions by striking the keys with greater force but also by enhancing the melodic and harmonic figures. He also undelines that there will always be a strongly individualised effect depending on the type od the clavichord itself: *Many instruments do not produce a perfect tone unless a strong touch is employed, while other ones must be played lightly or the volume will be excessive*[131].

When employing old fingering this touch (mentioned above) can present some difficulties. Whatever the order of the fingers, our fourth and fifth fingers might create certain difficulties. As a solution to this we can draw information from Friederich Konrad Griepenkerl's text, in he shares some advices by J. S. Bach himself:

The equality of the fingers as regards strength and flexibility makes yet another artificial resource necessary without which no one even with the greatest efforts and most persistent diligence can succeed in conquering the natural obstacle lying in the weakness of the fourth and fifth fingers. J. S.Bach found this resource in the use of the weight of the hand and arm that anyone may maintain with ease at will, either at the same degree or at a greater or lesser degree of force. No finger is too weak to serve as the point of support for this weight; the fourth and fifth fingers can bear it to the same degree as the second and third, and can transmit it to the keys with equal force, insofar as the agility inherent in each finger is brought into use. The most profound connection of this agility with the weight of the hand on Touching the key, is what is most essential in the whole mechanism of keyboard playing in Bach's manner[132]. He also stresses the need for relaxation of the hand**:** *In playing, the fingers should be arched and the muscles relaxed*[133].

We can read the following words in a similar text by Forkel:

[131] Cristiano Holtz, *J.S.Bach's Keyboard Technique According to Historical Sources,* Lisboa 2022, p. 80.
[132] Ibidem, p.75.
[133] Ibidem.

The holding of the arched fingers renders all their motions easy. There can therefore be none of the scrambling, thumping, and stumbling which is so common in persons who play with their fingers stretched out, or not sufficiently arched[134].

I think Forkel's words apply to all keyboard instruments. Finally, I think that if one can play the clavichord well, it will be much easier for him to get to know and train any other keyboard instrument.

III.2. Harpsichord

In order for the harpsichord to sound beautifully, the whole body must be in a relaxed state. This includes avoiding tension in the fingers, especially the little finger and thumb, which can cause hand spasms when tense. Especially during a bigger jump, the player never wants to extend those fingers. Instead, the fingers are slightly curled in and not extended. The best way to find this position is to drop ones arms and hands to the sides in complete relaxation, then raise ones hands and hold this position. This is a good position to play the harpsichord and always check to make sure the fingers are slightly bent and not spread. This would be a closer hand position where the fingers are close together, giving the best sound on the harpsichord because it relaxes more easily. When playing the harpsichord, it is worth striving for minimal movement, without any extra movement. So we only use the fingers unless the wrist is needed, and then we only use the wrist and fingers unless the arm is needed. There is a so-called "overlegato" playing technique, during which one note almost blends into another. This effect actually enriches the sound of the harpsichord and sustains certain harmonies. The performer should concentrate on relaxing the shoulders, wrists and elbows, and then on the sounds and the performance. The key to achieving this is relaxation, which is the biggest secret of correct harpsichord technique. To avoid this, arm tension, especially squeezing the elbows, either outward or toward the body, will lead to a forced sound. Harpsichord technique is primarily a task focused on accurate articulation. Articulation is the main way to express what the player wants to convey to the listener. I believe that also the harpsichord can also create audible dynamics if we touch the instrument while concentrating on this question and applying certain kinds of articulation including the "overlegato".

[134] Ibidem, p.75-76.

Let us now concentrate on the main question of my thesis – can it be useful to practice on different keyboard instruments? – and explore it using now harpsichord as a central instrument. If, for example, someone has problems with playing ornaments, which can lead to very complicated, often convulsive hand movements, it is worth practicing all this on the harpsichord. We can choose from many studies, for example from the ornaments of François Couperin or Carl Philip Emmanuel Bach. In order to play properly, one must prepare himself for a natural posture, as one sits at the harpsichord, with a straight back and a relaxed neck. The right distance from the keyboard should be maintained, not too close but not too far. One should also think of a double manual harpsichord where one wants to reach the upper keys.

I think the choice of repertoire can also influence the culture of touch and the technical issues during a performance on the harpsichord. The performance of Bach's pieces will provide a most delicate task, it is no coincidence that so many Baroque performers mention "music as speech". Since on a French-type instrument, where the sound is bright and rich, we cannot be played in the same way as a German instrument with a much darker sound and other resonance, it is also in this context that one can strive towards a sound ideal that cannot be created without comparison between different instruments A good musician can adapt to the circumstances, which is why I think it is important to get to know several types of instruments within one family of instruments. In every musician's life, a sudden situation can arise when one has to play an instrument that one could not practice on before, so it is important to familiarize ourselves with several keyboard instruments, thus making performance easier. When we practice on different instruments, use the touch in different ways, our technique can improve enormously.

The harpsichord literature is full of various ornamented notes that the harpsichordist should naturally be able to play without difficulty. We can read Carl Philipp Emanuel Bach's "Essay on the True Manner of Playing Keyboard Instruments" 1753 In the "Performance" chapter He describes a general ideal touch:

There are many who play stickily; as if they had glue between their fingers. Their touch is lethargic; they hold notes too long. Others, in an attempt to correct this, leave the key too soon, as if thes burned. Both are wrong. Midway between these extremes is best. Here again I speak in general, for every kind of touch has its use[135].

[135] Cristiano Holtz, *J.S.Bach's Keyboard Technique According to Historical Sources,* Lisboa 2022, p. 59.

In order to achieve a healthy harpsichord sound, or to avoid the harpsichord reacting too late or not playing at all, it is worth placing ones hands on the keys and touching them before starting to play and pressing the keys slightly. This movement is not used for creating the sound but for the player to feel the keyboard better, to feel the connection with the instrument, thereby it helps for the beautiful creation of the first note when the pick reaches the string. It is not enough for a good player to learn to press the keys with a good technique, he must pay equal attention to the release of the sound. This should preferably be done without any added noise. This noise is created if the connection with the instrument is not established by our finger placed on the keyboard before the first note. When you reach the final note, don't take your hands off the keyboard suddenly, but first feel the plucker finish his work on the string.

III.3. Organ

The style and technique of playing the organ is greatly influenced by the style of the instrument and on how much acoustics there is around the sound. If it is possible to practice in one room, due to the reverberation, we hear a much clearer, drier sound, which makes it more difficult to control our playing, but we can work out the piece more accurately and precisely. This is a big advantage, especially in the initial phase of practice. At the same time, music comes to life in a space with good acoustics. As for me, I first choose the room with smaller acoustics to learn the sounds and music, and after the precise work, I start a higher quality work in the church, where each sound sounds in a different quality, comes to life. From the acoustic point of view, we already perceive the advantages and disadvantages of practicing.

Bach's keyboard technique was unique, incomparable to anyone else's. Bach's playing style on the clavier and organ set him apart from all others. It's not for nothing that achieving authenticity is so complicated for today's player. Organists often use the special technique of Johann Sebastian Bach, Forkel writes about Bach's playing technique for organ – which also works excellently when applied to harpsichord and clavichord – like this: *according to Sebastian Bach's manner of placing the hands on the keys, the five fingers are bent so that their points come into a straight line, and so fit the keys, which lie in a plane surface under them, so that no single finger has to draw*

nearer when it is wanted, but every one is ready over the key which it may have to press down[136]. Much depends not only on the style but also on the size of the organ. Smaller organs, usually with pure tracker action, will require precise technique originating mostly from the finger tips and very much like the haprischord playing technique. Larger tracker instruments – both Baroque and Romantic – will require the use of the arm weight, especially when played with couplers. Organs with tubular pneumatic action do not require much force incorporated into the playing technique – on the contrary, it is possible to play even the fastest and most complicated pieces almost effortlessly on them.

III.4. Fortepiano and the modern piano

With the appearance of the fortepiano, the eighteenth and nineteenth centuries transformed the well-known traditional keyboard technique, style and compositions. A failure to change the way of thinking about harpsichord technique can result in poor piano technique[137]. The quality of the sound of a piano depends very much on how the key is pressed. If the pianist presses a key quickly, the result will be a stronger sound than if a slow tap produces a softer, quieter sound. Changing the tone makes the performance colorful, expressive and unique. Today, there are still debates about the historical performance methods, especially the performance method of Bach's music on different keyboard instruments. I am convinced that the answer to this question is only possible after well-founded theoretical and practical knowledge. It is still a question among pianists whether the pedal can be used when performing these Johann Sebastian pieces. There are many kinds of ideas, since today's people did not live in Bach's age and obviously cannot reconstruct the full amount of performance refinement from that time. I think the best way to find the way to the best performance for a pianist is to at least try out older keyboard instruments and use this experience to continue to find the way to an authentic, yet unique performance on a piano. One can play a large number of timbres on the piano, all of which are determined by the quality and manner of tilting. Compared to the piano, the fortepiano has much shorter

[136] Cristiano Holtz, *J.S.Bach's Keyboard Technique According to Historical Sources*, Lisboa 2022, p. 71.
[137] Rachel A. Lowrance, *Born to Conquer: The Fortepiano's Revolution of Keyboard Technique and Style*, Cedarville University 2014, 1-16.

and narrower keys, and I would rather say it is a more delicate instrument that requires less effort than the modern piano.

Where it is not enough to play only with our fingers, one needs the energy of even the whole body. Think of a fortissimo volume that reaches from the back of the player all the way through the shoulders and arms through the fingers to the body of the piano. For a good sound experience, it is worth sitting at the very end of the instrument, as the sounds gather in the body of the instrument, and this is where the power of the sound can be best transmitted to the listener. Due to the continuous change and development of instruments it was not easy for the player to suddenly get used to these new keyboard instruments. Pieces created to improve technical skills were often meant for teaching purposes[138]. These exercises are still useful exercises for keyboardists today, I think not only for pianists. Starting and releasing the sound is one of the vital elements, since improper sound release is detrimental to the quality of the sound. In the case of the piano it is no longer enough to use only our fingers to achieve the right sound, since in such a way we cannot create the proper *fortissimo* dynamics. It is said that the piano is the easiest to learn to play, since the notes are given, there is no need to shape them from the beginning to such an extent as with wind instruments.

But if we want to create a quality sound, we have to realize that maybe a pianist has an even harder job. I think that a musician often has to become a listener while playing, because what the pianist hears close to the piano very often only he can hear, but if he observes from the perspective of the listener, then he can really find the optimal solution. I find it fascinating that an instrument can sound completely different in the hands of musicians. the sound of the instrument is influenced both by the musician's technical and emotional playing but this makes each instrument and musician so unique and unrepeatable.

[138] Some of them are Muzio Clementi's "Gradus ad Parnassum" composed in 1817 or Louis Hanon's "Le Pianiste Virtuose" which was first published in 1873.

IV. Same repertoire on different keyboard instruments

In this chapter, I try to present the advantages and/or potential disadvantages of the keyboard instruments presented on the previous pages of this paper through the perspective of chosen instrumental pieces. These are personal opinions in which I try to present the differences in the performance of pieces written for the given keyboard instrument but performed on other keyboard instruments.

I think it is crucial to highlight the importance of practicing on different keyboard instruments. We can call ourselves lucky because we have restored historic instruments on which we can represent the music of the given era. In the modern process of education – at least in most cases – playing of each keyboard instrument is taught separately. The contact with the instrument itself teaches how to play, to rehearse, to find the best contact with the mechanics and sound, most importantly, to adapt to it. Let it be a piano transcription that the artist wants to perform on the organ. It is worth even studying the original work written for piano on the given instrument, and then to transfer the experience gained from it to the instrument on which the work should finally be played. Similarly, the lines written above are also true for a manualiter piece that can be played on other keyboard instruments, such as the organ, the clavichord or the harpsichord. As for the organ pieces, it is worthwhile to practice the manual part on the piano during the learning phase without pedaling, where the hammer mechanism enables interesting nuances of musical interpretation. In such cases we can practice with flexible dynamics which we will later try to implement on the organ. Now I would like to compare some pieces that can be performed on different instruments.

My first example is Toccata in d minor, Op. 11 composed by Sergei Sergeyevich Prokofiev. Prokofiev was a rather blunt, outspoken person. Revolutionary in his music, he sought for new paths and opposed all musical manifestations of romanticism. He played the piano in a completely unusual musical style, he himself stated that the piano is a percussion instrument and should be played that way.[139] This direction, which he represents, can be clearly heard in his toccata. In order for the main parts to be heard better, Jean Guillou transcribed notes into the pedal. Through this process and through the division of material between several organ

[139] https://librarius.hu/2023/01/10/prokofjev-ezer-arca-a-mupa-zenei-maratonjan/ [01.04.2023].

manuals Guillou makes the performance technically complicated while the pianist can achieve the desired sound effect with the help of his hands on only one keyboard. The continuous use of the pedal, sometimes with both feet, as well as frequent changes of manuals make this piece – I believe – almost more difficult for an organist to perform than it would be in the case of a pianist. This happens also because the stability of the sitting position is weakened by continuous necessity to change between so many keyboards. The other big issue is the registration, because the organ can't imitate the sound of a piano and I don't think the big church acoustics are good for this piece either. To give transparency and clarity to the different layers of the piece Guillou suggests applying quite dramatic changes of the instrument's timbre – something that would in my view not be necessary to such a degree on a piano. Overall, it's a huge challenge for musicians. Since this is a transcription, moreover, it is a transcription of a piano piece for organ, it is definitely worth learning the basics on the piano. I consider it very important to practice all the dynamics manually on a piano here, using an acoustically clear space, since in this piece, which requires very fast and precise playing, the blurred sound can only make it difficult to hear the rhythms and structures properly.

On the other hand, if we already know the piece well enough, the acoustics will help us, because a good acoustic is like a piano with a pedal. The music world of the 20th century was confusing and produced many interesting idioms. I believe that every composer wrote a work that reflected his own personality. Prokofiev really composed in a tonal style. But somehow it feels very different from anything they've composed before. Well, Prokofjev was quite a divisive personality, often receiving a negative feedback about his playing. In case of his toccata the whole piece is motoric, very persistent and filled with rhythmic energy. He knew how to achieve the strange, unexpected and then very exciting effect. His use of chromaticism helps to "spice up" the harmony and arrive at completely unexpected chords. Already at the beginning of the toccata, we can experience that the D minor tone, in which the piece was written, is almost imperceptible and rather used over short periods of time. But what is the purpose of repeating the note D? I am convinced that he stuck to this idea only because the piano was in his opinion a percussion instrument. In this piece, he completely convinced me that this is exactly the case. But how can we present this effect on the organ? I think that we should forget about the beautiful, sophisticated shape of the touch and do away with the fact that the organ is a piped, wind instrument. After much trying

and error, I have come to the conclusion that the best thing to do is to play shorter and harder notes on the organ, without any added, unnecessary movements. With loose wrists and leaving our hands in a static position. It usually helps me to imagine how the piano would sound.

In the following example I want to show a completely different perspective through György Ligeti's etudes, including his Music, Coulée, which was written on organ. Ligeti is very close to me as a Hungarian composer and I consider it important to present him and the excitement of his music to people who don't really know this composer. Often when we hear the term "Hungarian music" Béla Bartók or Zoltán Kodály come to our mind first. Ludic and almost village-like music come to mind at the same time. Although there are folkloristic elements in Ligeti's music, I consider him to be a complex composer. European influence and the appearance of Hungarian-Romanians can be observed in many of his works. He tries to approach Hungarian folk songs authentically, and he does this by using elements taken from folklore or invented melodies. *"The music shouldn't be normal, it shouldn't be well-mannered, no have a neatly tied tie"*[140]. Ligeti composed only three works for organ; Volumina (1961-62, rev. 1966), Harmonies (1967) and Coulée (1969)[141]. When we listen to such pieces for the first time, the question arises: what is the meaning, what does the composer want to convey with this unique, unusual style. My aim is to create a presenter's guide to this rarely played, perhaps little known, complicated piece. op-art, i.e. "optical illusion" is present throughout his work entitled Coulée. Rhythmically and metrically, it cannot be identified, the listener, especially if it is performed in a church with great acoustics, almost falls out of the space. The same thing happens in Ligeti's music, the effect is exactly audible. It is technically similar to etudes in that the motifs are repetitive and hand relaxation is essential. I also started learning this piece, I personally consider it minimalist music, unique in its simplicity. The question is repeated, what are the instruments on which it can be performed, what are the advantages and possible disadvantages? The composer originally intended his work for the organ, but many performers choose the harpsichord for the performance. I think this piece is an usual sound effect and it is its main purpose to pull the listener out of reality, metrum and tone. For this the deep, full sound of the organ is a great help and an added effect.

[140] Péter Várnai, *Beszélgetések Ligeti Györggyel*, Budapest 1979, p.4-5.
[141] Ibidem, p.6.

Ligeti's music is characterized by the "meccanico"[142] type of movement, which means that the music is machine-like, mechanical and precise in its sound. The phenomena taking place in Coulée are also about this. But what happens when the performer chooses a different instrument for his performance? Let's take two examples, the relationship between the metronome and the bell is relatively articulated. The sound of the bell is precise when ringing, but the sound image is murkier due to the longer attenuation time. In our case, the metronome is the same as the harpsichord, while the bell is the same as the organ. In the Coulée piece, the clean, comprehensible and blurred, fog-like parts alternate. We can think that there was a dominant-tonic relationship in classical music, but in this case it is a vague feeling. The presentation of the Coulée presents the performer with an extremely difficult challenge. Technical soundness is essential to be able to perform this piece convincingly. If we choose the organ as our performance instrument, we can achieve a very good effect if we perform it in a church with great acoustics, because then this piece helps to create a vague, almost incomprehensible sound set effect. What causes this vague, illusion effect? Motives first experienced within the piece become a little more pronounced as the music proceeds. The first notes of the repeated motifs bring different phase shifts created in the two hands.

We experience slow motion, the basis of which is an acoustic illusion. The ideal of mechanically ticking music has accompanied Ligeti since childhood. Due to the character of the harpsichord as such, this mechanical sound is more accessible, its strumming, sharp aura better imitates the folkloristic, coarsely performed songs of the village folk. In Ligeti's words, the emerging harmonies are "contaminated". It is worth choosing a light, soft-toned instrument. The performance on the harpsichord will sound really sharp due to the nature of the intrument. In spite of that, I found an interesting connection between these two pieces is that what can be found in the piece is the beginning effect of Prokofiev's toccata, when he repeats a note. Coulée is a sensual disappointment, which deceives the listener in such a way that the meter is completely lost, and due to a sense of tone, the focus is lost on thinking about the past and future: only the present remains.

Because of Ligeti's love for mechanical sound, I think that if he were alive today, the player who chooses the harpsichord as a performance instrument for this

[142] Péter Várnai, *Beszélgetések Ligeti...* p.7-8.

piece and uses the mechanical, rattling sound of the harpsichord as an advantage would be able to satisfy his expectations. Now let us focus on the harpsichord performance. The aim and task of every harpsichord is to avoid a mechanical sound. In this piece, however, we must watch for its return. To achieve the mechanical sound I find it exciting to throw away all the rules and go against them, to rebel a little, so to speak. I mentioned earlier that it is worth imagining what kind of instrument we want to reproduce. Now I'm going to change that, imagine any moving object that can create some kind of vibrating sound like an old wagon wheel. While doing so we feel the difference. With the help of a plucking mechanism connected to the keys, it actually tilts by plucking. It is worth trying to pluck the strings of a stringed instrument, then sit down next to the harpsichord and incorporate this experience into one's playing. Of course, this requires excessive, slow practice, which is automatically minimized. The Coulée is a great challenge not only because of the touch it requires, but also because of its fast pace. The most important thing is to relax the hand, the muscles, the joints, the entire arm during the whole piece, because one cannot rest during the performance. The player must prepare himself properly for this music. If possible, avoid any further movement in your technical apparatus and pay attention to this tingling sensation in your fingers. We are real at the tip of our fingers, and the round sound is when we can tilt to the edge of the keyboard. I think the key is to eliminate unnecessary movements from our performance.

As the following example I have chosen an easier-to-interpret piece. This piece is the first Toccata in a from Johann Jakob Froberger's "Libro Secondo". This piece is more popular among harpsichordists than among organists. It is sometimes claimed that Italian keyboard music in the late sixteenth and seventeenth centuries was indifferently intended for organ or harpsichord. There is no doubt that there was considerable overlap between the two mediums, but Frescobaldi, Froberger and their contemporaries distinguished between the organ and the harpsichord both in repertoire and playing technique. Still, it can be played excellently on both instruments. This is the work that has a mutually beneficial effect on each other. I practiced this piece on both instruments. I would like to present the perspective of the harpsichordist. The beginning of the piece begins with a section where the harpsichordist can freely trill on the instrument and develop the first chord according to his own wishes. It is worth touching one note as closely to the other as possible, this is similar to *legato* touch, but

actually the two notes still speak together for a very short time, which gives almost an ultrasonic, acoustic experience.

This method can really only be used by harpsichordists, as it would cause chaos on the organ if used excessively. The organist should perhaps use less ornamentation, rather keeping the resolution of the chord and the notes of the chord down continuously until the given chord is formed. For both instruments it is recommended to switch manually or register in the first fugue section. But even without it, the piece sounds beautiful. In the organist's version, pay attention that sound is clearl, in no way should the keys get playing the notes closer to each other, for a softer, more resonant effect. At the same time, both instruments must be able to articulate their pitch. Here, I would like to point out that it is not enough to just pay attention to our tilt, we must pay the same attention to the release of the sound. We leave our finger on the key and follow the path of the key while paying attention to the harpsichord to avoid disappointment. At the end, it is worth finishing the piece at the very edge of the key, controlling the ending with the phalanges of our fingers. On the organ, we should also stay in touch with the instrument's keys and let go of the keyboard softly and loosely, knowing that the sound ends when the acoustics are finished and, as applies to all instruments, try to avoid the sound of the keyboard mechanics.

V. Conclusion / Summary

From a historical point of view and without a mechanical review, it would be very difficult to play on the keyboard instruments authentically. This period was an experience for me as well, in which I could make sure of the joint importance and authenticity of the theoretical and practical connection. Musical instruments have undergone significant development in terms of their size and sound quality, providing inspiration to composers and performers alike. I hope that this thesis will be motivating and inspiring for the performers as well and can help in practice, as well as in the practicing period.

VI. List of Plates

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Appendix

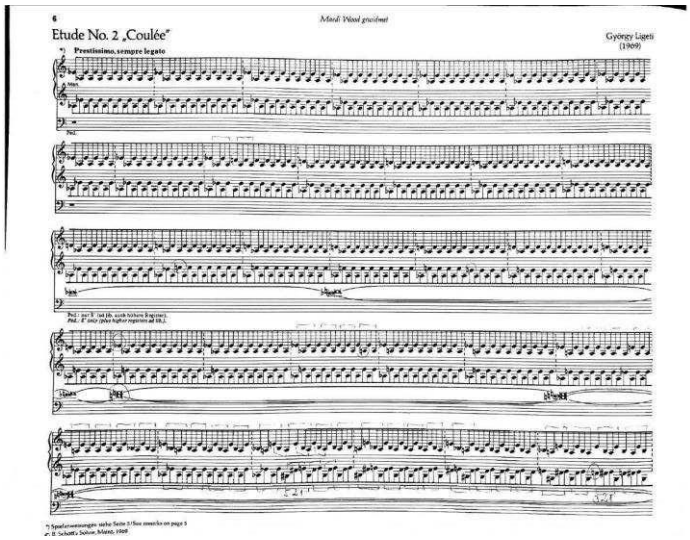

Plate 34. Ligeti György Coulée, 1. page.

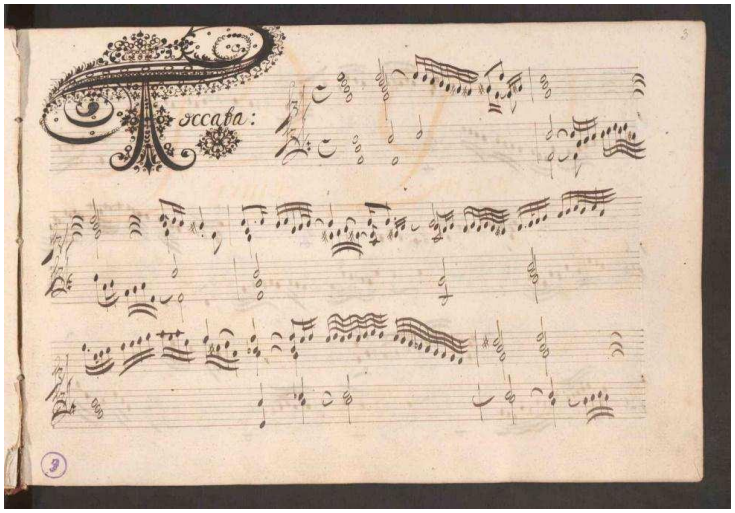

Plate 35. Johann Jacob Froberger Libro Secondo, Toccata in a FbWV 101 p. 5. Vienna: Holograph manuscript, 1649.

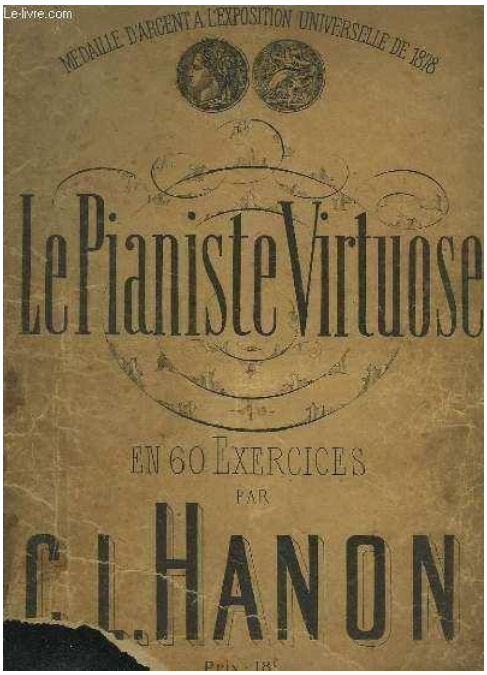

Plate 36. C. L. Hanon: Le Pianiste Virtuose (The Virtuoso Pianist).

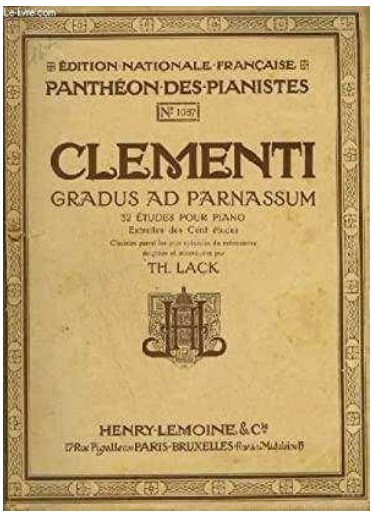

Plate 37. Muzio Clementi Gradus ad Parnassum.

Plate 38. G.B.Cramer Studi per Pianoforte (Steps to Mount Parnassus).