

The Development of Piano and Its Impact on Composers

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Abstract: *Keyboard instruments have evolved over the centuries. Their development and composers are deeply intertwined as the evolution significantly influenced how composers composed music and the genres created. Keyboard instruments were not widely used before the Renaissance and Baroque periods, as the majority was vocal music. The renowned composer J. S. Bach changed the way keyboard instruments were traditionally used after the development of the harpsichord. The Brandenburg Concerto No. 5 in D major, BWV 1050, in particular, is notable for its solo part in the setting of a chamber work. The "Well-Tempered Clavier", intrinsically tied to the invention of the clavier, paved the way for solo keyboard works. Around 1700, the fortepiano invented by Bartolomeo Cristofori offered composers, like Mozart and Beethoven, a new range of dynamics and expressive possibilities. During the Romantic era, improvements were made to the piano's mechanism for the purpose of expanding the instrument's abilities. This allowed composers to create more complex compositions in a greater and more expressive range. Leading up to the 20th century, pianos were no longer treated as melodic instruments, instead becoming a percussive instrument that composers experimented with in various ways. In this essay, I will discuss the history of the piano, its development and the impact it had on composers.*

Keywords: Keyboard instruments, Composers; Harpsichord; Clavier; J.S. Bach, Fortepiano; Mozart, Beethoven; Romantic period; Piano; 20th century; Extended techniques.

The Hydraulos, also known as the Water Organ, was an ancient musical instrument invented by the engineer, Ctesibius, in Alexandria during the Hellenistic period. It is recognized as the earliest precursor to the modern pipe organ and served as the first keyboard instrument. The hydraulis operated using water; it is a system of pipes that produce musical sounds when air is forced through them (Britannica, n.d.).

The dulcimer was invented in Iran shortly after the birth of Christ. The essential idea is similar to a piano, whereby the hammer strikes tuned strings across a flat soundboard. The dulcimer is played with two light sticks, the ends of which had wider blades without a mechanical hammer (Concert pitch piano services, 2021).

Prior to the Renaissance and Baroque periods, keyboard instruments were not commonly used. The common music of that time were mainly vocal works - Gregorian chants, motets and madrigals. Although keyboard instruments such as the organ existed, it was primarily used as a support in the Mass.

The virginal was a common instrument in the late Renaissance and early Baroque eras. It is a compact, rectangular box with 32 metal strings running parallel to the keyboard and one string per key. A straight rod with a leather plectrum is raised and used to pluck the string when a key is pressed. It lacks dynamic control even though it is louder than the clavichord. William Byrd, a well-known late Renaissance English composer, wrote 67 compositions in the Fitzwilliam Virginal Book, which demonstrated his command of the instrument, thus contributing to the virginal's repertoire (Koh, 2014).

The spinet is the smallest version of a harpsichord. It is short, narrow and cheap, with the intention of making music for the home. It is very similar to the virginal; the "wing-shaped" design and the longer strings are meant to create dynamics. It has a range of over 5 octaves. The instrument became popular in France in the 15th century and flourished in England till the early 19th century before it was replaced by the square piano. The strings which are plucked by quilled jacks, called plectra, are string at an angle to the keyboard and not parallel to it (Koh, 2014).

The clavichord is a stringed keyboard instrument with a rectangular shape. Its expressive capabilities allowed for nuanced performances, especially for works like Bach's 'Goldberg Variations BWV 988'. When a key is pressed, a thin blade of metal (a tangent) strikes the string. The player can control the force with which the string is struck by using the finger, in order to exercise some control over the volume of the note. Thus, moving the finger up and down creates 'vibrato' - an effect obtainable on a string instrument but not on the piano or harpsichord (Koh, 2014). The harpsichord has the shape of the modern grand piano. The pitches of the notes are determined by the strings' varied lengths. Despite having a high degree of sensitivity when producing legato and detached notes, the

instrument is unable to generate tone or dynamic contrasts. It often has two or more sets of string, contrasted in tone quality and pitch. These may be played independently - usually there is a second keyboard to make this easier - or coupled together so that they sound simultaneously. The control of these strings are activated by hand-drawn stops or foot-pedals (Kottick, 2003).

The flute and violin were typically given solo roles in J. S. Bach's Brandenburg Concertos. However, Bach revolutionized the harpsichord's role, as depicted in the 'Brandenburg Concerto No. 5 in D Major, BWV 1050'. It is considered a seminal work for the harpsichord because of the brilliant cadenza-like passage for the harpsichord solo, showcasing the harpsichordist's skills, as seen in Figure 1 - the accompagnato part and Figure 2 - the harpsichord solo.

Concerto
BWV 1050a

Johann Sebastian Bach

1. Allegro

Nachtrag zu NBA VI/2 © 1975 by Bärenreiter-Verlag, Kassel

Figure 1: Brandenburg Concerto No. 5 in D Major, BWV 1050
(1st Movement 'Allegro', Bars 1 - 5)

Figure 2: Brandenburg Concerto No. 5 in D Major, BWV 1050
(1st Movement 'Allegro' - Cadenza featuring the harpsichord solo, Bars 156 - 158)

Figure 3: Brandenburg Concerto No. 5 in D Major, BWV 1050 (continuation)
(1st Movement 'Allegro' - Cadenza featuring the harpsichord solo, Bars 159 - 172)

The Concerto No. 5 exemplifies Bach's ability to push the limits of musical expression and demonstrates the range of early Baroque keyboard instruments, thus foreshadowing the concerto genre.

The ancient modal system was the basis for early keyboards, consisting of white keys from A to G. An octave that is divided into twelve equal semitones is known as the equal temperament tuning system. Without having to return, this technique allows keyboard instruments to perform in any key. An instrument with keyboard strings, such as a harpsichord or piano, that are plucked or struck, is referred to as a "clavier", which also means keyboard in German. As a result of the term's frequent usage, a variety of keyboard instruments are included, highlighting the keyboard's essential role in their design and function (Koh, 1866).

In 1722, J. S. Bach wrote 24 Preludes and Fugues to promote equal temperament on keyboard instruments, and named the collection "Das Wohltemperierte Klavier I" (The Well-Tempered Clavier). "Tempered" refers to the adjustment in tuning of music intervals away from its natural scale (Koh, 1866). Players could play in every key, which interests him, to write in all 24 keys. He then completed the second book, much varied in contrapuntal style, in 1742. The prelude is a short, introductory piece based on one motif. The fugue, based on a single subject in imitative polyphonic texture for 2 to 5 voices, has 3 sections - exposition, middle section and final section (Koh, 1866). The two sets are considered influential, forming a basis for later keyboard compositions.

The Prelude No. 8 in E-flat minor and Fugue in D-sharp minor, BWV 853, from "The Well-Tempered Clavier, Book I," shows the keyboard development with two different sharp and flat key signatures, as the notes - Eb and D# - are enharmonic spellings. This showcases the capacity of the new tuning system, which accommodates key signatures with more than four sharps or flats, in which most triads would be out of tune in the previous mean-tone temperaments. Unlike Bach, Scarlatti only wrote keyboard sonatas until E Major and C# minor; the restricted key selection is due to the technical and tuning difficulties of the harpsichords and early keyboards of Scarlatti's time.

While Book I is for amateurs, he wrote Book II for his children and other professionals. Book II deploys some of the styles from suites. The Prelude No. 12 in F minor, BWV 881 of Book II resembles an 'Allemande' - a serious character dance in duple meter with moderate tempo, beginning with an upbeat of one with flow of sixteenth notes. The Prelude bears resemblance to an earlier work - 'Allemande' from the French Suite No. 2 in C minor, BWV 813. Both works feature syncopated rhythms; the syncopation is in the left hand in the French Suite, whereas in the Prelude, it is prominent in the right hand. Furthermore, the Prelude is characterized by melodic suspensions, creating tension and release, a shared technique utilized in both works.

The image displays the musical score for the first 19 bars of the Prelude in F minor No. 12, BWV 881. The score is written for a single melodic line on a grand staff (treble and bass clefs). The key signature is F minor (three flats) and the time signature is 3/4. The music begins with a single sixteenth note in the right hand, followed by a series of sixteenth-note patterns. The right hand features syncopated rhythms and melodic suspensions, while the left hand provides a steady accompaniment. The score is divided into three systems, with bar numbers 5, 10, and 15 indicated below the staves.

Figure 4: Prelude in F minor No. 12, BWV 881 (Bars 1 - 19)

Suite 2
BWV 813

1. Allemande

Figure 5: 'Allemande' from French Suite No. 2 in C minor, BWV 813 (Bars 1 - 8)

The Prelude No. 17 in A-flat Major, BWV 862, the longest of Book II, is written in the style of a French Overture, featuring chordal sequences in the opening bars. The Prelude bears resemblance to another previous work, the 'Overture' in Partita No. 4 in D Major, BWV 828. Both compositions are characterized by intricate counterpoint, ornamentation, and chordal sections (Lederer, 2010). They also require considerable technical skill from the performer, from elaborate passages to intricate fingerworks, which highlight the capabilities of the keyboard instrument.

Præludium 17.

The image shows the first 12 bars of Præludium 17. It is written for piano in Ab Major (three flats) and 3/4 time. The first system contains bars 1-4, and the second system contains bars 5-8. The third system contains bars 9-12. The music features a simple, rhythmic melody in the right hand and a steady accompaniment in the left hand.

Figure 6: Prelude No. 17 in Ab Major, BWV 862 (Bars 1 - 12)

Partita 4
BWV 828

1. Overture

The image shows the first 10 bars of the 'Overture' from Partita No. 4. It is written for piano in D Major (two sharps) and 3/4 time. The score is divided into four systems, each containing two staves (treble and bass clef). The music is characterized by a complex, rhythmic melody in the right hand and a more active accompaniment in the left hand.

Figure 7: 'Overture' from Partita No. 4 in D Major, BWV 828 (Bars 1 - 10)

In addition to borrowed elements from the dance suites, the works of Book II are technically more challenging. For example, the Fugue No. 20 in A minor, BWV 889 is known for its complexity in voicing and use of fugal devices such as inversions and augmentations. The intricate counterpoint requires the performer to manage multiple independent voices simultaneously, and each voice must be clearly articulated and balanced. Performers must navigate the dynamic contrasts and embrace the character of each voice while holding the structural integrity. The example below portrays the rapid passages that test the pianist's finger precision. Maintaining clarity and evenness in these passages is difficult when it is at a fast tempo.

The image displays a musical score for Fugue No. 20 in A minor, BWV 889, specifically focusing on bars 15 through 28. The score is written for piano and consists of two staves: a treble clef staff and a bass clef staff. The key signature is one flat (A minor), and the time signature is 3/4. The music is characterized by intricate counterpoint and rapid passages, particularly in the bass line. Annotations include 'B: gva' at bar 15, 'B: e'' at bar 17, and 'a)' at the end of bar 28. The score ends with a final chord marked 'a)'.

Figure 8: Fugue No. 20 in A minor, BWV 889 (Bars 15 - 28)

Bach's sets of "Well-Tempered Clavier" went on to influence Mendelssohn's Preludes and Fugues, Op. 35, and Shostakovich, who wrote a set of 24 preludes and fugues, reflecting his own skittish and ironic style. Chopin was also inspired to write 24 Preludes, Op. 28, which traversed all the major and minor keys, but he freed the genre by transforming the preludes into independent concert miniatures, which are widely performed today.

Before the invention of the fortepiano, the small black keys (seen on our modern day piano) were white and the huge white keys were black. To make the important differences more apparent, the colors were switched around (Koh, 2014). There were three main problems with keyboard instruments at the time, addressed by the creation of the pianoforte. The first was to point out the lack of dynamics in early keyboard instrument. The second was how the early keyboard instrument was not capable of sustaining notes. The third was how manufacturers were forced to produce two layers of harpsichords, one for soft playing and the other for loud ones.

Bartolomeo Cristofori, an Italian harpsichord maker, was generally credited with the invention of the piano in 1709. He wanted to create an instrument that is like "the harpsichord that plays soft and loud". Cristofori achieved that effect by replacing the plucking mechanism of the harpsichord with a hammer action, which strikes the strings with greater or lesser force. The name "fortepiano" literally means loud - soft, showcases the instrument's ability to change loudness according to the amount of pressure on the keys, a quality different from the harpsichord. The first concrete evidence of the existence of Cristofori's piano came from the 1700 inventory that mentioned "fortepiano", combining the elements of harp, dulcimer and keyboard (Pollens, 2017). The demands of the old piano masters, who desired more brilliance, color, and sustaining power from the piano keys, have directly led to an amazing change of Cristofori's pianoforte over the past 300 years (Renaissance Time Period, n.d.).

The harpsichord, an invention of the sixteenth century, was the precursor to the upright piano. However, a lot of piano makers attempted to adapt this design for the pianoforte in the 18th century. The first respectable uprights were created in the 1800s. By 1800, John Broadwood & Sons of London used a vast and specialized workforce to manufacture roughly 400 pianos annually. By 1850, the company was producing over 2000 pianos annually using steam power and mass-production techniques. While most were square pianos, as they were more affordable for middle-class families and suitable for parlors, several used grand pianos (Kottick, 2003).

The double-escapement mechanism was added in 1821, making it possible to play fast and repeated notes, thus raising the bar for virtuosity. Pianists and composers took full advantage of these newfound possibilities, turning the piano into an essential tool for creating music at home. Mozart's delicate and fluid harpsichord-derived playing style suited the light sounding and sensitive touch of the Viennese pianos of his day. Trained as a harpsichordist, Mozart did not begin performing on a regular basis until approximately 1774. The harpsichord and the pianos that Mozart played shared similar features, such as the wooden framed harps and the thin strings; moreover there were lesser keys, as compared to modern pianos. However, unlike the harpsichord, Mozart's piano had already included dampers and the double-escapement mechanism. During his lifetime, the piano's abilities were demonstrated in many of his works (Dolge, 1972).

Early Works of Mozart (1765 - 1777), including the Piano Sonata No. 1 in C Major, K. 279, display both the harpsichord and early fortepiano artistic characteristics. Mozart's piano sonatas written from 1777 to 1789 were the years of transition to the fortepiano. The influence of the developing fortepiano can be heard in works like Piano Sonata No. 8 in A minor, K. 310, featuring intricate fingerwork and rapid passages that reflects the technical advancements of the fortepiano (Mauder, 1992). The fortepiano of this period, which had a wider dynamic range than its predecessors, allowed Mozart to explore greater contrasts in volume and emotion.

Mozart's mastery of the fortepiano is further evident, as it was incorporated into an orchestral setting, as seen in his 27 concerti for solo piano and orchestra, a genre he was well-known for. He wrote numerous of them in his mature fortepiano period (1782 - 1786). The harpsichord was superseded by the piano, featuring hammers that hit the strings, and went on to become the most common instrument in concerto repertoire (Schwarm, 2024). Mozart further explored dramatic and emotional depth in his Piano Concerto No. 20 in D minor, K. 466, reflecting the instrument's tonal range improvements.

The standard piano keyboard spans seven and $\frac{1}{3}$ octaves, or 88 keys, although the first piano had a narrow range of four and a half octaves. The action of a grand piano, in contrast to a harpsichord, consists of a key and a group of levers known as the wippen, hammer, and damper. A damper is raised when a key is depressed, causing the matching steel-wired strings to ring when the hammer hits those specific strings. The felt-covered hammer returns to its starting position after hitting the strings. The damper stays off the strings unless the artist removes their finger from the depressed key, which causes the strings to vibrate until their tones naturally fade. A range of tones can be produced by the sensitive key-hammer action from soft to very loud and percussive effect (Koh, 2014).



Figure 9: Pedals of a Piano (The Sostenuto Pedal, 2017)

The grand piano has 3 pedals (from left to right): Una corda, sostenuto pedal and Damper. Out of the three, the damper is the most frequently used. When depressing the pedal, the dampers are removed from the strings, thus allowing the strings to continue vibrating even after the keys are released (Koh, 2014). The damper marking is usually indicated by:



Figure 10: Damper pedal Markings (Koh, 1866)

The Soft Pedal, or 'una corda', means one string. The grand piano's key-hammer mechanism is shifted to the right when the left pedal is taken hold, allowing the hammers to strike only one string of each tone. The pedal brings the hammers closer to the strings on the upright piano to provide a similar softening effect (Koh, 2014).



Figure 11: Ravel: Alborada del gracioso from Miroirs (Bars 75 - 76) (Koh, 1866) (2 Ped. means the use of both the damper pedal and the soft pedal at the same time.)

The Sostenuto Pedal only activates the depressed dampers of the keys it has selected, maintaining the tones of those keys. This middle pedal needs to be depressed simultaneously with the keys being depressed, or even after, but before the keys are released. Once the keys are released, the tones persist, creating a new pianistic effect that

allows for more resonance and a closer replica of orchestral sound. The sostenuto pedal, which produces this effect, is typically absent from upright pianos (Koh, 2014).

The German keyboard maker Gottfried Silberman (1683-1753) was reading an article on Cristofori's magnificent invention of the pianoforte. In 1711, Silberman started to recreate it while also incorporating his own invention, the first "damper pedal" (Renaissance Time Period, n.d.).

The piano is a flexible instrument, which can be utilized with every instrument and instrumental combination because of its wide range. Due to its quick dynamics changes and sustaining of notes, it supplanted the harpsichord in the 18th century. It functions well as an orchestral instrument in works from the 20th century, as a solo instrument or ensemble instrument, such as piano quartet, piano quintet; it also works as an accompanying instrument, for instance the Violin Sonata or Lied (Koh, 2014).

Around 1792, the emergence of the Romantic pianoforte coincided simultaneously with Beethoven's entrance in Vienna. Beethoven, in contrast to Mozart, was among the first keyboard players of his generation to be raised on the pianoforte, thus allowing him to exploit the full features, including the wide and contrasting dynamic range, variety of attack and articulation, and capacity for sustained notes. Beethoven commissioned Broadwood to build a pianoforte in 1817, with 76 keys within the range of 6 octaves. It had a wooden harp and somewhat thin strings, but it was larger in size and the tone was more sonorous. When the metal frame was first used in England in the 1820s, the strings were much tighter, improving the legato touch and producing more volume and longer sustained notes. Felt-covered hammers made it possible to have contrasting dynamics, from *pp* to *ff*, which was majorly exploited by Beethoven (Isacoff, 2012).

Beethoven's Piano Sonata No. 29 in B-flat Major, nicknamed the 'Hammerklavier' Sonata, is an important piece in the history of the pianoforte. Composed between 1817 and 1818, this masterwork illustrates the change undergone by the pianoforte in the early 1800s. As the pianoforte surpassed the harpsichord at the end of the 18th century, composers began to write music specifically for this "new" instrument. 'Hammerklavier' means hammer keyboard in German; alluding to a key invention that made keyboard instruments more expressive and dynamically rangeable, in respect to the use of hammers within pianos. Its original title "Große Sonate für das Hammerklavier" shows its relation to the inventive application of the piano's hammer mechanism (Isacoff, 2012). The *una corda* pedal is used extensively in the work, and Beethoven provided, for his time, remarkably comprehensive instructions on when and how to use it.

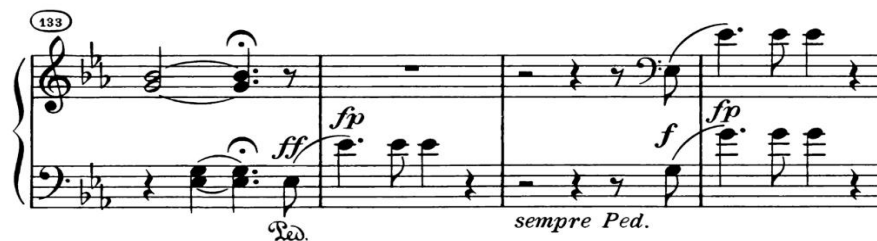


Figure 12: Piano Sonata No. 29 'Hammerklavier' in B-flat, Op. 106 (1st Movement, Bars 133 -136) (*sempre Ped.* means sustained pedal)



Figure 13: Piano Sonata No. 29 'Hammerklavier' in B-flat, Op. 106 (1st Movement, Bars 142 - 149) (*una corda* means soft pedal; *tutte le corde* means releasing the soft pedal)

The 'Hammerklavier' Sonata pushed the boundaries of contemporary piano technology while also advocating for a greater dynamic range. The *ff* fanfare-like B \flat major chords used in the opening movement showed the additional power and resonance. Beethoven longed for pedal effects that were unavailable on earlier pianos. The development of pedals was brought about by the evolving design of the pianoforte and had an impact on the expressive potential of the sonata. The difficult technical aspects of the piece - rapid passages, wide leaps, and intricate ornamentation - reflected the pianoforte's growing abilities. Beethoven's innovative approach to the instrument inspired subsequent developments.

Technological developments and shifting aesthetic priorities include emphasis on emotion and expansion of repertoire, propelled a major transformation in piano music throughout the Romantic era. From 1820 to 1850, the standard range expanded from six to seven octaves. The improved mechanism pushed the piano's limits to create multi-tiered and expressive music. There has been a large body of concertos written for the piano since the 18th century, in view of the rise of piano virtuosos.

The amount of piano manufacturers that broke into the scene had benefited the Romantic composers, as the composers were given more options to decide which make would suit their style. For example, Franz Liszt was particularly fond of the pianos made by the French manufacturer, Sébastien Érard. Liszt was among the first to take advantage of the revolutionary double-escapement action on a seven-octave grand piano gifted to him by piano builder, Sébastien Érard, which allowed rapid repetition and opened up new avenues for virtuosity. Liszt had played on the Pleyel for a fair amount, however he felt it was lacking for his demanding style; preferring the pianos by Érard, which suited his powerful and expressive playing style. Érard's seven-octave piano further suited Liszt's approach because of the broader sound, a result from the heavier action. His compositions are filled with streams of quick note repetitions that can fool the audience into thinking the piano has been transformed into a sustaining device, as heard in 'The Tarantella' from *Années de Pèlerinage, Deuxième: Italie* (Years of Pilgrimage, Second Year: Italy), S. 161. Liszt suggested playing the tremolando as quickly as possible, with the keys already halfway depressed and a tiny tremble of the hand bringing them to life (Burkholder et al., 2014).

Another key figure of Romanticism is Johannes Brahms, who favored the Streicher piano, a German manufacturer that was known for its warm and rich tone, and excellent craftsmanship of leather-wrapped hammers. The tonal qualities of Streicher pianos complemented the sonority in the music of Brahms. The Streicher features a short keystroke, gentle touch, and a lower tension due to its straight strung design. When Brahms received a Streicher piano in 1873, he played it exclusively until 1880, at which point he switched to Bösendorfer pianos (Burkholder et al., 2014). Compared to modern pianos, it had a purer sound with fewer overtones and a much lighter bass. Brahms preferred to place melodies in the "tenor voice," where they could be brought out much easily because of the middle register's full and unique tone. Although Brahms did not prescribe how the musician should utilize the pedal, he did specify when he desired it for specific effects. His pedal indication sometimes blurred the measures, which is a tendency of Romanticism to create the long expressive melody. See the example below.

Klavierstücke. Intermezzo.

Allegro non assai, ma molto appassionato. Op. 118 No. 1 (1892)

The musical score is presented in five systems, each with a treble and bass staff. The tempo is marked 'Allegro non assai, ma molto appassionato'. The piece is in A minor, Op. 118 No. 1. The score includes dynamic markings such as *f*, *espress.*, *dim. rit.*, and *cresc.*. There are also performance instructions like 'Red.' and '* Red.' written below the staves. The notation includes various rhythmic values, slurs, and articulations.

Figure 14: Brahms: Intermezzo in A minor, Op. 118 No. 1 (from Six Pieces for Piano, Bars 1-19).

During this time, the piano was regarded as a vehicle for personal and emotional expression. As a result of the advancements, pianists could perform in larger settings, as compared to earlier periods, when music was primarily performed in church or for the aristocrats. Thus giving rise to public recitals, a term pioneered by Liszt (Burkholder et al., 2014). Liszt was regarded as one of the greatest pianists during the 1830s for his virtuoso skills, which were reflected in his Transcendental Études, S. 139 and Grandes études de Paganini, S. 141. In the Transcendental Étude No. 10 in F minor S. 139, technical challenges are apparent:

10.

Allegro agitato molto [$\text{♩} = 104$]

Figure 15: Transcendental Étude No. 10 in F minor, S. 139 (Bars 1 - 12)

Precise timing and synchronization between two hands are required in the intricate polyrhythms (Bars 1 and 2). The rapid tempo changes (Bars 22), and constant sense of agitation that demands a high level of emotional and technical control are required in order to execute the complex arpeggios rapidly and accurately.

Liszt ventured further in piano music through his transcriptions from orchestral works and operas, exhibiting his personal tone color (Koh, 2014). Gradually, more composers followed suit; for instance, Chopin, who was notable for writing mainly piano works. Henceforth, the piano attained its status as the central instrument in society.

Music of the 20th Century has significant shifts, which impacted the evolution of western music. It is an era of exploration, upheaval, experimentation, and discovery, yet lacking the unified styles and values displayed in musical expression of previous eras. Therefore, a wide range of compositional movements are introduced, like avant-garde music, serialism, neoclassicism, impressionism, and post-modernism.

Béla Bartók's early compositions were influenced by late Romanticism and the works of Wagner, Brahms, and Liszt. He later achieved his distinctive personal modernist idiom by combining elements of Bulgarian, Hungarian, Slovak, and Romanian peasant music with French and German classical music. His works introduced a new approach to the piano, exploiting it more as a percussive instrument than previous period, which was an instrument for cantabile melodies and resonant accompaniment. His renowned work, *Mikrokosmos* (1926 - 1939), 153 pieces

in six volumes, contains great pedagogical value that represents Bartók's own personal style. Mikrokosmos is designed as a progressive piano method, starting from very simple pieces and advancing to highly complex ones. On top of his personal folk idiom, portrayed by the unusual tonalities, irregular rhythms and whole tone scale, Bartók further enhanced the percussive nature of the piano through syncopations, staccato, accent markings, strong and rhythmic dances (Burkholder et al., 2014). The 'Six Unison Melodies' (Nos. 1 to 6) are simple, stepwise and unison melodies that remain within one "five-finger position" on the keyboard, which suits beginners, helping them to build foundational skills in a straightforward manner. The first two pieces (Nos. 1 and 2) are shown below:

The image displays two musical staves for piano pieces. The first staff, labeled '1', is in 4/4 time with a tempo of quarter note = 96. It features a simple stepwise melody in both hands, with a duration of [20 sec.]. The second staff, labeled '2', is also in 4/4 time with a tempo of quarter note = 96. It features a more complex stepwise melody with some chromaticism in both hands, also with a duration of [20 sec.]. A small inset shows a close-up of the right hand for part 2.

Figure 16: Six Unison Melodies No. 1 and No. 2 (from Volume I of Mikrokosmos, Sz. 107)

Bartók's first significant independent piano composition, *Allegro barbaro* (1911), is characterized by the influence of folk music, which shapes his style in terms of both technical elements and intellectual principles. This work undoubtedly marks a significant turning point in Bartók's music development. Both the sharp rhythmic pattern, constant chordal device of the subject, and the combination of Lydian and Phrygian modes, in particular combines the chromaticism of Romanian music and pentatonicism of the Hungarian scales to exhibit a primal intensity of rhythmic energy. Bartók highly utilized tone clusters - dissonant chord structures composed of second intervals in major and minor that were influenced by Henry Cowell (Burkholder et al., 2014). Compared to Beethoven's *sf*, Bartók's use of *sff* showcases more intensity in the music to portray the percussive character.

Although the piano did not develop any further in the 20th century, some composers thought of extended techniques for the piano. Two great examples are Henry Cowell and John Cage. In *The Tides of Manaunaun* (ca. 1917), Cowell produced tone clusters, diatonic chords, chromatic seconds by pressing the keys with his fist or forearm to portray the tides. In *The Aeolian Harp* (1923), the performer strums the piano strings while playing down three- or four-note chords on the keyboard, mimicking the playing of an autoharp. In *The Banshee* (1925), an assistant depresses the damper pedal to allow the strings to resonate freely, while the pianist strums, plucks, and rubs the lower wire-wound strings with their fingertips or nails to produce an eerie, voice-like howl reminiscent of the banshee, a spirit from Irish folklore (Burkholder et al., 2014).

John Cage was regarded as a pioneer in unconventional use of musical instruments. Following his studies with Henry Cowell and Arnold Schoenberg, he created serial music in the mid-1930s, experiencing experimental music throughout the 1940s, and in the 1950s and 1960s, he embraced increasingly radical ideas about music,

establishing himself as the foremost composer and thinker of the post war avant-garde. Cage's most important invention is the prepared piano. It utilizes a variety of items, such as pennies, bolts, screws, or wood, plastic, silt bamboo that are placed between the strings to produce percussive sounds, therefore turning the piano into a solo percussion ensemble that plays typical or uncommon instruments, such as gongs, woodblocks, and drums. The *Sonatas and Interludes* (1946–1948), a collection of sixteen "sonatas", is his most renowned composition for prepared piano. Preparing the piano ahead of time involves the pianist adhering to specific guidelines about the placement and positioning of objects between the strings. Different sets of figuration timbres are explored in each movement. In *Sonata V*, Cage creates interactions between the durational framework and the content, which is a succession of sounds. It also demonstrates the contrasts he obtains between wood, drum, gong, and unaffected piano notes (Burkholder et al., 2014).

When World War II ended in 1945, the affected countries focused predominantly on rebuilding and redefining regularity in life. This period was simultaneously when cultural and technological innovation flourished, thus the birth of a new wave of electronic instruments (*Electronic Instruments in the Post-War Years* - Google Arts & Culture, n.d.).

When the electric piano was invented in 1950, it became accessible for everyone. The mechanics were simplified, the instrument was more affordable and also convenient to transport around. In addition, there were various functions, features and effects for the users to play around. The electric piano paved the way for the birth of synthesizers in the 1960s. Unlike the electric piano's prefix sounds, a player could control the sound options on the synthesizers, allowing the music to be shaped. Digital piano, born in 1980, offered superior acoustic piano tones and replicated the motion of real acoustic instruments. Expert musicians, instructors, and solo artists are able to refine their techniques in relation to the digital piano's ability of producing conventional and classic piano tones (Cooper, 2015).

Yamaha's invention on innovative technologies in pianos, such as the Disklavier, which includes digital elements, and the Silent Piano, an acoustic piano that allows the volume to be adjusted (Randall, 2018). Another piano manufacturing company named Bösendorfer, came up with the innovation - Bösendorfer Concert Grand 290 (also known as the Imperial); its tonal range of a full eight-octaves allowed for the additional bass required and produced an almost orchestral sound experience (YAMAHA Music London, n.d.). In 1892, Max, Bruno and Robert Blüthner of Blüthner built an extremely lightweight grand piano for the airship Hindenburg, which was employed for the first piano concert in the air (*Our Story*, n.d.). Steinway & Sons has been granted more than 150 patents since the company was founded in 1853, and it has some notable innovations such as overstring scale, which is also called cross-stringing. This innovation allows the bass strings to cross over the middle and treble strings, producing a richer and more powerful sound. Steinway's Diaphragmatic Soundboard is a construction that enables the tone to not only flow freely, but also to have a more resonating sound (Ratcliffe, n.d.).

Keyboard instruments have undergone significant changes over the centuries, first in the form of the hydraulis and evolving into the modern piano. The harpsichord was previously used as a basso continuo in trio sonatas and concerti grossi during the early Baroque period. Equal temperament emerged to give rise to new keyboard genres like preludes, fugues and suites. This new division of an octave into 12 equal parts, made writing for pieces with more flats and sharps possible, thus creating the *clavier*. On account of the Industrial Revolution, the Baroque keyboards had to make way for the pianoforte. Classical composers, particularly Mozart, was able to expand the pianoforte into an orchestral setting, thus popularizing concerti. In contrast to Mozart, Beethoven's pianoforte music contained more pedal markings and wider dynamic contrasts. By the romantic period, the range of 88 keys on a piano was established. Historical shifts in playing techniques from the finger-centric approach of Classicism to the inclusion of arm weight in the Romantic period, allowed more expressive playing and produced a wider variety of tones; as a result giving way to Liszt and his concept of 'solo recital'. Many composers followed suit, with the likes of Chopin and Rachmaninov.

In the 20th century, the piano underwent significant changes in its role and the techniques used to play it. Historically treated primarily as a melodic and harmonic instrument, it began to be explored for its percussive potential. Composers like Bartók started to view the piano as a percussive instrument, he experimented with techniques to produce different rhythmic and tonal effects. American composers Henry Cowell and John Cage extended the piano techniques by formulating the string and prepared piano. This opened up new sonic possibilities and expanded the traditional boundaries of piano music.

APPENDIX

Chronological List of Works of J. S. Bach's Works

French Suite No. 2 in C minor, BWV 813 (1722 - 1725)
 Partita No. 4 in D major, BWV 828 (1726 -1731)
 Prelude No. 8 in E-flat minor and Fugue in D-sharp minor, BWV 853 (1722)
 Prelude No.17 in A-flat major, BWV 862 (1722)
 Prelude No. 10 in F minor, BWV 881 (1738-1742)
 Fugue No. 20 in A minor, BWV 889 (1738 - 1742)
 Brandenburg Concerto No. 5 in D major, BWV 1050 (1721)
 Goldberg Variations BWV 988 (1741)

Chronological List of Works of Mozart's Piano Works

Piano Sonata No. 1 in C Major, K. 279 (1774)
 Piano Sonata No. 8 in A minor, K. 310 (1778)
 Piano Concerto No. 20 in D minor, K. 466 (1785)

Chronological List of Works of Beethoven's Piano Works

Piano Sonata No. 29 'Hammerklavier' in B-flat major, Op. 106 (1817 - 1818)

Chronological List of Works of Liszt's Piano Works

Transcendental Étude No. 10 in F minor, S. 139 (Final version published in 1852)

Chronological List of Works of Brahms' Piano Works

Six Pieces for Piano, Op. 118 (1893)

Chronological List of Works of Bartók's Piano Works

Six Unison Melodies, Sz. 108 (from Mikrokosmos, Volume I) (1926 - 1939)
 Allegro Barbaro (1911)

Chronological List of Works of Henry Cowell's Piano Works

The Tides of Manaunaun (ca.1917)
 The Aeolian Harp (1923)
 The Banshee (1925)

Chronological List of Works of John Cage's Piano Works

Sonatas and Interludes for Prepared Piano (1946–1948)

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