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Design, sound and compositional aesthetic: The grand piano in late eighteenth-century London and Vienna

Izaac Masters
Edith Cowan University

Edith Cowan University

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DESIGN, SOUND AND COMPOSITIONAL AESTHETIC: THE GRAND PIANO IN LATE EIGHTEENTH-CENTURY LONDON AND VIENNA

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Prof. Geoffrey Lancaster and Dr Victoria Rogers

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ABSTRACT

During the late eighteenth century, the piano was the dominant musical instrument for musical composition, performance and instrument making. There were many innovations in the design, sound and touch of the piano, fuelling the emergence of a large body of idiomatic repertoire. Two distinct traditions of piano design emerged at the same time during the late eighteenth century, one in England and the other in Austria. The focal points of these traditions were, respectively, London and Vienna where resident composers in each of these locations wrote for the instruments made in these cities. Traditions of grand piano design in London and Vienna were exemplified in the instruments of John Broadwood (in London) and Anton Walter (in Vienna). This study focusses on the design principles underlying the scaling, striking points and dampers in late eighteenth-century grand pianos together with technical data associated with these design elements. Furthermore, the sonic result of the realisation of these design principles in grand pianos by Broadwood and Walter are discussed, and the compositional response of selected late eighteenth-century composers in London and Vienna to the grand pianos of John Broadwood and Anton Walter.

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DESCRIPTIVE CONVENTIONS

Letter names of pitches

Letter names of individual pitches are designated using a synthesis of the Swedish rendering of Helmholtz notation and the English octave-naming system:[1] FF—the lowest key of the commonly occurring late eighteenth-century five-octave keyboard—F, f, f^1, f^2, f^3—the highest key. Our contemporary 'middle C' is therefore c. Changes at each octave are designated: FF–EE, F–E, f–e, f^1–e^1, f^2–e^2, f^3–e^3, f^4–e^4.[2]

[1] See Brian Blood, "Helmholz pitch notation," in "Music Theory Online: Staffs, Clefs & Pitch Notation, Dolmetsch Organisation, 2000–13," accessed May 19, 2020, www.dolmetsch.com/ musictheory1.htm.
[2] See Geoffrey Lancaster, *The Book of Beck* (unpublished manuscript, 2020), n. pag.

CHAPTER 1

Setting of the study

During the late eighteenth century, the piano[3] inspired musical composition, performance and instrument making to such an extent that two distinct traditions of piano design emerged—one in England and the other in Austria. The focal points of these traditions were, respectively, London and Vienna.[4] Traditions of grand[5] piano design in these cities were exemplified in the instruments of John Broadwood (1732–1812) in London and Anton Walter (1752–1826) in Vienna. In London and in Vienna, innovations in piano design—especially with regard to scaling,[6] striking points[7] and dampers[8]—resulted in pianos with different sonic qualities.

During the late eighteenth century, professional composers were usually professional pianists. Commonly, composers had their favourite piano makers, and wrote with the instruments of these makers in mind. Muzio Clementi (1752–1832), John Baptist Cramer (1771–1858), Jan Ladislav Dussek (1760–1812) and John Field (1782–1837) wrote for pianos made in London by, for example, Broadwood, and by Clementi. In Vienna, Joseph Haydn (1732–1809), Wolfgang Amadeus Mozart (1756–91), Ludwig van Beethoven (1770–1827)

[3] For the purposes of this study, "the term 'piano' is used generically to denote the various incarnations of touch-sensitive stringed keyboard instruments—with the exception of clavichords and keyboard pantalons—that emerged within the context of Western civilisation from Bartolomeo Cristofori's invention through to [the late eighteenth and early nineteenth centuries]". Lancaster, *The Book of Beck*, n. pag.
[4] See Bart van Oort, "The English Classical Piano Style and its Influence on Haydn and Beethoven" (DMA diss., Cornell University, 1993), Abstract.
[5] For a definition of the term 'grand piano', see Appendix B.
[6] The term 'scaling' refers to "the system or systems of string lengths [and string thicknesses] used in a stringed keyboard instrument". John Koster, *Keyboard Musical Instruments in the Museum of Fine Arts, Boston* (Boston: Museum of Fine Arts, 1994), 340. Scaling "is determined by the desired pitch" range of the instrument "and string material, whether iron, steel, or copper alloy". Richard Burnett, *Company of Pianos* (Goudhurst, Kent, UK: Finchcocks Press, 2004), 209.
[7] The term 'striking point' denotes the direct point of contact between the hammer head and the string. The 'hammer' is "the part of . . . [a piano] action that comprises the hammerhead and hammer shank". The 'action' of a piano is the "system of levers, comprising . . . the hammers, keys, and any additional levers or moving parts, by which the energy of the downward movement of the finger on the key is transmitted to the hammer which sounds the string. The function of the action is to transform a lower velocity of the key into a higher one for the hammer". The term 'hammer head' refers to "the wooden structure at the end of a hammer shank, usually covered with leather, which strikes the string". The 'hammer shank' is "the long and thin portion of a hammer between the hammer butt or hammer pivot axle and the hammerhead". The term 'hammer butt' denotes "the part of the hammer furthest from the hammerhead". Geoffrey Lancaster, *Culliford, Rolfe and Barrow: a tale of ten pianos* (Crawley, WA: UWA Press, 2017), 704, 699, 705, 705, 704.
[8] The term 'damper' refers to "a discrete mechanical part in the action whose function is to quell the vibration of the strings when the finger releases the key". Michael Cole, *The Pianoforte in the Classical Era* (Oxford: Clarendon Press, 1998), 378–9.

and Franz Peter Schubert (1797–1828) wrote for the pianos of Viennese makers such as Walter. These pianist/composers embraced the characteristic design, sound and touch of pianos that were identified with the city in which they worked; such sonic characteristics were compositionally exploited using a number of elements, including register, texture and articulative variety. These elements were significant aspects of the musical aesthetic associated with these cities.

Throughout the music history of Western culture, distinct musical aesthetics have been associated with particular countries. Each national musical aesthetic (hereafter referred to as 'aesthetic') reveals a particular approach to sonority. For example, during the eighteenth century, the 'French' aesthetic was characterised by a luminous, 'creamy' and ethereal sound, supporting overt elegance. Compositions by Jean-Baptiste Lully (1632–87) and Marin Marais (1656–1728) exemplify the French aesthetic. On the other hand, the 'Italian' aesthetic manifested itself through a bright, focussed and powerful sound supported by overt virtuosity. This is evident in the music of, for example, Giuseppe Valentini (1681–1753) and Antonio Vivaldi (1678–1741). The 'German' aesthetic combined the French and Italian. The music of composers such as Johann Sebastian Bach (1685–1750), and Georg Philipp Telemann (1681–1767) embody the German aesthetic.

From the twelfth century onwards, the 'English' aesthetic was expressed through 'rich', 'lush' and 'warm' sonority, for example, in John Dunstable's (1390–1453) and William Byrd's (1543–1623) vocal music, and the piano music of Cramer and Dussek. Late eighteenth-century English composers, who had a predilection for rich, lush and warm sonorities, wrote music characterised by linearism, expansive lyrical phrases and an integrated sense of colour which produced a generally 'darker' sonority than in Vienna. Examples of this aesthetic include Clementi's Symphony no. 3 in G major WO 34 (date unknown) and Dussek's piano concerto in G minor Op. 49 (1801).

During the last four decades of the eighteenth century in Vienna, the French and Italian aesthetics were subsumed into one; this was an aesthetic whose focus was 'colour' and invention. In Vienna, instrumental virtuosity was rarely overt. Joseph Haydn's Symphony no. 22 in E-flat major ('The Philosopher') (Hob. I:22) (1764), the Overture to W. A. Mozart's opera *Die Entführung aus dem Serail* (The Abduction from the Hareem) (KV 384) (1782), W. A. Mozart's Symphony no. 41 in C major ('Jupiter') (KV 551) (1788) and the symphonies of Johann Baptist Vanhal (1739–1813) for example, are decidedly Viennese in their aesthetic.

Given the existence of the English and Viennese aesthetics during the late eighteenth century, given also that there are marked differences in the scaling, striking points, dampers

and the resultant sound of grand pianos made by Broadwood in London and Walter in Vienna, and given that resident composers in each of these locations wrote for the instruments made in these cities, this study seeks answers to the following questions:

1. What were the design principles underlying the scaling, striking points and dampers in late eighteenth-century grand pianos?
2. What was the sonic result of the realisation of these design principles in grand pianos by Broadwood and Walter?
3. What relationship, if any, might there be between grand piano design, sound and compositional aesthetic in late eighteenth-century London and Vienna?

Aims

This study seeks to achieve the following research aims:

1. To describe the technical principles underlying grand piano design in relation to scaling, striking points and dampers in late eighteenth-century London and Vienna.
2. To identify the realisation of these principles in the late eighteenth-century grand pianos of John Broadwood and of Anton Walter.
3. To identify the sonic result of the realisation of these principles in the late eighteenth-century grand pianos of John Broadwood and Anton Walter.
4. To analyse and compare selected late eighteenth-century English and Viennese solo keyboard repertoire in relation to the compositional elements of register, texture and articulative variety.
5. To identify the relationship, if any, between the sonic result of scaling, striking points and dampers in grand pianos of John Broadwood and Anton Walter and the compositional aesthetic in relation to register, texture and articulative variety in late eighteenth-century London and Vienna.

Rationale

The late eighteenth century[9] is selected. It is selected because:

- Innovations in piano design and making occurred during this period.
- Solo piano repertoire was composed during this period.
- Compositional innovations in solo piano repertoire took place during this period.
- The piano became the pre-eminent musical instrument during this period.

London and Vienna are selected. This is because during the late eighteenth century, these cities were individually:

- A musical, economic and commercial centre.
- A centre within which innovations in piano design occurred.
- A centre of piano making.
- A centre of piano playing.
- A centre of piano composition.
- A centre within which compositional innovations took place.

The 'grand piano' is selected according to the following criteria:

- It was the instrument often selected and/or used by late eighteenth-century professional musicians within contexts of public performance.
- The instrument has sonic characteristics that were valued by professional pianists and composers during the late eighteenth-century.
- It manifested late eighteenth-century innovations in design which were embraced by contemporaneous piano makers.
- There is an unbroken tradition, from the late seventeenth through to the eighteenth centuries, of the grand piano's 'flügel' (wing) shape dating back to the 'invention' of the piano by Bartolomeo Cristofori.

[9] For the purposes of this study, the late eighteenth century is the period between the mid 1760s—when the German musical instrument maker Johann Christoph Zumpe (1726–90) began producing square pianos of his own design in London—to 1800.

The grand piano design elements of scaling,[10] striking points[11] and dampers[12] are selected. These design elements are selected because:

- Each of these design elements, both independently and in combination, influence the sound of a grand piano.
- The design elements are unified through a direct relationship with the strings—that is:
    - Scaling directly influences string length and string thickness;
    - The hammer[13] striking point is the direct point of contact with each string; and
    - The strings are directly contacted by the damping material in the damper compartment.[14]

  (The soundboard[15] is not selected because there is no direct contact between the strings and the soundboard—the strings contact the bridge pins,[16] which in turn contact the bridge,[17] which in turn contacts the soundboard.)

The London-based piano maker John Broadwood is selected. This is because:

- Traditions of grand piano design in late eighteenth-century London are exemplified in instruments of this maker.

The Vienna-based piano maker Anton Walter is selected. This is because:

- Traditions of grand piano design in late eighteenth-century Vienna are exemplified in his instruments.

Four composers are selected, two from London and two from Vienna. The selected composers are:

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[10] See fn. 6.
[11] See fn. 7.
[12] See fn. 8.
[13] See fn. 7.
[14] The damper compartment is "the portion of the damper that contains the damping agent". Lancaster, *Culliford, Rolfe and Barrow*, 702. For a definition of the term 'damper', see fn. 8.
[15] In a stringed keyboard instrument, the soundboard is "the thin wooden plate that transmits the vibration of the strings to the air. . . . In almost all surviving eighteenth- . . . century examples, the wood used is spruce, fir, pine or cypress". Lancaster, *Culliford, Rolfe and Barrow*, 710–11.
[16] The term 'bridge pin' denotes "a small piece of brass or other metal wire (effectively a headless nail) driven part-way into the bridge [see fn. 17 below] so as to determine the correct lateral position of the string bearing on the bridge. The bridge pin serves to delimit one end of that string's speaking length". Lancaster, *Culliford, Rolfe and Barrow*, 700.
[17] In stringed keyboard instruments, the 'bridge' is "a long, narrow wooden structure, commonly of serpentine design, usually made from a deciduous hardwood such as beech, maple, walnut, or fruitwood, and fastened to the soundboard, on which the strings – which are kept in their correct lateral position by bridge pins – bear. The bridge serves both to define one end of the speaking length of each string and to transmit its vibration to the soundboard". Lancaster, *Culliford, Rolfe and Barrow*, 700.

- Muzio Clementi (London)
- Jan Ladislav Dussek (London)
- Joseph Haydn (Vienna)
- Wolfgang Amadeus Mozart (Vienna)

The composers are selected because:

- They are contemporaneous late eighteenth-century composers.
- They were each regarded in the late eighteenth century as being significant.
- They each lived and worked either in London or in Vienna.
- They were each familiar with the grand pianos of makers in the cities within which they lived and worked.
- They each wrote for the grand pianos of makers in the cities within which they lived and worked.

The selected composers who lived and worked in London (Clementi and Dussek) were familiar with the grand pianos of John Broadwood. The selected composers who lived and worked in Vienna (Joseph Haydn and W. A. Mozart) were familiar with the grand pianos of Anton Walter.

Four fantasias for solo piano are selected, one by each of the selected composers. The genre of 'fantasia' is selected because:

- It was an established compositional genre in late eighteenth century London and Vienna.
- It was readily distinguishable from other contemporaneous genres.[18]
- It was identified with the piano in late eighteenth century London and Vienna.
- Late eighteenth-century composers in London and in Vienna wrote works in this genre.
- It is associated with wide ranging register, texture and articulation.
- It was contemporaneously associated with the musical connoisseur.

The selected fantasias are:

- Muzio Clementi: Capriccio—that is, Fantasia—in A major Op. 34, no. 1 (1795)
- Jan Ladislav Dussek: Fantasia in F minor Op. 50 (1804)

[18] See Daesik Cha, "Transformation of the Keyboard Fantasia in the Classical Period (1780–1800)" (PhD diss., Brandeis University, 2016), 17.

- Joseph Haydn: Fantasia in C major (Hob. XVII:4) (1789)
- W. A. Mozart: Fantasia in C minor KV 475 (1785)

The selected fantasias are analysed in relation to:

- Register
- Texture
- Articulative variety

Register, texture and articulative variety are selected because:

- They are compositional elements that exploit the sonic characteristics of late eighteenth-century grand pianos.
- They are compositional elements used by late eighteenth-century composers.

Methodology/Design of the study

Background to the piano - Contextualising discourse:
A brief history of the development of the grand piano from 1440– ca. 1800 on the continent and in England.

Underlying principles of late eighteenth-century grand piano design:

- Scaling
- Striking points
- Dampers
- English grand piano design
- Viennese grand piano design

London:

- John Broadwood
  - Broadwood's grand piano design
  - Description of scaling
  - Description of striking points
  - Description of dampers
  - Resultant sound of Broadwood grand pianos

Composition:

Muzio Clementi – Capriccio [Fantasia] in A major
Op. 34, no. 1 (1795)

Analysis:

- Register
- Texture
- Articulative variety

Jan Ladislav Dussek – Fantasia in F minor Op. 50 (1804)

Analysis:
- Register
- Texture
- Articulative variety

Summary of English compositional aesthetic.

Vienna:

- Anton Walter:
  - Walter's grand piano design
  - Description of scaling
  - Description of striking points
  - Description of dampers
  - Resultant sound of Walter grand pianos

Composition:

Joseph Haydn – Fantasia in C major (Hob. XVII:4) (1789)

Analysis:
- Register
- Texture
- Articulative variety

W. A. Mozart – Fantasia in C minor KV 475 (1785)

Analysis:
- Register
- Texture
- Articulative variety

Summary of Viennese compositional aesthetic.

Thereby resulting in identifying the relationship between English and Viennese grand piano design and English and Viennese compositional aesthetics.

Significance of the Study

This study is seen as significant because it uses underlying principles of late eighteenth-century grand piano design—in relation to scaling, striking points and dampers—as realised in the late

eighteenth-century grand pianos of John Broadwood and of Anton Walter, as a springboard from which to investigate the relationship between the sonic result of these design principles and the compositional aesthetic—in relation to register, texture and articulative variety as found in selected fantasias—of four contemporaneous composers in London and in Vienna. Study of the juxtaposition of design principles and the compositional aesthetic revealed in the fantasia genre fills a gap in the existing research.

CHAPTER 2

Literature Review

Primary sources

Given the pre-eminence of English and Viennese piano design, making, playing and composition during the late eighteenth century, it is surprising that comparatively few contemporaneous sources discuss all of these areas of piano-based activity or the specific location of these activities. Furthermore, most of the primary sources that discuss these issues do not date from the late eighteenth century, but from the first half of the nineteenth century.

In 1828, the virtuoso pianist and composer Johann Nepomuk Hummel (1778–1837), in his treatise on playing the piano *Ausfürliche theoretisch-practische Anweisung zum Piano-Forte-Spiel*, identified England and Vienna as two centres of piano design, playing and composition; he also discussed the touch of English and Viennese instruments.[19]

In 1831, the virtuoso pianist Fréderic Wilhelm Michael Kalkbrenner (1785–1849) identified the sound and touch of English pianos; moreover, he linked the design and sound of English pianos with English compositional and playing styles:

> The English pianos . . . have caused the professional musicians of that country to adopt a grander style and that beautiful way of singing which distinguishes them.[20]

Concerning Viennese piano design, the German lexicographer Ernst Ludwig Gerber (1746–1819) wrote a biographical dictionary of musicians[21] in which he included an entry on the life and work of the grand piano maker Johann Andreas Stein (1728–92).[22]

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[19] See Johann Nepomuk Hummel, *Ausfürliche theoretisch-practische Anweisung zum Piano-Forte-Spiel, vom ersten Elementar-Unterrichte an bis zur vollkommensten Ausbildung* [Detailed theoretical and practical Instruction on Piano Playing, from the first Elementary Lessons to the most complete Training] (Vienna: Haslinger, 1828), 439. See also van Oort, "The English Classical Piano Style," 21–2.

[20] See Fréderic Wilhelm Michael Kalkbrenner, *Méthode pour Apprendre le Piano-forté à l'aide du Guide-mains* [Method for Learning the Pianoforte using a Hand guide] Op. 108, 2nd edn (Paris: Pleyel, 1831), 10.

[21] Ernst Ludwig Gerber, *Historisch-biographisches Lexicon der Tonkünstler, welches Nachrichten von dem Leben und Werken musikalischer Schriftsteller, berühmter Componisten, Sänger, Meister auf Instrumenten, Dilettanten, Orgel- und Instrumentenmacher enthält* [Historical-biographical dictionary of musicians, containing information on the life and works of writers on music, famous composers, singers, instrumental virtuosi, amateurs and organ- and instrument-makers], 2 vols (Leipzig: J. G. I. Breitkopf, 1790–2), facsimile edn (London: Forgotten Books, 2015). See also Eva Badura-Skoda, *The Eighteenth-Century Fortepiano Grand and its Patrons: From Scarlatti to Beethoven* (Bloomington: Indiana University Press, 2017), 318–21.

[22] Gerber, *Historisch-biographisches Lexicon*, 2:cols. 572–3.

In 1796, Johann Ferdinand von Schönfeld (1750–1821) wrote about piano makers in Vienna and discussed the sound and touch of pianos by Stein. Von Schönfeld identified

> . . . two types of player amongst our best pianists . . . One of these types seeks nourishment for the soul, and not only loves clarity, but also soft and melting playing. For such pianists, there can be no better instrument than the Stein type.[23]

He also compared Stein's pianos with those of Walter, observing that pianos by the latter maker have "a full, bell-like tone, a clear response, and a very strong, full bass."[24] By way of comparison, von Schönfeld noted that pianists who had a preference for Walter's grand pianos:

> play with an abundant sound, extremely fast[, and] study the most difficult passages and the fastest octaves . . . This requires authority and a strong nerve; to employ these, . . . one requires pianos that can take any excesses. For the virtuosi of this kind we recommend the Walter style of piano.[25]

In 1801, the Viennese piano maker Andreas Streicher (1761–1833), wrote that, ideally, the sound of a piano should "approach the tone of the best wind instruments".[26]

Letters written by late eighteenth century Viennese musicians sometimes mention the Viennese piano, and/or particular Viennese piano makers. The most often quoted letters are those written by:

1. Joseph Haydn to:
    i) The music publishing house "Artaria [on] 26 October 1788, [where he] . . . asked that "31 gold ducats" be paid to Wensel [Wenzel] Schanz [Schantz, ca. 1750–90] for a "new fortepiano".[27]
    ii) Maria Anna von Genzinger (1754–93) on 4 July 1790, where he writes:

> I would like Your Ladyship to try . . . [a piano] made by Mr Schanz. His fortepianos are particularly light in touch and have very agreeable mechanism. Your Ladyship has great need of a good fortepiano, and my Sonata [in E-flat major, Hob. XVI:49

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[23] Johann Ferdinand von Schönfeld, *Jahrbuch der Tonkunst von Wien und Prag* [A Yearbook of the Music of Vienna and Prague] (Vienna: Im von Schönfeldischen Verlag, 1796), facsimile edn (Munich: Emil Katzbichler, 1976), pp. 90–1.
[24] von Schönfeld, *Jahrbuch*, 88.
[25] von Schönfeld, *Jahrbuch*, 90–1.
[26] Johann Andreas Streicher, *Kurze Bemerkungen über das Spielen, Stimmen und Erhalten der Fortepiano welche von Nannette Streicher, geborne Stein in Wien verfertiget warden* [Brief Remarks concerning Playing, Tuning and Maintaining Fortepianos made by Nannette Streicher, born Stein in Vienna] (Mit Albertischen Geschriften, 1801), facsimile edn (The Hague: Lelieveld, 1979), 12. Quoted and trans. van Oort, "The English Classical Piano Style," 50.
[27] Geoffrey Lancaster, *Through the Lens of Esoteric Thought: Joseph Haydn's* The Seven Last Words of Christ on the Cross (Crawley, WA: UWA Publishing, 2019), 539.

> (1789–90)] would gain so much from it . . . I consider Mr Schanz at present to be the best fortepiano maker.[28]

2. W. A. Mozart to:

    i) His father on 17 October 1777, where he praises Stein's grand pianos:

> I will begin immediately by describing Stein's pianofortes. Before I had seen any of Stein's work, Späth's claviers had always been my favourites; but now I prefer Stein's, for they damp even better than the Regensburg instruments. When I strike hard, no matter whether I keep my finger on the key or raise it, the sound ceases the moment I raise my finger. In whatever way I touch the keys, the tone is always even. It never jars [*schebern*], . . . [and] it is always even. . . . The device . . . which you work with your knee . . . is so much more perfect than in the instruments of anyone else. I have only to touch it and it works; and when you shift your knee the slightest bit, you do not hear the least reverberation.[29]

Secondary sources

Traditions of piano design, making, playing and composition were located in London and Vienna in the late eighteenth century. These traditions have been the subject of scholarly investigation. From this literature, four themes are of particular relevance to this study:

1. The existence of two pre-eminent centres of piano design, and/or making, and/or playing, and/or composition in London and in Vienna.
2. Piano design, and/or making, and/or playing and/or composition specifically in London.
3. Piano design, and/or making, and/or playing and/or composition specifically in Vienna.
4. The life and/or work of Clementi, Dussek, Haydn and W. A. Mozart.

London and Vienna as two pre-eminent centres

There is a range of literature identifying and discussing London and Vienna as the pre-eminent centres of piano design, and/or making and/or playing and/or composition during the late eighteenth century. These themes are addressed in various types of literature, including dissertations, books and journal articles.

[28] Lancaster, *Through the Lens of Esoteric Thought*, 540–1.
[29] Lancaster, *Through the Lens of Esoteric Thought*, 535–6.

Dissertations

In his ground-breaking study, *The English Classical piano style and its influence on Haydn and Beethoven*[30], Bart van Oort identifies England and Vienna as pre-eminent centres of late eighteenth-century piano design and making. He establishes this fact by categorising pianos as being either "English" or "Viennese":

> Little attention has been paid to the fact that there were different types of pianos being built in the period between approximately 1770 and 1830, with the English and Viennese as the two leading schools.[31]

It could be argued that van Oort's use of the word 'school' is problematic. The literature reveals that differences in piano design, piano making procedures and piano makers' business models in late eighteenth-century England and Vienna precluded the unity of concept and practice implied by the term 'school';[32] with regard to piano design, differences were usually subtle. Piano making procedures and piano makers' business models, however, could differ markedly from city to city and from maker to maker.

When speaking of design differences between English and Viennese pianos, van Oort observes that the hammer heads in an English piano strike the strings with a direct blow, whilst those of Viennese pianos 'caress' or 'brush' the string within an arch of movement:

> When the English hammer is catapulted up by the jack, it hits the string with a direct blow. With the Viennese hammer, being attached to the key, part of the movement of the key is translated into a horizontal movement of the hammer.[33]

Van Oort concludes that this design difference has ramifications for a piano's sound.[34] As Lancaster observes:

> [In Viennese pianos,] the hammer head remains in contact with the string for a slightly longer period of time than it would if it struck with a direct blow. Some overtones are therefore damped out by the hammer itself. This accounts[, in part,] for [the sonic characteristics of Viennese pianos].[35]

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[30] See van Oort, "The English Classical Piano Style," Abstract.
[31] van Oort, "The English Classical Piano Style," Abstract.
[32] See, for example, discussions concerning piano design, piano making procedures and business models of the piano makers (respectively) Frederick Beck, John Broadwood, and the piano making firm of Longman & Broderip in Geoffrey Lancaster, *The First Fleet Piano: a musician's view* (Acton, ACT: ANU Press, 2015). See also Lancaster, *Culliford, Rolfe and Barrow*. See also Chao-Hwa Lin, "The Impact of the Development of the Fortepiano on the Repertoire Composed for it from 1760–1860" (DMA diss., University of North Texas, 2012), 49.
[33] van Oort, "The English Classical Piano Style," 20.
[34] See van Oort, "The English Classical Piano Style," 45.
[35] Geoffrey Lancaster, "Keyboard Music of W.A. Mozart and F.J. Haydn: Response by Pre-Tertiary Piano Students to Historically-Informed Performance Practice" (PhD diss., University of Sydney, 1999), 22.

Building on van Oort's research, Michael Latcham, in his doctoral dissertation *The Stringing, Scaling and Pitch of Pianos Built in the Viennese and South German Traditions 1780–1820*[36], investigates string scaling, and damper design. Acknowledging London and Vienna as pre-eminent centres of late eighteenth century piano making, Latcham identifies seven eminent and influential Viennese makers—Johann Fritz (?–ca. 1835), Ferdinand Hofmann (1756–1829), Johann Jacob Könnicke (ca. 1756–1811), Johann Schantz (1762–1828), Stein, Nannette Streicher (1769–1833), and Walter. He also gives detailed information concerning the design of English pianos and the influence that they had on the design of Viennese instruments.[37]

Unlike van Oort and Latcham, Chao-Hwa Lin focusses on the relationship between maker and composer.[38] Like van Oort, however, Lin identifies two national 'schools' of piano making:

> With the increasing popularity of the fortepiano, its manufacturers gradually divided into two major schools in the late-eighteenth century: the German and the English.[39]

Lin locates the "English" centre of piano making in London,[40] and the "German" centre in Vienna.[41]

Books

Across the research, publications rarely identify both London and Vienna as pre-eminent centres of late eighteenth-century piano design, and/or making, and/or playing, and/or composition. An exception is found in Martha Clinkscale's *Makers of the Piano: 1700-1820*[42], within which the life, work and extant instruments of over 2,000 makers who produced pianos in England and on the continent are discussed. Although Clinkscale does not explicitly state that late eighteenth-century London and Vienna were centres of piano design and making, the extensive data presented in her tome makes it clear that this was the case. Moreover, the detailed and systematic way in which Clinkscale presents instrument-measurement and

[36] Michael Latcham, "The Stringing, Scaling and Pitch of Pianos Built in the Viennese and South German Traditions 1780–1820" (PhD diss., The University of Edinburgh, 1998).
[37] Michael Latcham, "The Stringing, Scaling and Pitch," 358–72.
[38] Chao-Hwa Lin, "The Impact of the Development of the Fortepiano on the Repertoire Composed for it from 1760–1860" (DMA diss., University of North Texas, 2012).
[39] Lin, "The Impact of the Development of the Fortepiano," 40.
[40] Lin, "The Impact of the Development of the Fortepiano," 50–1.
[41] Lin, "The Impact of the Development of the Fortepiano," 49.
[42] Martha N. Clinkscale, *Makers of the Piano: 1700-1820* (Oxford: Oxford University Press [Hereafter referred to as OUP], 1993).

provenance information is in keeping with highest quality organological scholarship. In her companion volume *Makers of the Piano: 1820-1860*[43], Clinkscale observes that during the early nineteenth century, London remained as a pre-eminent centre of piano design and making: "London was indeed the largest and most important piano manufacturing centre in the world".[44]

Cynthia Adams Hoover, Patrick Rucker and Edwin M. Good's book *Piano 300: Celebrating Three Centuries of People and Pianos*[45] was published to compliment an exhibition presented in 2001 at the Smithsonian's International Gallery, Washington D.C. Functioning in part as an exhibition catalogue, the book discusses the design and sonic characteristics of grand pianos in German Europe, Vienna and in England—identifying, by implication, London and Vienna as the pre-eminent centres of piano design and making.[46]

In his study on piano pedalling during the period between the early eighteenth century and the 1860s,[47] David Rowland quotes Kalkbrenner, who observed in 1831: "The instruments of Vienna and London have produced two different schools".[48] Kalkbrenner is referring not only to two 'schools' of piano design and making, but also of composing and playing. Kalkbrenner's past tense "have produced" points to the late eighteenth-century origins of the two pre-eminent centres of piano design, making, playing and composition which were located in London and in Vienna.

Journal articles

A single journal article written by Michael Latcham identifies two pre-eminent late eighteenth-century centres of piano design and making as being located in England and in Vienna. Moreover, with characteristic scholastic precision, Latcham distinguishes between the "piano building" which took place in German Europe ("Germany") and in Vienna:

> Towards the end of the eighteenth century two main traditions of piano building had become established, one in England, the other in Germany and Vienna.[49]

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[43] Martha N. Clinkscale, *Makers of the Piano: 1820-1860* (Oxford: OUP, 1999).
[44] Clinkscale, *Makers 1820-1860*, ix.
[45] Cynthia Adams Hoover, Patrick Rucker and Edwin M. Good, *Piano 300: Celebrating Three Centuries of People and Pianos* (Washington DC: Smithsonian Institution, 2001).
[46] Hoover, Rucker and Good, *Piano 300*, 17.
[47] David Rowland, *A History of Pianoforte Pedalling* (Cambridge: Cambridge University Press [Hereafter referred to as CUP], 1995).
[48] Rowland, *A History of Pianoforte Pedalling*, 34. See also Kalkbrenner, *Méthode*, 10.
[49] Michael Latcham, "The Check in Some Early Pianos and the Development of Piano Technique around the Turn of the 18th Century," *Early Music* 21:1 (1993): 29.

London as a pre-eminent centre

Dissertations

A comparatively large percentage of relevant dissertations focus on piano design, and/or making, and/or playing and/or composition as manifested specifically in England—and by extension, in London. Sources include dissertations, books and journal articles.

Van Oort's description of the English piano action[50] is both clear and accurate:

> The hammer of the English action is attached to a rail and points away from the player. . . . A jack . . . [(a vertically-oriented lever) pushes] up the rear of the hammer, close to the hinge; the jack escapes under a wooden block onto which the hammer shank is glued. The hammer is caught by a check.[51]

Van Oort reveals that during the late eighteenth century, the touch of English pianos was sometimes regarded as being heavier than that of Viennese instruments:

> The touch of English pianos as felt by many contemporary players (among them Beethoven) [was perceived] to be heavier than that of the Viennese.[52]

He also highlights the influence of the check[53] in the action of English pianos: "The presence of a check, allowing for a greater control over the action, enables the pianist to play with a greater dynamic range".[54]

Additionally, van Oort discusses the English compositional style and how music written for English pianos contains features arising both from piano design and resultant sonic characteristics; van Oort draws close attention to Muzio Clementi, whose piano music reveals innovative pianistic and compositional techniques:

> Clementi . . . set a new standard of virtuosity with techniques like runs in [parallel] thirds, sixths and octaves, arpeggio and scale passages, leaps and big chords, all combined with ample use of the keyboard extremes resulting from the desire for greater brilliance in the treble and greater sonority in the bass.[55]

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[50] See fn. 7.
[51] van Oort, "The English Classical Piano Style," 17. The word 'jack' refers to the "lever articulating from, or attached directly to the key lever, which transmits the motion of the key lever to the hammer butt. . . . [The jack may also be] called the 'hopper' in . . . actions of the English type". The term 'check' denotes the "action element . . . usually consisting of a leather pad . . . which catches the returning hammerhead to prevent its rebounding to strike the string an unwanted second time". Lancaster, *Culliford, Rolfe and Barrow*, 706, 701.
[52] van Oort, "The English Classical Piano Style," 18.
[53] See fn. 51.
[54] van Oort, "The English Classical Piano Style," 18–19.
[55] van Oort, "The English Classical Piano Style," 53.

Van Oort's dissertation is the first major study within which the relationship between the late eighteenth-century piano in London and the music that was written for it—with an emphasis on music by Haydn and Beethoven—is examined in detail.

Concerning piano design in London, Chao-Hwa Lin describes the sonic outcome of the relationship between the action and stringing of the English piano; furthermore, she identifies the 'intermediate lever'—the defining feature of the English action:

> The English action often came with triple stringing throughout the entire instrument. . . . The result was a greater volume. . . . The jack was controlled by a lever that moved directly from the butt of the hammer . . . and the movement [of the hammer] was triggered by an intermediate lever between the jack and the hammer.[56]

Lin's observation regarding the sonic result of triple stringing[57] in English grand pianos—when compared with Viennese grand pianos—is correct: "greater volume"[58]—Edwin "Good reveals that triple stringing as opposed to double-stringing increases the volume of the sound by seventeen percent".[59] Unlike van Oort, however, Lin's description of the English grand piano action is substantially incorrect. She suggests that the "jack"[60] was moved by a lever "from the butt of the hammer" between the jack and the hammer.[61] There is, in fact, no intermediate lever between the jack and the hammer butt. Nor is the jack "controlled by a lever that moves "directly from the butt of the hammer".[62] In an English grand piano action, the jack itself is the intermediate lever, and it moves from the key lever.

When discussing the touch of the English grand piano, Lin makes the following remarks:

> An advantage of the English action was the capacity of the pianist to better adjust the touch weight of the finger in a thicker musical texture. If pianists pushed a key far down to the bottom, the touch would be heavy because the hammer was released from the jack that was closer to the string.[63]

Lin's comments are faulted for several reasons; firstly, she describes the "advantage of the English action" as being the pianist's technique ("capacity of the pianist" – something that has

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[56] Lin, "The Impact of the Development of the Fortepiano," 43.
[57] That is, three unison strings per note.
[58] Lin, "The Impact of the Development of the Fortepiano," 43.
[59] Edwin M. Good, *Giraffes, Black Dragons, and Other Pianos* (Stanford, CA: Stanford University Press, 2001), 70.
[60] See fn. 51. See also Figure 5.
[61] Lin, "The Impact of the Development of the Fortepiano," 43.
[62] Lin, "The Impact of the Development of the Fortepiano," 43.
[63] Lin, "The Impact of the Development of the Fortepiano," 44.

nothing to do with the piano's action); secondly, she does not define "touch weight of the finger";[64] and thirdly, she implies that in compositional contexts where textures are 'thick', the player's pushing "a key far down to the bottom" results in "the touch [being] heavy".[65] Lin's notion that pushing "a key far down to the bottom"[66]—that is, pushing a key down to the limit of its 'key dip'[67]—directly influences touch weight is incorrect; research by Kenneth Mobbs[68]––published eleven years prior to Lin's dissertation—reveals that in both English and Viennese late eighteenth-century grand piano actions, there is no direct relationship between key dip and touch weight.[69] Lin limits her discussion of piano repertoire in late eighteenth-century London to consideration of Dussek's two piano concerti in B-flat major Opus 22 (1793) and Opus 40 (1798), and his solo piano sonatas in B-flat major Opus 24 (1793) and E-flat major Opus 44 (1800).

Esther Wang provides brief and accurate observations on late eighteenth-century English piano action design, sound and compositional style.[70]

Alastair Laurence, in his *The Evolution of the Broadwood Grand Piano 1785-1998*[71], provides detailed information concerning the design of Broadwood grand pianos, as well as the business practices of the Broadwood firm until its demise in the twentieth century.

A number of scholars have examined musical life in late eighteenth-century London;[72] in each instance, the investigations of these researchers are predicated—either implicitly or explicitly—on an understanding that London was a pre-eminent centre of piano design,

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[64] A piano's 'touch weight' is an inherent aspect of the instrument itself, not, as Lin implies, of the finger. The term 'touch weight' is commonly understood as being "the minimum weight on the [top front edge of a key lever's key plate] . . . necessary to make the hammer just slowly rise upwards towards the string [when the dampers are raised]". Kenneth Mobbs, "A Performer's comparative study of Touchweight, Key-dip, Keyboard Design and Repetition in Early Grand Pianos, c.1770 to 1850," *The Galpin Society Journal* 54 (2001): 17.
[65] Mobbs, "A Performer's comparative study," 16.
[66] That is, to the limit of a piano's 'key dip'.
[67] "In keyboard instruments, [the term 'key dip' refers to] a measurement of the vertical displacement of the front end of a key lever when it reaches the limit of its downward movement". Lancaster, *The First Fleet Piano*, 2:419.
[68] See Mobbs, "A Performer's comparative study."
[69] See Mobbs, "A Performer's comparative study."
[70] Esther Wang, "Mozart Piano Concerto in G Major, K. 453: The First-Movement Cadenzas" (DMA diss., University of Cincinnati, 1997), 64–5.
[71] Alastair Laurence, "The Evolution of the Broadwood Grand Piano 1785-1998," (PhD diss., University of York, 1998).
[72] See, for example, Martin Clayton, Trevor Herbert and Richard Middleton (eds), "Social History and Music History," in *The Cultural Study of Music: A Critical Introduction* (London & New York: Routledge, 2003), 146–58; Simon McVeigh, *Concert Life in London from Mozart to Haydn* (Cambridge: CUP, 1993); Deborah Rohr, *The Careers of British Musicians, 1750-1850: A Profession of Artisans* (Cambridge: CUP, 2001); William Weber, *The Great Transformation of Musical Taste: Concert Programming from Haydn to Brahms* (Cambridge: CUP, 2008); Ian Woodfield, *Music of the Raj: A Social and Economic History of Music in Late Eighteenth-Century Anglo-Indian Society* (Oxford: OUP, 2000); Ian Woodfield, *Salomon and the Burneys: Private Patronage and a Public Career* (Aldershot: Ashgate, 2003).

making, playing and composition. Against the background of late eighteenth-century London's social strata, Dorothy Jean de Val's dissertation *Gradus ad Parnassum: The Pianoforte in London, 1770-1820*[73] examines Broadwood's and Clementi's piano making activities, the music publishing industry, and piano repertoire.

Books

A number of authors discuss piano design and/or making and/or playing and/or composition in London.

Nicholas Temperley's twenty-volume *The London Pianoforte School*[74] is an anthology comprising facsimiles of the first editions of English piano music composed between 1766 and 1860. No other source provides such a comprehensive view of piano repertoire written by London-based composers—800 works by 49 composers reveal the contemporaneous compositional exploitation of the English piano's sonic characteristics. Temperley's "extensive introductory essay"[75]—in volume one of the anthology—convincingly makes it clear that London was a pre-eminent centre of late eighteenth-century piano design, making, playing and composition.

Some scholars use research focussing on particular private collections of historical pianos as a catalyst for discussion concerning piano design, and/or making, and/or playing and/or composition in late eighteenth-century London. Richard Burnett and C. F. Colt—both of whom are pianists and historians—are such scholars. Of the fifteen chapters that comprise Burnett's monograph *Company of Pianos*[76], seven are related to the design and makers of pianos in London;[77] a further two chapters deal with repertoire and relevant historically informed performance practice.[78] On the other hand, C. F. Colt's *The Early Piano*[79] takes a more organological approach, frequently providing detailed measurements of 36 instruments selected from the Colt Clavier Collection—the selected instruments range in date from 1775–1868; eighteen of the selected instruments are by London makers.

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[73] Dorothy Jean de Val, "Gradus ad Parnassum" (PhD diss., University of London, King's College, 1991).
[74] Nicholas Temperley, *The London Pianoforte School, 1766-1860: Clementi, Dussek, Cramer, Field, Pinto, Sterdale Bennett, and Other Masters of the Pianoforte* (New York: Garland Publishing, 1984–6).
[75] Temperley, *The London Pianoforte School*, 3:vii.
[76] Burnett, *Company of Pianos*.
[77] See Burnett, *Company of Pianos*, 14–106.
[78] See Burnett, *Company of Pianos*, 168–196. The term 'historically informed performance practice' denotes the "conventions of performance that appear to have been prevalent among knowledgeable performers before our time, including those customs that were so commonly understood that they were not notated, as well as aspects of performance that were too subtle to notate". Lancaster, *Culliford, Rolfe and Barrow*, 705.
[79] C. F. Colt, *The Early Piano* (London: Stainer & Bell, 1981).

David Wainwright's book *Broadwood by Appointment*[80] identifies London as a pre-eminent centre of piano design, making, playing and composition. Wainwright's detailed and extensive study is significant; it is the first scholarly work to focus exclusively on the life and business activities of the London-based piano maker John Broadwood. Wainwright's study includes a detailed history of the maker's early life, information concerning the extent of the success of Broadwood's piano manufacturing firm and details pertaining to the development of the design of Broadwood's pianos.

Using Wainwright's research as a basis for further investigation, Michael Cole's book *Broadwood Square Pianos*[81] provides further—and hitherto unknown—information regarding Broadwood's life and work as well as developments in the design, production and sale of his square pianos. Cole's book is unique because of its exclusive focus on Broadwood's square pianos.[82] Cole's focus may have been catalysed by the increase of interest in English square pianos that emerged online during the first decade of the twenty-first century.[83]

Arthur Loesser's book *Men, Women and Pianos: A Social History*[84] places research into the history of the development of the piano within a cultural, social and economic framework. Late eighteenth-century London looms large in his exposé of design innovations, piano making and playing.

Certain scholars view the developments in piano design and playing that took place in late eighteenth-century London through the lens of performance practice. The most substantial monograph arising from this view is *The Keyboard Sonatas of Joseph Haydn* by the renowned Haydn specialist László Somfai.[85]

Journal articles

There are a handful of journal articles that deal with piano design, and/or making, and/or playing and/or composition specifically in London.

[80] David Wainwright, *Broadwood by Appointment* (London: Quiller Press Ltd, 1982).
[81] Michael Cole, *Broadwood Square Pianos* (Cheltenham: Tatchley Books, 2005).
[82] For a definition of the term 'square piano', see Appendix B.
[83] See, for example, http://www.friendsofsquarepianos.co.uk; https://www.squarepianos.com; www.squarepianotech.com.
[84] Arthur Loesser, *Men, Women and Pianos: A Social History*, 3rd edn (New York: Dover Publications, Inc., 1990).
[85] László Somfai, *The Keyboard Sonatas of Joseph Haydn: Instruments and Performance Practice, Genres and Styles* (Chicago: The University of Chicago Press, 1995).

Virginia Pleasants provides an overview of developments in piano design in late eighteenth-century London.[86] Pleasants posits that the physical separation of England from the continent created a context within which innovations in piano design could easily be made.

Building upon information contained in the introductory essay to his anthology of late eighteenth- and nineteenth-century English piano music, *The London Pianoforte School*,[87] Nicholas Temperley's "London and the Piano, 1760–1860"[88] focusses on London-based composers and piano music during the hundred-year period identified in the title of the article. Temperley's research is especially significant because it identifies London as the late eighteenth century centre of compositional innovation in piano music:

> Many of the leading developments in piano music in this period originated in London – that is to say, in music composed and published in London and primarily intended for use there. . . . Pianistic textures and idioms, uses of the sustaining pedal, development of new genres such as the study, nocturne, prelude and characteristic rondo . . . all took their main impetus from . . . London.[89]

David Rowland's article "Piano Music and Keyboard Compass"[90] investigates changes in the piano's keyboard compass as well as the makers responsible for these changes in London during the late eighteenth century:

> A number of individuals played an important role in the extension of the piano's compass in England during the 1790's. . . . The most documented developments are those of John Broadwood and Son.[91]

Christopher Clark, in his journal article "The English Piano", discusses piano making workshops before and after the industrial revolution. He outlines how late eighteenth-century grand pianos were hand-made, highlighting the precision required and the materials used. He also describes the workings of Broadwood's workshop, and the design and the prices of his grand pianos. Clark's view of Broadwood's role in musical London is broad; not only does he discuss the piano maker's industrial circumstances, but suggests that Broadwood's work contributed to an active compositional culture in that city.[92]

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[86] Virginia Pleasants, "The early piano in Britain (*c*1760–1800)," *Early Music* 13:1 (1985).
[87] See fn. 74.
[88] Nicholas Temperley, "London and the Piano, 1760-1860," *The Musical Times* 129:1744 (1988).
[89] Temperley, "London and the Piano, 1760-1860," 289–90.
[90] David Rowland, "Piano Music and Keyboard Compass in the 1790s," *Early Music* 27:2 (1999).
[91] Rowland, "Piano Music and Keyboard Compass," 283.
[92] Christopher Clarke. "The English Piano," in *Musique ancienne—instruments et imagination. Actes des Rencontres Internationales harmoniques, Lausanne 2004* [Old Musical Instruments and Imagination. Proceedings of the International Harmonics Meeting, Lausanne 2004], ed. Michael Latcham (Berne: Peter Lang, 2006), 245.

Richard Burnett exposes the relationship between piano design and urban domestic culture in late eighteenth-century London. Burnett's article "English Pianos at Finchcock's"[93] highlights the effect of high-density city living on innovations in piano design. When describing the relative sonority and resonant capabilities of the English pianos in the famous Finchcocks Collection, however, there is little original scholarship. On the positive side, Burnett implicitly makes it clear that during the late eighteenth century, London was a pre-eminent centre of piano design, making, playing and composition.

Vienna as a pre-eminent centre

Dissertations

Given that the twentieth- and twenty-first-century 'Early Music movement'[94] has focussed primarily on the canon[95] of eighteenth- and early nineteenth-century Viennese repertoire, it is not surprising that pianos made by Viennese makers and upon which Viennese composers—such as Joseph Haydn and W. A. Mozart—played have dominated research. Consequently, a substantial number of scholars have given attention to piano design, and/or making, and/or playing and/or composition in Vienna.

In his doctoral dissertation "The English Classical piano style and its influence on Haydn and Beethoven",[96] van Oort discusses the design features of pianos made in late eighteenth-century Vienna; he describes the action of these pianos:

> In the Viennese action, the hammer head points towards the player. It is thrown up to the string when the rear end of the hammer shank hits a rim, held in its place by a spring. . . . The hammer butt escapes when this rim moves backwards. The hammer is fixed in a fork (*Kapsel*) on the rear of the key, which functions as a hinge when the rear end of the hammer shank,

[93] Richard Burnett "English Pianos at Finchcocks," *Early Music* 13:1 (1985).
[94] The 'Early Music movement' emerged in the mid-1960s. Supported by research into historically informed performance practice, as well as by the recording industry and instrument makers and restorers, the movement was—and remains—associated with the performance of music from Western culture's past using historical instruments—and/or replicas of historical instruments—played in accordance with relevant historical performance practices.
[95] The canon of repertoire comprises an inviolable selection of musical works "transmitted in writing and accepted by the current generation through its enactment, supported by written programs, [and] by non-innovatory performers. . . . The vocabulary that surrounds . . . [these works] includes "immortal masterpieces," "works that will live forever," and "the world's greatest music." Bruce Haynes, *The End of Early Music: A Period Performer's History of Music for the Twenty-First Century* (Oxford: OUP, 2007), 5, 71. The 'cellist and conductor Nikolaus Harnoncourt describes the canon as "this very paltry selection [of repertoire], which was selected by our great-grandparents". Nikolaus Harnoncourt, *Baroque Music Today: Music As Speech. Ways to a New Understanding of Music*, trans. Mary O'Neill (Portland, OR: Amadeus Press, 1988), 69.
[96] See fn. 4.

> pushed up through the movement of the key, is caught by the escapement.[97]

Esther Wang provides a concise summary of the design of the late eighteenth-century Viennese piano action, along with a brief mention of the Viennese piano makers Schantz, Stein, and Walter.[98]

Several scholars credit J. A. Stein with the invention of the 'Viennese' piano action.[99] Mark Steven Ritzenhein, however, and without supporting evidence, casts some doubt over Stein's role in the action's invention:

> It is not clear if Johann Andreas Stein invented the . . . Viennese action, . . . but he was one of the first to use it.[100]

Surprisingly little research concerning the eminent Viennese piano maker Anton Walter appears in dissertations; van Oort mentions him briefly: "The . . . Viennese . . . [action is] typified by . . . Stein and Walter respectively".[101]

Books

Numerous books discuss piano design and/or making and/or playing and/or composition in Vienna. For example, Eva Badura-Skoda's *The Eighteenth-Century Fortepiano Grand*[102] comprises historical accounts of innovations in piano design, as well as piano builders in German Europe around 1750. Badura-Skoda also refers to the invention of the 'Viennese' action by J. A. Stein:

> What made Stein's name really famous in his day and more so in modern times was his invention of the completely altered new

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[97] van Oort, "The English Classical Piano Style," 19. An escapement is a "contrivance in . . . by which the element that impels the hammer toward the string ceases to do so by pivoting away from the hammer . . . before the hammerhead reaches the string". Koster, *Keyboard Musical Instruments in the Museum of Fine Arts, Boston*, 336. This allows for a "disengagement of the hammer from the impelling force provided by the finger on the key". Cole, *The Pianoforte in the Classical Era*, 379. "An escapement provides the player with comfortable, reliable and subtle control over dynamics". Lancaster, *Culliford, Rolfe and Barrow*, 747, fn. 305.

[98] See Wang, "Mozart Piano Concerto in G Major, K. 453", 64–7.

[99] See, for example, Andrea Botticelli, ""Creating Tone": The Relationship Between Beethoven's Piano Sonority and Evolving Instrument Designs, 1800-1810" (DMA diss., University of Toronto, 2014), 10; Andrew Brownell, "The English Piano in the Classical Period: Its Music, Performers, and Influences" (DMA diss., City University, London, 2010), 134; Lin, "The Impact of the Development of the Fortepiano," 22; Jacquelyn DeNure McGlynn, "Keyboard Style in Late Eighteenth-Century England: A Study of Fingering, Touch, and Articulation" (MA diss., The University of Western Ontario, 1999), 16; van Oort, "The English Classical Piano Style," 19.

[100] Mark Steven Ritzenheim, "Fortepiano Design and Construction" (MA diss., Michigan State University, 1990), 88.

[101] van Oort, "The English Classical Piano Style," 19.

[102] See fn. 21.

> action mechanism for his grand fortepianos, the . . . Viennese action.[103]

Quoting Badura-Skoda, Geoffrey Lancaster compares the sound of Schantz's pianos with those made by Stein and by Walter:

> The timbre of Schantz fortepianos [differs] from Walter pianos. Walter's sometimes have a bass register that is too mighty and powerful, and . . . often a less clear (though beautiful sounding) treble register compared with Schantz's instruments. . . . It was the clarity as well as the perfect balance of treble and bass registers in Schantz's [and in Stein's] pianos that [made their instruments so desirable to many late eighteenth-century Viennese musicians].[104]

Grant O'Brien's *Art and Music in Nineteenth Century Milan*[105] contains detailed organological information concerning Schantz pianos. His description cements an understanding of Viennese piano design elements. O'Brien does not, however, discuss piano playing or piano composition in late eighteenth-century Vienna.

Just as Hoover, Rucker and Good discuss the design and sonic characteristics of grand pianos in England,[106] they similarly identify, by implication, Vienna as a pre-eminent centre of piano design and making.

Keyboard Instruments in Eighteenth-Century Vienna[107] by Richard Maunder adds substantially to the body of knowledge and is an invaluable resource. Maunder's book is significant because of its wealth of content; it provides numerous titles given to the piano in Vienna during the late eighteenth century,[108] as well as discussion concerning eighteenth century Viennese piano makers, piano design, piano music and the contemporaneous economic considerations associated with the piano. Furthermore, Maunder provides detailed information concerning the influence of Viennese keyboard instruments on the music of Joseph Haydn.

Haydn is also a part of research by László Somfai, who positions the changes in piano design and playing that took place in late eighteenth-century Vienna within the context of an investigation into issues arising from performance practice relevant to Haydn's keyboard music.[109]

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[103] Badura-Skoda, *The Eighteenth-Century Fortepiano Grand*, 325.
[104] Lancaster, *Through the Lens*, 544.
[105] Grant O'Brien, *Art and Music in Nineteenth Century Milan at the time of Cristina Archinto Trivulzio* (Briosco: Villa Medici Giulini, 2008).
[106] Hoover, Rucker and Good, *Piano 300*, 17.
[107] Richard Maunder, *Keyboard Instruments in Eighteenth-Century Vienna* (Oxford: Clarendon Press, 1998).
[108] See Appendix A.
[109] László Somfai, *The Keyboard Sonatas of Joseph Haydn*.

Books within which anything connected with Viennese-style pianos is mentioned are consistent in either implicitly or explicitly regarding Vienna as a pre-eminent centre of late eighteenth-century piano design, making, playing and composition.

Journal Articles

A number of articles research piano design and/or making and/or playing and/or composition in late eighteenth-century Vienna.[110]

The eminent curator Alfons Huber investigates the history of action design in Viennese pianos.[111] Huber hypothesises that the action developed by Stein around 1780—which became the common type of Viennese piano action for the next 40 years—had been preceded in Vienna by an action based on Cristofori's design—that is, on the kind of action with an intermediate lever between the key-lever and the hammer, a design principle utilised by piano makers in London.

Composers' life and/or work

Works selected for analysis in this study are composed by, respectively, Clementi, Dussek, Joseph Haydn and W. A. Mozart. Given that Haydn and Mozart are traditionally included in the canon of repertoire as 'great' composers, it is not surprising that their life and work has been the subject of much research. On the other hand, Clementi and Dussek are not commonly regarded as 'great', nor does their music appear frequently in the canon of late eighteenth-century repertoire; this may be due to the fact that the high degree of expressivity inherent in Clementi and Dussek's keyboard music is severely reduced by the conjunction of the sonic characteristics of the modern piano—which, until the emergence of the Early Music movement in the mid 1960s, was the instrument commonly used to play Clementi's and Dussek's keyboard works—with the 'modernist' interpretative style.[112]

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[110] See, for example, Malcolm Bilson, "The Viennese fortepiano of the late 18th century," *Early Music* 8:2 (1980); Botticelli, ""Creating Tone": Beethoven's Piano Sonority"; Bernard Brauchli, "Christian Baumann's Square Pianos and Mozart," *The Galpin Society Journal* 45 (1992); Alfons Huber, "Was the 'Viennese Action' Originally a Stossmechanik?" *The Galpin Society Journal* 55 (2002), accessed May 17, 2020, URL: https://www.jstor.org/stable/4149041; Richard Maunder, "Mozart's keyboard instruments," *Early Music* 20:2 (1992); David Rowland. "Early pianoforte pedalling: The evidence of the earliest printed markings," *Early Music* 13:1 (1985); Rita Steblin, "Early Viennese Fortepiano Production: Anton Walter and New Inventions by Johann Georg Volkert in 1777-1783," *Studien zur Musikwissenschaft* 55 (2009).

[111] Huber, "Was the 'Viennese Action' Originally a Stossmechanik?"

[112] A performance style characterised by literalism in relation to the score as well as by a 'motoric' approach to rhythm and phrasing. The 'modernist' style is the dominant stylistic protocol taught in most conservatoria worldwide, and is the antithesis of the interpretive flexibilities revealed by late eighteenth-century peformance practice.

Various types of literature focus on the life and/or work of, respectively, Clementi, Dussek, Joseph Haydn and W. A. Mozart: dissertations, books and journal articles.

Dissertations

Because research concerning W. A. Mozart and Joseph Haydn commonly focusses on a specific aspect or issue found in their music, information arising from the life and work of these composers usually functions as a background to many studies.[113] No dissertations exclusively examine the life and work of these two composers.

When it comes to Clementi and Dussek, however, the situation is different. The American musicologist William S. Newman reviews the earliest twentieth-century scholarly examination of Clementi's life and work, the "remarkably thorough dissertation by Max Unger, *Muzio Clementis Leben*, [Muzio Clementi's Life] published in 1914"; Newman observes that "This study [has] been utilized all too little in the subsequent biographical accounts of even the chief music dictionaries".[114]

The most significant dissertation focussing on Clementi's keyboard music is Erin Helyard's "Muzio Clementi, Difficult Music, and Cultural Ideology in Late Eighteenth-Century England".[115] In detail and with great insight, Helyard positions the pianistic difficulties encountered in Clementi's piano music within the broad context of piano music in late eighteenth-century London—for the time, many passages contained within Clementi's piano works are uniquely difficult.

Hwa Young Kim's study on Jan Ladislav Dussek—"Jan Ladislav Dussek (1760-1812): His Little-Known Works for Piano Solo"—provides a detailed biography of Dussek's life as well as descriptions of his piano works written in London and later in Paris.[116]

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[113] See, for example, Howard Lee Irving, "The Piano Trio in London From 1791 to 1800" (PhD diss., Louisiana State University, 1980); Yifat Shohat, "Haydn's Musical Rhetoric: Compositional Strategy, Audience Reception, and Connection with Classical Oration" (PhD diss., Rutgers, The State University of New Jersey, 2006); Wang, "Mozart Piano Concerto in G Major, K. 453"; Thomas Bauman, "Haydn and the Cult of Genius" *The Musical Quarterly* 87:2 (2004); Emily I. Dolan, "Haydn, Hoffman, and the Opera of Instruments," *Studia Musicologica* 51:3/4 (2010); Matthew Head, "Music with "No Past?" Archaeologies of Joseph Haydn and "The Creation,"" *19th Century Music* 23:3 (2000); James Webster, "Haydn's Sensibility" *Studia Musicologica* 51:1/2 (2010); Neal Zaslaw, "Mozart, Haydn and the Sinfonia da Chiesa" *The Journal of Musicology* 1:1 (1982).

[114] William S. Newman, [Untitled,] review of *Clementi: His Life and Music*, by Leon Plantinga, *19th Century Music*, 1:3 (1978), 261.

[115] Erin Helyard, "Muzio Clementi, Difficult Music, and Cultural Ideology in Late Eighteenth-Century England (PhD diss., McGill Univerity, 2011).

[116] Hwa Young Kim, "Jan Ladislav Dussek (1760-1812): His Little-Known Works for Piano Solo" (DMA diss., University of Maryland, 1997).

Gavin Gostelow's substantial "Indications for the Use of the Moderator in the Sonatas of Dussek and His Contemporaries" is noteworthy because it not only provides an overview of Dussek's life, but also discusses his piano music with specific focus on the performative use of the 'moderator';[117] Gostelow is the first to examine this performance practice issue in detail.

Books

Numerous books discuss the life and work of Joseph Haydn and W. A. Mozart—that this is so may be the result of the high artistic and intellectual status commonly given to both composers, a status reinforced by their inclusion in the canon of late eighteenth-century Viennese repertoire.

In relation to Haydn, the most thorough, systematic and significant study is the five-volume *Haydn: Chronicle and Works*[118] by the American musicologist Howard Chandler Robbins Landon (1926–2009). As Lancaster observes: "Landon's biography is unique; there is no other composer biography as extensive".[119]

Several scholars have made significant contributions to the understanding of Joseph Haydn's keyboard music. A. Peter Brown's *Joseph Haydn's Keyboard Music: Sources and Style* provides, to date, the most detailed exposé of the instrumental context, history and structure of Haydn's keyboard works.[120] Building on Brown's work, László Somfai's *The Keyboard Sonatas of Joseph Haydn*[121] authoritatively discusses the types of piano—both Viennese and English—that Haydn encountered during his lifetime, and provides recommendations for the types of piano that may be used when performing each of Haydn's keyboard sonatas today. Somfai also provides suggestions—based on historically informed performance practice—both for the interpretation of ornament signs and for improvised ornamentation in each of Haydn's sonatas.

Concerning W. A. Mozart, Maynard Solomon's *Mozart: A Life* is commonly regarded as the most significant biography; Solomon's insights into Mozart's psychology and the

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[117] Gavin Gostelow, "Indications for the Use of the Moderator in the Sonatas of Dussek and His Contemporaries" (MMus diss., University of Sydney, 2009). In pianos, a 'moderator' is a mechanism "comprising a batten situated closely below the strings, with projecting pieces of woven cloth or soft leather that can be interposed – by means of a hand stop, knee-lever, or pedal – between the hammerhead and strings". Lancaster, *Culliford, Rolfe and Barrow*, 707–8. Moderators were not a part of English piano design.

[118] Howard Chandler Robbins Landon, *Haydn: Chronicle and Works*, 5 vols (London: Thames and Hudson, 1977–80).

[119] Lancaster, *Through the Lens of Esoteric Thought*, 15.

[120] A. Peter Brown, *Joseph Haydn's Keyboard Music: Sources and Style* (Bloomington, IN: Indiana University Press, 1986).

[121] László Somfai, *The Keyboard Sonatas of Joseph Haydn: Instruments and Performance Practice, Genres and Styles* (Chicago: The University of Chicago Press, 1995).

composer's life and work—as well as the fact that the study includes numerous documents that have not previously appeared in any other biography of W. A. Mozart—make the monograph an important and enlightening work of scholarship.[122] Simon Keefe's *Mozart in Vienna: The Final Decade* focuses on Mozart's roles as a performer and composer, and reveals how the composer's compositional output was affected by performance-related matters.[123]

A number of books discuss the life &/or work of Muzio Clementi. The major study undertaken to date is Leon Plantinga's detailed and thorough *Clementi His Life and Music*.[124] Plantinga's research is based entirely on primary sources and displays Clementi as an important and central figure in the musical life of London. In 2002, a further assessment of Clementi's place in late eighteenth-century English music culture was presented in *Muzio Clementi: Studies and Prospects*[125]— that Leon Plantinga is the author of the monograph's "Introduction"[126] implies that the eminent Clementi scholar had no qualms in giving his blessing to the research.

The most recent book devoted to the study of Clementi comprises eleven essays by nine eminent musicologists—edited by Luca Sala, and Robert Stewart-MacDonald.[127] This book explores "Clementi's multivalent contribution to piano performance, pedagogy, composition and manufacture in relation to British musical life and its international dimensions."[128]

Journal Articles

Some scholars provide information concerning the life and work of Joseph Haydn as a foil for the investigation of specific Haydn-related issues.[129]

In relation to W. A. Mozart, Richard Maunder's "Mozart's Keyboard Instruments" investigates the keyboard instruments that the composer owned or borrowed, and their makers; these instruments included harpsichords, clavichords and pianos.[130]

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[122] Maynard Solomon, *Mozart: A Life* (London: Pimlico, 1995).
[123] Simon Keefe, *Mozart in Vienna: The Final Decade* (Cambridge: CUP, 2017).
[124] Leon Plantinga, *Clementi His Life and Music* (London: OUP, 1977).
[125] Roberto Illiano, Luca Sala and Massimilliano Sala, *Muzio Clementi: Studies and Prospects* (Bologna: Ut Orpheus Edizione, 2002).
[126] See Illiano, Sala and Sala, *Muzio Clementi*, xxi–xxviii.
[127] Luca Lévi Sala and Rohan H. Stewart-MacDonald (eds), *Muzio Clementi and British Musical Culture: Sources, Performance Practice and Style* (New York: Routledge, 2019).
[128] Sala and Stewart-MacDonald, *Muzio Clementi*, i.
[129] See, for example, Thomas Bauman, "Haydn and the Cult of Genius," *The Musical Quarterly* 87:2 (2004); Emily I. Dolan, "Haydn, Hoffman, and the Opera of Instruments," *Studia Musicologica* 51:3/4 (2010); Matthew Head, "Music with "No Past?" Archaeologies of Joseph Haydn and "The Creation,"" *19th Century Music* 23:3 (2000); James Webster, "Haydn's Sensibility," *Studia Musicologica* 51:1/2 (2010); Neal Zaslaw, "Mozart, Haydn and the Sinfonia da Chiesa," *The Journal of Musicology* 1:1 (1982).
[130] Richard Maunder, "Mozart's Keyboard Instruments," 207–9, 214–19.

John Irving's "Mozart's Words, Mozart's Music" is largely derivative in its identification of W. A. Mozart's keyboard instruments—Irving draws on Maunder's pre-existing research. As an extension of Maunder's research, however, Irving discusses Mozart's piano works, his concert life and his encounters with other eminent musicians.[131]

Journal articles concerning the life and/or work of Clementi or Dussek are comparatively rare; usually, each of the two composers are only mentioned in passing. Early twentieth-century research on Clementi dates from 1932; in his "Muzio Clementi", Cuthbert Girdlestone describes Clementi as "this forgotten composer".[132]

[131] John Irving, "Mozart's Words, Mozart's Music: Untangling an Encounter with a Fortepiano and its Remarkable Consequences," *Austrian Studies* 17 (2009): 29–42.
[132] Cuthbert Girdlestone, "Muzio Clementi," *Music and Letters* 13:3 (1932): 286.

CHAPTER 3

Background to the development of the grand piano 1440– ca. 1800

The development of the grand piano between the early 1400s to ca. 1800 is a trail that winds from Flanders, through Italy, Southern Germany and Austria, to England.

Flanders

Arnaut of Zwolle

In 1440, Henri Arnaut of Zwolle (1400–66) describes the *dulce melos*. This musical instrument was the earliest form of the piano; the instrument's action had one moving part—either a hinged hammer or a free-moving non-pivoting hammer ('tangent')[133] (Figure 1).

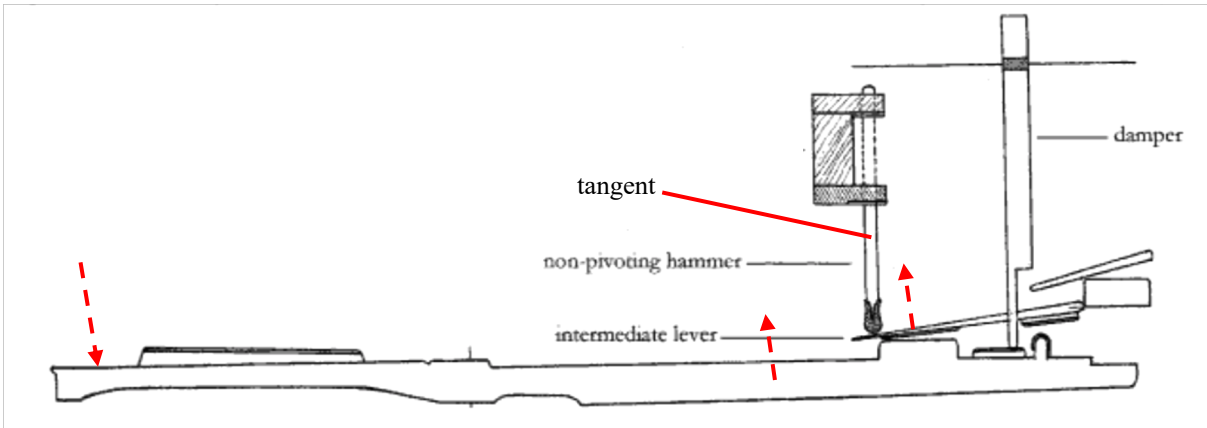

Figure 1. Elevation of 'tangent' action. The tangent is the vertical slip of bare wood; it is projected upward toward the strings by the action of the intermediate lever. The intermediate lever is hinged from an over-rail at the back of the keyframe. After the front top face of the tangent has struck the string, the tangent falls back down under gravity. *Source:* Caption: See Michael Cole, *The Pianoforte in the Classical Era* (Oxford: Clarendon Press, 1998), 196; Drawing: Giovanni Paolo Di Stefano, "The *Tangentenflügel* and Other Pianos with Non-Pivoting Hammers," *The Galpin Society Journal* 61 (2008): 79.

[133] See Stewart Pollens, *The Early Pianoforte* (Cambridge: CUP, 1995), 7–17. A tangent action has *non*-pivoting vertical rebounding hammers—rather than the piano action's pivoted rebounding hammers. "The distinguishing feature of the so-called tangent action is that the vertical hammers are not attached to any other part of the action but move up and down in a guide similar to the jack guide of the harpsichord. . . . The non-pivoting vertical hammers are propelled towards the strings from below, either by the keys on which they rest or by intermediate levers interposed between the keys and the hammers. The intermediate levers can be mounted on the key lever or hinged above the keys. Both these types of intermediate levers can face towards the player or away from the player." Giovanni P. di Stefano, "*Tangentenflügel* and other pianos with non-pivoting hammers," *The Galpin Society Journal* 61 (2008): 80.

Italy

Bartolomeo Cristofori

Approximately 255 years after Arnaut of Zwolle's *dulce melos*, the next mention of a piano was made in Italy by the

> poet, librettist and playwright Marchese Scipione Maffei (1675–1755). Maffei's description [of the piano's action], published in 1711 in the *Giornale di Litterati d'Italia* is the fruit of the earliest known interview of a musical instrument maker.[134]

Maffei describes the *arpicembalo che fa il piano e il forte* [harp-harpsichord that has the soft and the loud], invented in the late 1690s by

> the Paduan-born Bartolomeo Cristofori (1655–1731; 1732 according to the modern calendar). . . . The name '*arpicembalo*', combining the words for 'harp' (*arpa*) and 'harpsichord' (*cimbalo*), gives an indication of how the character of the sound of the newly invented instrument may initially have been perceived.[135]

Cristofori is commonly credited with the invention of the piano. The genius of Cristofori's piano action (Figure 2) was the inclusion of an intermediate lever—located between the key lever and the hammer[136]—which was involved in enabling the hammer to fall back to its rest position immediately after striking the string, even though the key remained pressed down.

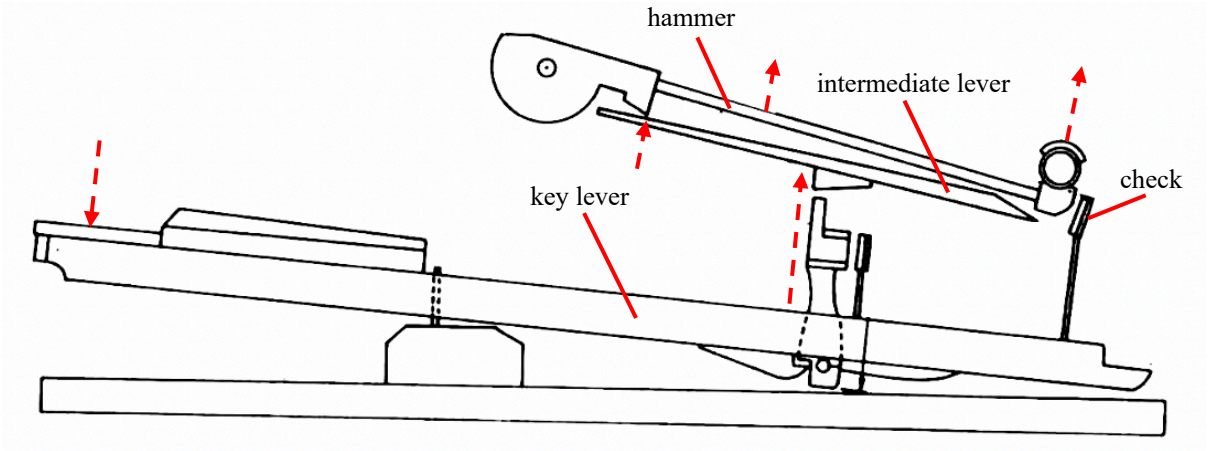

Figure 2. Elevation of Cristofori's piano action. *Source:* Stewart Pollens, *The Early Pianoforte* (Cambridge: CUP, 1995), 93.

[134] Lancaster, *The First Fleet Piano*, 1:25.
[135] Lancaster, *The First Fleet Piano*, 1:25.
[136] See fn. 7.

Southern Germany

Gottfried Silbermann

Cristofori's design made its way to Southern Germany; along with a slight increase in keyboard compass and a richer, darker and more present sound, the pianos of the Strasbourg organ builder Gottfried Silbermann (1683–1763) emulated Cristofori's action design. Unlike Cristofori's grand piano action, Silbermann's action did not have a check.[137] Silbermann's first grand pianos date from no earlier than 1732.

Austria

Johann Andreas Stein

In Augsburg, around 1773, Stein invented the so-called 'Viennese' piano action (Figure 3).

As Lancaster reports: "The design, sound and touch of Viennese pianos are dissimilar to English pianos";[138] unlike the 'full', powerful sound of English grand pianos, Stein's pianos had a 'silvery', 'sweet', 'reedy' sound. In 1796, von Schönfeld (1750–1821) noted that "the evenness, clarity, lightness, sweetness, and softness of . . . [Stein's pianos] are unmatched."[139] As can be seen in Figure 3, Stein's action has no intermediate lever between the key lever and the hammer. This results in a light and responsive action—Stein's pianos were renowned for their light and responsive touch.

Figure 3. Elevation of 'Viennese' action of a grand piano by Johann Andreas Stein, dated 1783. *Source:* John Koster, *Keyboard Musical Instruments in the Museum of Fine Arts, Boston* (Boston: Museum of Fine Arts, 1994), 138.

[137] See fn. 51.
[138] Lancaster, *Culliford, Rolfe and Barrow*, 722, fn. 14.
[139] von Schönfeld, *Jahrbuch*, 90.

Anton Walter

Although Walter lived in Vienna from 1776, he first appeared there as an independent piano maker in 1780. By the 1790s, Walter had the largest piano-making workshop in Vienna with up to twenty men producing approximately one piano every ten days.[140]

Walter's pianos are modelled on Stein's instruments. Walter modified Stein's action design in order to make grand pianos that had a more focussed sound than Stein's (Figure 4).

Figure 4. Elevation of 'Viennese' action of a grand piano by Walter, dated ca. 1795. *Source:* Michael Cole, *The Pianoforte in the Classical Era* (Oxford: Clarendon Press, 1998), 225.

As previously mentioned, von Schönfeld wrote in his *Jahrbuch* of 1796 that Walter's fortepianos have "a full, bell-like tone, a clear response, and a very strong, full bass."[141]

The light and subtle touch of Stein's instruments was also a characteristic of Walter's grand pianos; this enabled the performance of the rapid passagework found in the piano music of late eighteenth-century Viennese composers.

Walter's pianos were praised for their quality by many of Vienna's greatest musicians––W. A. Mozart premiered his mature concerti on his (still extant) Walter fortepiano, and Beethoven owned one at the end of 1799.[142] According to Mozart's second son Karl Thomas (1784–1858):

> . . . most remarkable is the wing-shaped pianoforte [by Anton Walter] for which my father had a special preference to such a degree that he not only wanted to have it in his study all the time, but exclusively used this and no other instrument in all his concerts, regardless of whether they took place in court, in the palaces of noblemen or in theatres or other public places.[143]

[140] See Michael Latcham, "Mozart and the Pianos of Johann Andreas Stein," *The Galpin Society Journal* 51 (1998): 122.
[141] von Schönfeld, *Jahrbuch*, 88.
[142] See Tilman Skowroneck, *Beethoven the Pianist* (Cambridge: CUP, 2010), 75.
[143] Viviana Sofronitsky, "Anton Walter (1752–1826)," in "Copy of Anton Walter fortepiano ca. 1792 built by Paul McNulty," in "Instruments," accessed 16 October 2014, http://www.sofronitzki.com/instruments.html.

England

Dr Charles Burney (1726–1814)—"the English music historian, opinion-maker and persuasive advocate of German music",[144]—discusses the first time that a grand piano arrived in England and how:

> The first piano to arrive in England was brought from Rome by a gentleman named Samuel Crisp, who had spent some time abroad in the 1730s. The instrument was built by an English monk in Rome called Father Wood.[145]

It is likely that the design of this piano was similar to that of Cristofori's instruments.

The English did not take to the piano until the late 1760s; in London, two employees in the workshop of the renowned harpsichord maker Burkat Shudi (1702–73)—John Broadwood and Robert Stodart (1748–1831)—

> would leave work together in the afternoon and go to the workshop of [the Dutch keyboard instrument maker] Americus Backers [?–1778] where the three spent countless evenings working on what would eventually be known as the English grand piano.[146]

The English grand piano action was based on Cristofori's design; an important difference between the two was that, in the English instrument, the intermediate lever situated between the key lever and the hammer was re-oriented from Cristofori's horizontal position to a vertical one (Figure 5). This resulted in a more efficient amplification of the movement of the key to the hammer.

[144] Lancaster, *Through the Lens of Esoteric Thought*, 4.
[145] Charles Burney, *The Memoirs of Dr. Charles Burney*, ed. Slava Klima (Lincoln, NE: University of Nebraska Press, 1988), 73.
[146] Brownell, "The English Piano in the Classical Period," 25.

Figure 5. Elevation of 'English' grand piano action. *Source:* John Koster, *Keyboard Musical Instruments in the Museum of Fine Arts, Boston* (Boston: Museum of Fine Arts, 1994), 172.

Underlying principles of late eighteenth-century grand piano design

The development of grand piano design during the late eighteenth century involved changes in the concept of and/or an interaction between design elements. This study identifies three of these elements:

1. Scaling
2. Striking points
3. Dampers

Scaling

String scaling is the measurement of string length, string diameter and the copper-to-core wire ratio in overspun open-covered bass strings.[147] Scaling is responsible, in large measure, for the outline shape of the piano's soundboard, bridge and case.

Different wire diameters emit a different series of overtones. String scaling involves knowledge of the sonic effect of changes in string diameter, how many strings there are for each note, and the length of each string. Bass register string design involves knowledge of the proportion of helical copper covering to core wire in an open-covered string[148]—open-covered

[147] An 'overspun open covered' string is one in which "adjacent loops [of a] thin wire helical covering (commonly brass or copper) [are] wound around the straight core (usually brass or iron)"; with open-covered strings the loops "do not touch each other". Lancaster, *Culliford, Rolfe and Barrow*, 708.
[148] Palmieri, *Keyboard Instruments*, 339.

strings are only used in the bass register and may have different diameters; consequently, a different series of overtones.

Striking points

The striking point in a piano is the direct point of contact between the hammer head and the string. The striking point influences the perceived balance between the 'fundamental' and 'overtones' of a pitch.[149] In English grand pianos, the striking point is very close to the end of the string near the nut. This enhances the higher overtones, rendering the sound both 'complex' and powerful.[150]

Dampers

In pianos, the damper is a

> discrete mechanical part in the action whose function is to quell the vibration of the strings when the finger releases the key. . . . The agent used to quell the vibrations is generally [woven cloth,] a soft pad of cloth or [soft] leather. Felt dampers as seen on modern pianos are a mid-[19th] century invention.[151]

Underlying principles of grand piano design in England

In the 'English' grand piano action (Figure 5) the hammer is not connected to the key lever; the hammer butt is hinged to a rail, and the hammer pivots freely. Furthermore, "the hammerhead points to the back of the instrument"[152]—away from the player.

Because the hammer is not connected to the key lever, an intermediate lever—'jack' or 'hopper'[153]—amplifies the movement of the key to the hammer. The intermediate lever is oriented vertically and is attached to the key lever.

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[149] A given pitch comprises many frequencies; the fundamental of a pitch is the lowest of these frequencies, whilst overtones are the frequencies above the fundamental.
[150] In grand pianos, the nut is the "long, narrow . . . bar of hardwood attached to the wrestplank" that supports the strings at the end opposite to the sound board bridge". Clinkscale, *Makers 1700–1820*, 400. See also Lancaster, *Culliford, Rolfe and Barrow*, 382. "Its purpose is to define one end of the speaking length of the string". Clinkscale, *Makers 1700–1820*, 400. The wrestplank is "the heavy hardwood block that holds the wrest pins (tuning pins)". Lancaster, *Culliford, Rolfe and Barrow*, 714. A wrest pin is "the upright iron pin (about 4 mm to 6 mm in diameter; sometimes called "tuning pin") held by the wrest-plank around which a string is wound. The head of the pin is shaped so that it can be gripped by a special wrench, the tuning hammer . . . by which the pin can be rotated to change the tension and therefore the sounding pitch of the string". Lancaster, *Culliford, Rolfe and Barrow*, 714.
[151] Cole, *The Pianoforte in the Classical Era*, 378–9.
[152] Cole, *The Pianoforte in the Classical Era*, 359.
[153] See fn. 51.

When the key is depressed, the distal end of the key lever rises. The vertically-oriented intermediate lever rises with the key lever, transferring its movement to the hammer butt—the point at which the intermediate lever pushes the hammer butt upwards is close to where the hammer pivots freely on its hinge in the hammer rail. The intermediate lever 'escapes' from under the hammer butt both when the hammer shank reaches a certain angle in relation to the string, and when the intermediate lever reaches a certain height. A check catches the hammer after it bounces back from striking the string.

In pianos, the part of the damper that contains the damping agent is referred to as the 'damper compartment'.[154] In English grand pianos, the damper compartment is a light wooden clamp; the clamp holds the damper itself—three or four strips of woven cloth, the edges of which rest on the strings a little like an open book (Plate 1). Throughout the compass, all the damper cloths are the same size.

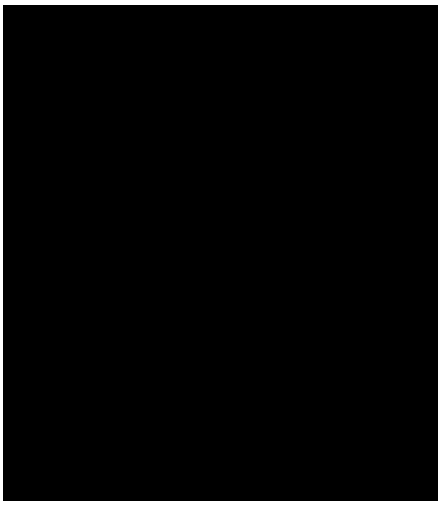

Plate 1. English grand piano damper compartment for c^3, from an instrument by Clementi & Co. (London, ca. 1806–10, serial number 526) (detail).[155]

This "intentionally inefficient damping system" enhances the piano's sonic character with

> a background 'haze' of overtones . . . which [influence] the perceived 'end' of any given note or chord played with the dampers lowered. In late eighteenth and early nineteenth-century England, this background glow of sound . . . was regarded as the equivalent of resonance, and was greatly desired. . . .
>
> English piano makers were capable of incorporating an efficient damping system into their instruments. . . . That they did not leads

[154] Lancaster, *Culliford, Rolfe and Barrow*, 702.
[155] Lancaster, *First Fleet Piano*, 323, Plate 419. Reproduced with permission.

> one to conclude that the typically 'resonant' sound of English pianos had its basis in aesthetic and musical considerations.[156]

As previously mentioned, English grand piano dampers, unlike the dampers in Viennese grand pianos, are the same size across the compass. This means that the damping of a vibrating string in the bass—with its wide amplitude of vibration—is inefficiently damped by a damper whose efficiency is only marginally greater when damping a vibrating string in the treble—with its narrower amplitude of vibration. Dampers in late-eighteenth century English pianos were commonly operated by a foot pedal.

The design features of the English piano result in the instrument's following sonic characteristics:

1. A relatively long attenuation of sound
2. An equality of tonal prominence between the treble and bass registers
3. A smooth timbral transition between all registers
4. A background 'haze' of overtones

Underlying principles of grand piano design in Vienna

In the 'Viennese' action (Figure 4 above) the hammer pivots in a fork (*kapsel*) which is attached to the end of the key lever—the hammer is pivoted at about nine-tenths of its length, with the hammerhead pointing towards the player—the opposite of the English action.

When the key is depressed, the distal end of the key lever rises. As the lever rises, so too does the fork; the rising movement causes the back end of the hammer shank—the 'beak', a small horizontal slip of leather—to catch under an overhanging rim. This rim is held in place by a spring. Because the beak is prevented from further upward movement by the overhanging rim, the forked pivot in which the hammer sits acts as a hinge, and the hammerhead is thrown upwards. The hammer 'escapes' from the overhanging rim when the rim moves backwards away from the player before the hammer head strikes the string. (This means that the player controls the speed of the hammer for virtually all the hammer's arc of travel toward the string; only the final two millimetres of the hammer's travel is the result of inertia. As a result, the player has control over extremely subtle gradations of dynamic.) In some Viennese actions, the hammer is caught by a check after it falls back to its rest position after striking the string; these instruments may be played more forcefully without fear of the hammer bouncing and unwantedly restriking the string.

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[156] Lancaster, *Culliford, Rolfe and Barrow*, 16.

The Viennese damping system was extremely effective. In the bass register, comparatively heavy wooden blocks to which leather covered wedges were glued, fall between the strings; in the treble, a flat felt pad dampens the two or three strings of each unison (Figure 6).

Figure 6. Damper types. (a) English damper, shown sideways; (b) Viennese bass damper, as seen by the player; (c) Viennese treble damper, as seen by the player. *Source:* Bart van Oort, "The English Classical Piano Style and its Influence on Haydn and Beethoven" (DMA diss., Cornell University, 1993), 29.

Dampers in late-eighteenth century Viennese pianos were operated by a knee lever—commonly located centrally under the keyboard.

Viennese pianos were usually triple strung in the high register to compensate for the comparatively weak treble.

The touch on Viennese grand pianos was shallower than in English instruments.

The design features of the Viennese piano result in the following sonic characteristics:

1. A relatively short attenuation of sound
2. A strong bass and a weaker treble
3. A clear, bright timbre
4. A wide range of nuanced dynamics
5. Precise control of the 'end' of a sound

As previously stated, composers such as Joseph Haydn, W. A. Mozart, Beethoven and Schubert were familiar with this type of action.[157]

[157] Lin, "The Impact of the Development of the Fortepiano," 41.

Broadwood's pianos and English piano music

John Broadwood

In 1761, the Scotsman John Broadwood began employment as a journeyman[158] in London at the workshop of the renowned Swiss-born harpsichord maker Burkat Shudi.

> For several years [Broadwood] was the foreman responsible for the most important tasks, such as making new soundboards and installing them into harpsichords.[159]

In 1769, Broadwood married Shudi's daughter, Barbara (1749–1812). Two years later, in 1771, the sixty-nine year old Shudi signed his entire business, including his house, over to Broadwood.[160]

John Broadwood did not make pianos before 1778;[161] this is surprising, because—as Cole shows—eleven eminent craftsmen had established themselves in London as successful makers of the popular 'square piano'[162] before 1775.[163]

> The earliest [square] pianos made in . . . [Broadwood's workshop] are inscribed as by *Burkat Shudi et Johannes Broadwood*, but from 1782 onwards the Shudi name was dropped, and thereafter the inscriptions show the name of Broadwood alone.[164]

Broadwood began making grand pianos in 1784; these instruments had:

1. a five-octave keyboard compass
2. an English grand piano action (Figure 5)
3. triple stringing across the entire compass
4. two pedals: one engaging all the dampers, and one engaging the *una corda*[165]

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[158] A journeyman is an individual who has successfully completed an apprenticeship and who may, therefore, work for any master of their choice. Traditionally, journeymen travelled "from city to city, working with various masters in order to perfect [themselves] in [their] trade". Frank Hubbard, *Three Centuries of Harpsichord Making*, 9th edn (Cambridge, MA: Harvard University Press, 1992), 194.
[159] Cole, *Broadwood Square Pianos*, 7.
[160] See Cole, *Broadwood Square Pianos*, 11.
[161] See Cole, *Broadwood Square Pianos*, 25.
[162] For a definition of the square piano, see Appendix B.
[163] See Cole, *Broadwood Square Pianos*, 37.
[164] Cole, *Broadwood Square Pianos*, 15.
[165] "The *una corda* [is a mechanism that] laterally realigns the keyboard—and therefore the action—causing the hammers to strike only one or two of each note's three strings". Geoffrey Lancaster, *Fortepiano: Paul McNulty (Divisov, Czech Republic, 2019, Serial number 246) after Conrad Graf op. 318 (Vienna ca 1819)* (unpublished manuscript, 2020), n. pag.

Broadwood's grand piano design

The first grand pianos made by Broadwood had a five-octave compass—FF to f^3. This was extended upwards to five-and-a-half octaves in 1791 "to please Dussek"[166]—who thought that the addition of a half octave to the treble "would add dramatic sparkle".[167] Broadwood's first six-octave grand piano—CC to c^4—was made in ca. 1794.[168]

Broadwood's grand pianos reveal design innovation; for example, although the hammer heads are traditionally made of thin flat blades of wood (Figure 5), they are covered with several layers of leather; sheep or goatskin for the inner layers, and a soft outer layer of oil-tanned deerskin. This hammer head covering provided a much wider dynamic range than had been available previously. Moreover, the larger mass of the hammer head produced a sound with more fundamental,[169] and the several layers of leather hammer head covering ensured that the sound did not become shrill with forceful playing.[170]

Broadwood's grand piano scaling[171]

The scaling of Broadwood's grand pianos has ramifications for their sound.

In about 1788, at the instigation of Clementi, John Broadwood sought advice from the Royal Society[172] concerning ways to improve grand piano tone. As a result, Broadwood modified the design of the bridge; his design modification was a response to the effect of scaling on the sound of iron and brass strings.

Traditionally, in harpsichords, strings were iron until the lowest fifteen or sixteen notes, which were brass—if iron had been used for bass strings, an unpleasant series of overtones would have marred their tonal quality; brass bass strings sound better.

Furthermore, the tone of brass bass strings was better when scaling required that they be shortened; the theoretically-correct scaling of the iron strings cannot be maintained in the bass—given that the length of a string doubles to create the octave below, if this is continued throughout the entire compass, FF would need a sounding length of 3200 mm and the instrument would need to be over three-and-a-half metres long.

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[166] Cole, *The Pianoforte in the Classical Period*, 134.
[167] Wainwright, *Broadwood by Appointment*, 75.
[168] Wainwright, *Broadwood by Appointment*, 74–5.
[169] See fn. 149.
[170] See Clarke, "The English Piano," 251.
[171] This section is based on Cole, *The Pianoforte in the Classical Period*, 135–6, and Laurence, "The Evolution of the Broadwood Grand Piano," 29–32, 34–5, 128–32.
[172] See "Broadwood Pianos: Then and Now," The Piano Shop Bath, accessed September 14, 2020, https://www.thepianoshopbath.co.uk/bath/broadwood-pianos-then-and-now/.

Instead of the traditional continuous bridge, Broadwood created two bridges (Figure 7).[173] The iron strings of the treble register were positioned to over the longer of the two bridges; the brass bass strings were positioned over the shorter second bridge. This improved tone quality in the tenor register—that is, in the octave below c.

Figure 7. Broadwood's divided bridge. *Source:* Michael Cole, *The Pianoforte in the Classical Era* (Oxford: Clarendon Press, 1998), 137.

Brass and iron strings, respectively, produce the best sound when each has different scaling—iron (treble) strings double in length to create the octave below, as physics demands, whilst the optimum scaling for brass (bass) strings is approximately fifteen per cent shorter than for iron; this shortening is compensated for by increasing the diameter of the strings (thereby increasing their mass).[174]

In grand pianos with a continuous bridge, the change from iron to brass traditionally takes place at A (iron) downwards to G# (brass).

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[173] Broadwood's two bridges are commonly referred to either as a 'divided bridge' or a 'split bridge'. For the purposes of this study, the term 'divided bridge' will be used.
[174] A string's diameter is commonly termed 'string gauge'.

With a continuous bridge, in order to obtain the best sound from iron strings when they are in tune, the strings must be at approximately 80% of their breaking tension. On the other hand, if brass strings with the same length and gauge as iron strings are tensioned at more than 70% of their breaking tension, they will snap—iron strings have a higher breaking point than brass.

At the transition point between iron and brass—A (iron) downwards to G# (brass)—the lowest iron string has to be under-tensioned—producing a deficient sound—and the highest brass string has to be tensioned dangerously near to its breaking point. Inevitably—with a continuous bridge—the change from iron to brass is audible; the iron string sounds dull, whilst the brass is markedly prominent.

Broadwood's solution to this problem was to divide the continuous bridge into two bridges (Figure 7 above). With a divided bridge, the highest brass (bass) strings are shorter than the adjacent iron (treble and tenor registers) strings. Although the tension on the strings G# (brass) and A (iron) is still unequal—as with a continuous bridge—with a divided bridge the difference between these string tensions is not nearly as extreme; the brass strings are not under so much tension and are therefore not inclined to snap. This has two positive results: firstly, there is a barely noticeable timbral transition from iron strings downward to brass; and secondly, it produces a richer, more sonorous-sounding tenor register.[175]

Moreover, Broadwood's divided bridge scaling was linked with a "considered scheme of gauge changes through the compass";[176] the associated string tensions enabled a full, 'even' sound to be produced across the entire compass.

Broadwood also changed the design of the bridge itself. Traditionally, the bridge's cross-section was triangular, with the apex flattened. In Broadwood's grand pianos, the cross-section of the bridge is square; the

> flat upper surface [is] . . . scalloped with alternating rebates in a zig-zag pattern so that . . . equalizing the string lengths could be . . . continued . . . down to the lowest note on the keyboard. . . . The aim . . . was to produce a smoother tone and better tuning stability, by ensuring that each of the three unison strings was at the same tension. . . . This scheme . . . may [be seen] . . . today by lifting the lid of any modern piano.[177]

[175] See Cole, *The Pianoforte in the Classical Era*, 137.
[176] See Cole, *The Pianoforte in the Classical Era*, 139.
[177] Cole, *The Pianoforte in the Classical Era*, 135–6.

Broadwood's grand piano striking points

The striking point[178] influences the prominence of the fundamental and overtones.[179] Broadwood experimented with the striking points. Cole observes:

> Measurements taken from Broadwood's grand pianos from 1787 to 1805 show considerable variation in the [striking point] ratio. . . . Broadwood changed his . . . [striking point] from those adopted by [other makers, such as] Backers and Stodart. . . . [A] move away from the nearer [striking point] . . . of earlier makers appears to be an intentional design change.[180]

Cole provides the following data (Table 1):

Table 1. Striking points as a ratio of the sounding length of strings on selected English grands. *Source:* Michael Cole, *The Pianoforte in the Classical Era* (Oxford: Clarendon Press, 1998), 138.

Broadwood's nearer-to-the-nut striking points—the smaller numbers—are an obvious and intentional design feature. Broadwood's striking points ensure that the upper overtones are prominent; consequently, the sound of Broadwood's grand pianos was more full, complex and "round"[181] in every register than that of the grand pianos of contemporaneous makers.

[178] See fn. 7.
[179] See fn. 149.
[180] Cole, *The Pianoforte in the Classical Era*, 138.
[181] Rowland, quoting Kalkbrenner, in *A History of Pianoforte Pedalling*, 34.

Broadwood's grand piano dampers

The purposely inefficient dampers in English grand pianos[182] were an integral part of Broadwood's instruments and their sonic character; for example, following the attack of a loud *staccato* chord in the bass, and after the dampers have fallen onto the strings, the dampers of a restored Broadwood grand piano of 1796—serial number 875[183]—allow the strings to resonate for approximately seven seconds as the sound dies away. Moreover, the degree of damping inefficiency in Broadwood's grand pianos increased during the first half of the nineteenth century; Bart van Oort observes:

> Richard Burnett . . . describes a restored 1823 Broadwood grand in which the tone takes eight seconds to die out after a staccato chord in the bass, and a 'massive concert grand' of 1848 by Broadwood, in which it takes ten seconds.[184]

The inefficient damping in Broadwood's grand pianos aided in the creation of a sense of overall resonance.

The sound of Broadwood grand pianos

In summary, the scaling, striking points and dampers in Broadwood's grand pianos combined to produce a resonant, full, complex, "round"[185] sound, equal tonal strength in all registers—notably, a treble that matched the bass—and a smooth timbral transition throughout the compass. These sonic qualities set Broadwood's grand pianos apart from those of his contemporaries.

Composition – Analysis

In 1851, the German musicologist and critic Franz Brendel (1811–68) remarked:

> Of great influence in . . . composition was the difference in instruments which both schools used, the variance between the Viennese and the English instruments.[186]

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[182] See Plate 1.
[183] This instrument is part of the Geoffrey Lancaster collection, Perth, WA. I am grateful to Geoffrey Lancaster for this information.
[184] van Oort, "The English Classical Piano Style," 30, fn. 75.
[185] Rowland, quoting Kalkbrenner, in *A History of Pianoforte Pedalling*, 34.
[186] Helmut Perl, *Rhythmische Phrasierung in der Musik des 18. Jahrhunderts. Ein Beitrag zur Aufführungspraxis* [Rhythmic Phrasing in Eighteenth Century Music. A Contribution to Performance Practice] (Wilhelmshaven: Heinrichshofen's Verlag, 1984), 55.

Brendel's comment clearly indicates that both in London and Vienna, composers responded distinctively to the sonic differences between pianos designed and made in those cities.

An examination of the compositional response—in relation to register, texture and articulative variety—by four selected composers—two based in London, and two in Vienna—follows. The selected composers are:

1. Muzio Clementi
2. Jan Ladislav Dussek
3. Joseph Haydn
4. Wolfgang Amadeus Mozart

The works selected to illustrate the compositional response of the four composers are representative of the style of writing that emerged as a result of the sonic qualities of pianos designed, made and played in (respectively) London and Vienna.

Clementi: Capriccio in A major Op. 34, no. 1 (1795)

Clementi was born in Rome in 1752. In 1774 he relocated to England as a pianist, composer, conductor and pedagogue.

He composed a large quantity of piano music in England, and for most of his life performed on English grand pianos. His solo piano music exploits the sonic qualities of the English piano through compositional elements such as register, texture and articulative variety; these compositional elements are exemplified in his Capriccio in A major Op. 34, no. 1 (1795).

Register

Clementi often exploits the English piano's extremes of register using wide-ranging passagework and arpeggiation (Figure 8, bars 5–6, 9–12 and 13). Performatively, this figuration reveals the equal timbral 'fullness' inherent in the bass and treble of the English grand piano. An equivalent compositional device is rarely found in Viennese piano music.

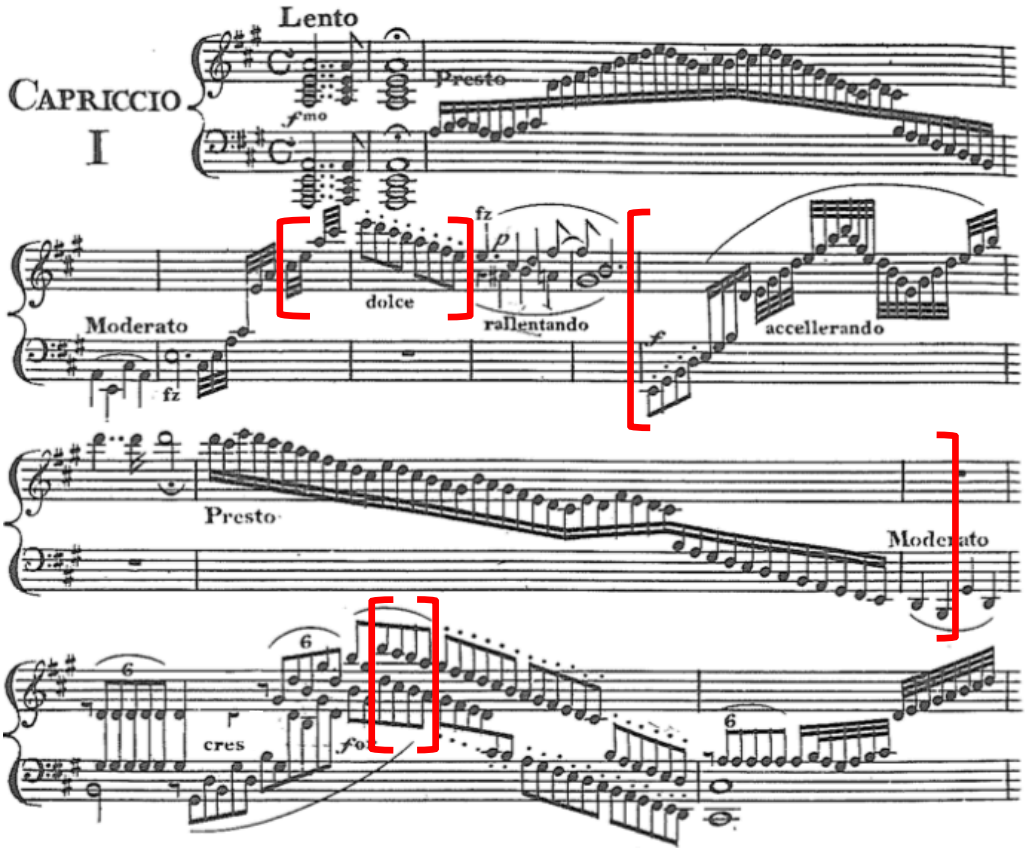

Figure 8. Muzio Clementi (1752–1832), Capriccio in A major Op. 34, no. 1 (1795), bars 1–14. *Source:* Nicholas Temperley (ed.), *The London Pianoforte School 1766–1860*, 20 vols (New York, NY: Garland Publishing Inc., 1984), 3:204–9.

Texture

Clementi explores the resonant, full, "round"[187] sound of English grand pianos using broken chords in rapid semiquaver groups (Figure 9).

[187] Rowland, quoting Kalkbrenner, in *A History of Pianoforte Pedalling*, 34.

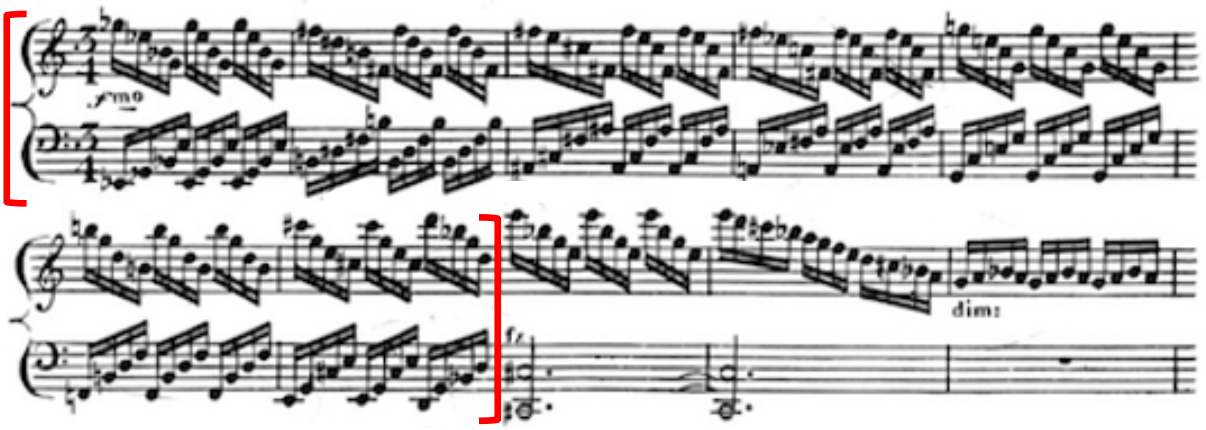

Figure 9. Muzio Clementi (1752–1832), Capriccio in A major Op. 34, no. 1 (1795), bars 120–30. *Source:* Nicholas Temperley (ed.), *The London Pianoforte School,* 3: 204–9.

If played without all dampers being raised, the resonant effect produced by the inefficient dampers on English pianos creates a 'glowing', overtone-rich 'halo' of sound. On the other hand, and to further the effect, relevant historically informed performance practice dictates that all dampers may be raised when the harmony does not change[188]—a performative option for bars 1–8 and 9–13. The semiquaver figuration creates the effect of thick chords arpeggiated inwards, and with dampers continuously raised, the resultant musical effect leads the listener to believe—as the piano maker Nannette Streicher states: "that we hear an organ, the fullness of an entire orchestra".[189]

The thick texture of the eight-note chords in Figure 10 are typical of the "grand" style[190] of English piano music, catalysed by the resonant, full and even sound inherent in all registers of English pianos.

[188] See Sandra Rosenblum, *Performance Practices in Classic Piano Music: Their Principles and Applications* (Bloomington, IN: Indiana University Press, 1991), 110.
[189] Rowland, *A History of Pianoforte Pedalling*, 31.
[190] See van Oort, "The English Classical Piano Style," 3.

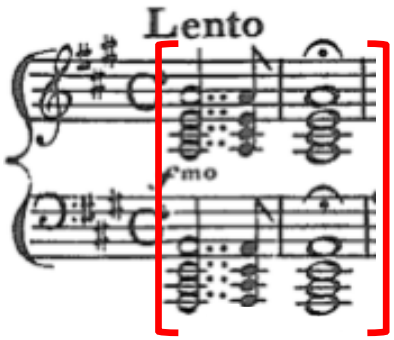

Figure 10. Muzio Clementi (1752–1832), Capriccio in A major Op. 34, no. 1 (1795), bars 1–2. *Source:* Nicholas Temperley (ed.), *The London Pianoforte School,* 3:204–9.

Articulative Variety

In his piano treatise *Introduction to the Art of Playing on the Piano Forte* (1801), Clementi states:

> The best general rule, is to keep down the keys of the instrument, the full length of every note . . . legato . . . must be played in a smooth and close manner; which is done by keeping down the first key, 'till the next is struck; by which means, the strings vibrate sweetly into one another.
>
> N. B. When the composer leaves the legato, and staccato to the performer's taste; the best rule is, to adhere chiefly to the legato reserving the staccato the give spirit occasionally to certain passages, and to set off the higher beauties of the legato.[191]

Clementi's comment concerning the ideal piano performance style is revealing; "To imitate with the sound of the piano, the legato style and grandness of the orchestra".[192] Clementi's comments point to *legato* as being the performative norm for piano repertoire.[193] In London, clear articulation on an English piano was thwarted by the instrument's purposely inefficient dampers.

> The legato touch, thicker and richer tone, longer tone life, and incomplete damping enriched the singing powers of the instrument and inspired composers to write long cantabile melodies. Furthermore, the incomplete damping necessitated extra care in the notation of short or cut-off notes.[194]

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[191] Muzio Clementi, *Introduction to the Art of Playing on the Piano Forte. Containing the Elements of Music, Preliminary Notions on Fingering, and Fifty Fingered Lessons* (London: Clementi, Banger, Hyde, Collard & Davis, 1801), facsimile edn (New York: Da Capo Press, 1974), 8–9.
[192] Clementi, *Introduction to the Art of Playing on the Piano Forte*, x, fn. 28. Clementi's remark is revealing in relation to orchestral performance practice in late eighteenth-century London.
[193] Van Oort observes that *legato* is "not as dominant in [Clementi's] early sonatas as in his later works". van Oort, "The English Classical Piano Style," 80.
[194] van Oort, "The English Classical Piano Style," 61–2.

Figure 11 shows the care that Clementi has taken to indicate shortened sounds with *staccato* dots. The resultant non-*legato* scalic passage is a deviation from Clementi's *legato* norm.

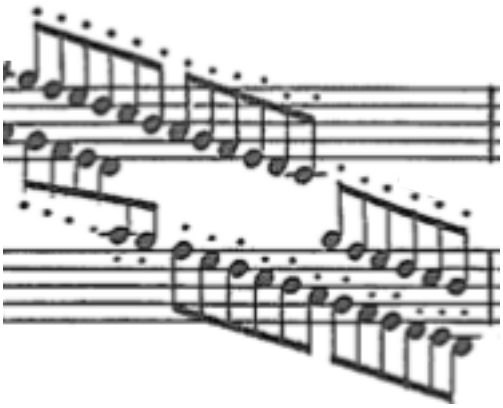

Figure 11. Muzio Clementi (1752–1832), Capriccio in A major Op. 34, no. 1 (1795), bar 13. *Source:* Nicholas Temperley (ed.), *The London Pianoforte School,* 3:204–9.

Because of the English piano's inefficient damping, the cascading passage 'rings' with overtones rather than sounding as a progression of clear, 'short', 'sharp' notes; the resonant 'haze' of the English piano triumphs over the sounding of shortened notes.

Figure 12 shows an example of slurs that shape the long *legato* phrases typically encountered in late eighteenth-century English piano music. The elision of the slur in bar 33 above the G-clef staff "preserves a continuous legato while indicating the structural [grouping] and the necessity of expressive nuance in playing the pivotal note [b^1]"[195]—the elided slur causes b^1 to sound as an upbeat within the melodic phrase.

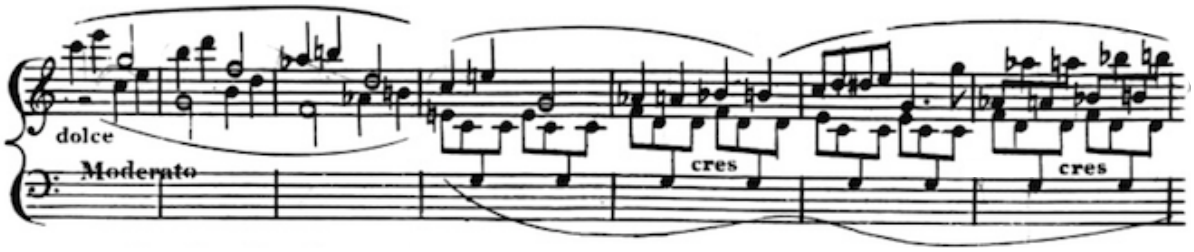

Figure 12. Muzio Clementi (1752–1832), Capriccio in A major Op. 34, no. 1 (1795), bars 29–35. *Source:* Nicholas Temperley (ed.), *The London Pianoforte School,* 3:204–9.

Clementi's exploitation of register, texture and articulative variety in his Capriccio in A major Op. 34, no. 1 is not rare within his compositional output. Rather, it is typical not only

[195] Rosenblum, *Performance Practices in Classic Piano Music*, 166.

of his compositional response to the English pianos that he encountered in London, but also of the late eighteenth-century English compositional aesthetic.

Dussek: Fantasia in F minor Op. 50 (1804)

Dussek was born in 1760 into a musical family[196] in Caslav, Bohemia. Gostelow notes:

> [Dussek] performed extensively across the north of Europe between 1780 and 1786, being well known and highly regarded in most main centres [of musical activity] from St Petersburg to Paris.[197]

In 1786, Dussek began a three-year sojourn in Paris, where he was the favourite pianist of Marie Antoinette (1755–93). With the start of the French Revolution in 1789, Dussek fled to London. From this time onwards, he played English pianos exclusively, performing alongside luminaries such as Clementi, Cramer, Adalbert Gyrowetz (1763–1850), Joseph Haydn and Ignaz Pleyel (1757–1831) among others.[198] Dussek was particularly fond of Broadwood's grand pianos; in 1791, when Joseph Haydn was in London, Dussek lent his Broadwood grand piano to the composer.[199]

In 1799, Dussek fled from London to escape debtor's prison. After arriving in Hamburg in 1800, he performed often, and was an agent for the London piano-making firm of Longman and Clementi.

Between 1807–12, Dussek lived in Paris, working for Prince Charles-Maurice de Talleyrand-Perigord (1754–1838). Gostelow reports that Dussek's

> salary was "more than adequate, his situation congenial, and his duties very modest. His concert appearances drew great acclaim, and he published extensively. . . . Dussek became increasingly corpulent, inactive and ill in his last few years, and died of gout in 1812.[200]

Register

Dussek's Fantasia in F minor Op. 50 was initially published as the first movement of his Fantasia and Fugue Op. 55 (1804). It is reasonable to propose that following the work's release, a desire for profit motivated Dussek's publisher to re-issue the Fantasia and Fugue as two

[196] Dussek's grandmother, father, mother, uncle, brother and sister were musicians.
[197] Gostelow, "Indications for the Use of the Moderator," 33.
[198] See Gostelow, "Indications for the Use of the Moderator," 35.
[199] David Wainwright, "John Broadwood, the Harpsichord and the Piano," *The Musical Times* 123:1676 (1982): 677. See also Caryl Clark, ed., *The Cambridge Companion to Haydn* (Cambridge: CUP, 2005), 285, fn. 4.
[200] Gostelow, "Indications for the Use of the Moderator," 36, 37.

separate works—respectively, as Op. 50 and Op. 55. For the purposes of this study, the Fantasia will be identified as Op. 50.

Like Clementi, Dussek utilises the English piano's extremes of register. This is seen in Figure 13, where arpeggiated figuration extends in a broad sweep from the bottom to the top note of the English five-octave grand piano. Doubtless, the dampers were raised throughout this arpeggio. An equivalent expansive musical gesture cannot be found in late eighteenth-century Viennese piano repertoire.

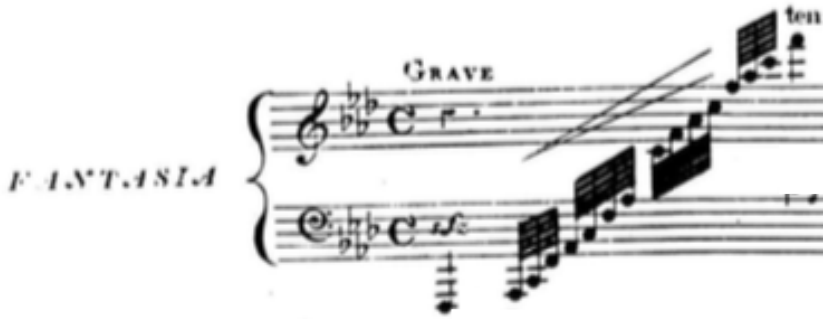

Figure 13. Jan Ladislav Dussek (1760–1812), Fantasia in F minor Op. 50 (1804), bar 1. *Source:* Nicholas Temperley (ed.), *The London Pianoforte School 1766–1860*, 20 vols (New York, NY: Garland Publishing Inc., 1984), 6:233.

Figure 14 shows a melodic line positioned in the extreme low register—it includes the bottom four notes of the piano (FF, GG, AA, BB). Such an astonishing use of the extreme bass register is rarely encountered in late eighteenth-century Viennese piano music and exploits—even within a *pianissimo* dynamic—the resonant, full sound of the English grand piano.

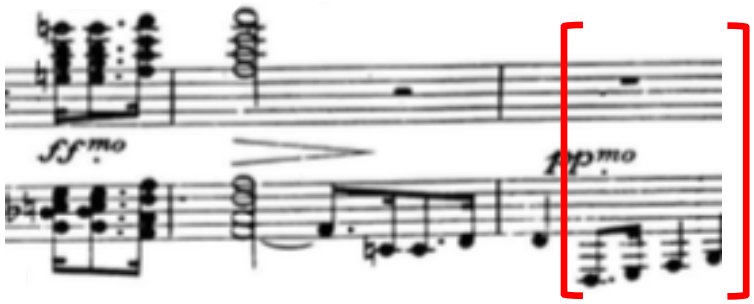

Figure 14. Jan Ladislav Dussek (1760–1812), Fantasia in F minor Op. 50 (1804) (1804), bars 15–17. *Source:* Nicholas Temperley (ed.), *The London Pianoforte School*, 6:233.

The melodic top note of the thick chords that precede the bass register single-note material comprise the top two notes of the contemporaneous five-octave piano—e^3 and f^3. The contrast

between the extreme treble and extreme bass registers creates a "sense of orchestral colour and depth"[201] as well as the sonorous quality that characterised the English compositional aesthetic.

Texture

For Dussek, "the use of the [damper raising] pedal [was] a basic [performative] attitude".[202] The raising of the dampers to create thick texture and a sense of 'orchestral' grandeur is implied in Figure 15.

In the right hand, a sequence of broken chords is immediately followed by figuration comprising virtuosic alternating parallel thirds and sixths; this material appears under an expansive two-bar slur. When the dampers are raised for the duration of the slur—here implied[203]—a massive sonic texture is created; one which exploits the characteristic resonance and fullness of the English piano's sound.

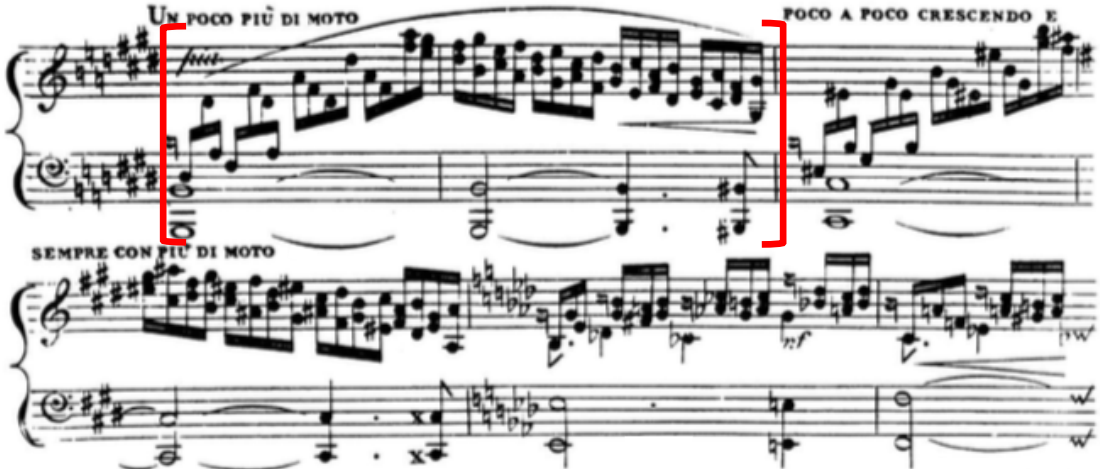

Figure 15. Jan Ladislav Dussek (1760–1812), Fantasia in F minor Op. 50 (1804), bars 18–23. *Source:* Nicholas Temperley (ed.), *The London Pianoforte School*, 6:234.

Figure 16 reveals thick and sonically massive chordal and arpeggiated textures; these exploit the fullness, resonance and the long after-ring arising from purposely inefficient dampers of the English grand piano. Apart from aesthetic considerations, Dussek—the pianist/composer—may have written these chords and arpeggiated figures because, as van Oort observes:

> English instruments had a heavier feel to the touch and a deeper key dip. . . . It made them more resistant against larger . . . chords,

[201] van Oort, "The English Classical Piano Style," 111.
[202] van Oort, "The English Classical Piano Style," 96.
[203] The slur also functions as 'short hand' notation and should be understood as applying to the similar two-bar material that immediately and sequentially follows.

> in which the pianist had to make more use of the weight of the arm versus mostly finger play.[204]

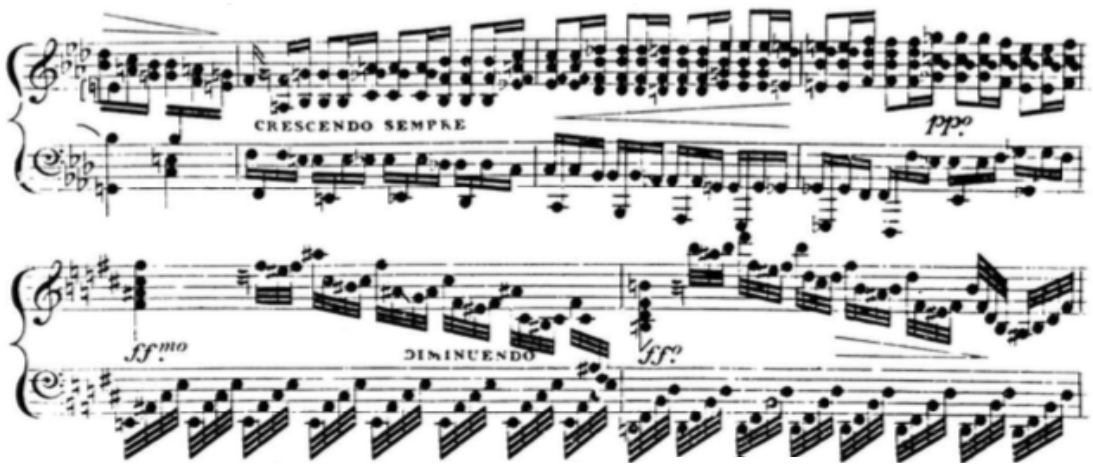

Figure 16. Jan Ladislav Dussek (1760–1812), Fantasia in F minor Op. 50 (1804), bars 42–7. *Source:* Nicholas Temperley (ed.), *The London Pianoforte* School, 6:235.

Articulative variety

As previously mentioned, the usual touch in English piano playing was *legato*, even in the most technically difficult passagework. Dussek reinforces this norm with an extended slur that indicates *legato* for a phrase comprising technically difficult broken chords and alternating parallel thirds and sixths (Figure 17); this figuration would be more easily navigated by including shortened notes—for example by slurring the parallel thirds and sixths in pairs. The level of virtuosity required to play the material under Dussek's *legato*-indicating slur is astonishing.

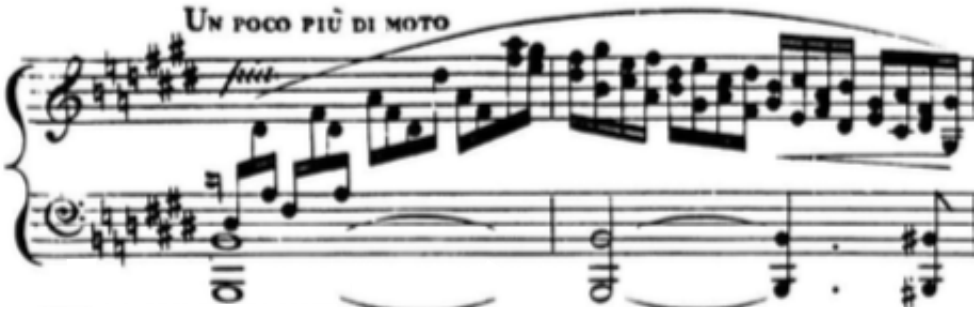

Figure 17. Jan Ladislav Dussek (1760–1812), Fantasia in F minor Op. 50 (1804), bars 18–19. *Source:* Nicholas Temperley (ed.), *The London Pianoforte School*, 234.

[204] van Oort, "The English Classical Piano Style," 109–10.

The purposely inefficient dampers of English pianos meant that composers had to notate shortened notes with extra care in order to ensure the degree of articulation that they intended.[205] Figure 18 provides an example of Dussek's notational care.

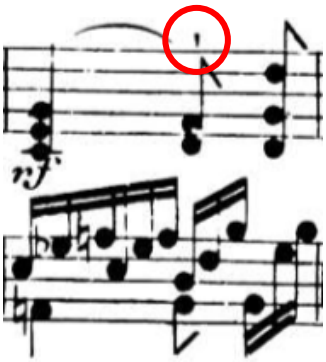

Figure 18. Jan Ladislav Dussek (1760–1812), Fantasia in F minor Op. 50 (1804), bar 56. *Source:* Nicholas Temperley (ed.), *The London Pianoforte School*, 6:236.

The wedge indicates a particular degree of *staccato*; this is discussed in Clementi's *Introduction to the Art of Playing on the Pianoforte*:

> The best general rule, is to keep down the keys of the instrument, the FULL LENGTH of every note; for when the contrary is required, the notes are marked either [with a wedge] . . . denoting . . . SHORTNESS of sound; which is produced by lifting the finger up, as soon as it has struck the key: or they are marked [with a dot] . . . which, when composers are EXACT in their writing, means LESS staccato than . . . [a wedge]; the finger, therefore, is kept down somewhat longer.[206]

The excerpt in Figure 18 above appears within the context of a *piano* dynamic. The notes that have a wedge above them are located in the middle register of the piano; in this register, and even when played *piano*, the inefficient dampers of the English grand piano do not create an extremely short sound. Aurally, they create a *staccato* rather than a *staccatissimo*. Dussek would have been aware of this fact, and has notated a wedge in order to achieve the degree of note shortening that he intends should be heard.

Like Clementi, Dussek's exploitation of register, texture and articulative variety in his Fantasia in F minor Op. 50 is typical not only of his compositional response to English pianos, but also of the late eighteenth-century English compositional aesthetic.

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[205] See van Oort, "The English Classical Piano Style," 86. Performatively, "to achieve real staccato . . . almost requires staccatissimo on the English piano". van Oort, "The English Classical Piano Style," 87.
[206] Clementi, *Introduction to the Art of Playing on the Piano Forte*, 8.

Summary of English compositional aesthetic

In summary, the English compositional style includes:

1. The exploitation, simultaneous sounding—or near simultaneous sounding—of extreme bass and treble registers.
2. Thick chordal textures.
3. Thick textures arising from arpeggiated and/or broken chords—often played with dampers raised.
4. Passagework in parallel thirds or in sixths—melody as the top voice.
5. Expansive slurred—*legato*—phrases.

Walter's pianos and Viennese piano music

Anton Walter

Anton Walter was born in Neuhausen (east of Stuttgart). In 1780 he established a business in Vienna as an independent piano maker. By the 1790s, Walter had the largest piano-making workshop in Vienna with up to twenty men producing approximately one piano every ten days.[207] Both Joseph Haydn, W. A. Mozart and Beethoven owned Walter grand pianos.

Walter's grand piano design

The first grand pianos made by Walter had a five-octave compass—FF to f^3. In 1791, this was extended upwards to five-and-a-half octaves.

Like Broadwood's grand pianos, the tail of Walter's grand pianos is square ended.

The fork in which the hammer pivots (*kapsel*) is not made of wood, but of brass (see Figure 4 above). The hammer is

> transfixed with a short axle that has pointed ends which clip into dimples impressed in the inner faces of the *Kapsel*.[208]

The pivoting hammer is virtually free of friction, "and so the hammers fall back from the strings very promptly";[209] because of this speed, the hammers are prone to bounce after they have

[207] See Latcham, "Mozart and the Pianos of Johann Andreas Stein," 122.
[208] Cole, *The Pianoforte in the Classical Period*, 223.
[209] Cole, *The Pianoforte in the Classical Period*, 223.

rebounded from the string. To prevent them from bouncing, Walter incorporated a check[210]—comprising a triangular-section wooden bar, covered with leather at the top (see Figure 4 above).

The hammer heads in Walter's grand pianos are "strongly graduated in weight, the hammers for the tenor and bass being notably heavier than [those in the treble]".[211] This creates a slight change in touch weight[212] from the bass (heavier) through to the treble (lighter).

Walter's grand piano scaling and striking points

Unlike Broadwood, Walter's grand piano design reveals that no attempt has been made to equalize the sounding lengths of the strings.[213]

Moreover, unlike Broadwood's grand pianos, the wrestplank[214] in Walter's grands is narrower in the treble than in the bass. As a result, the strike line[215] of the hammers is not at right angles to the spine;[216] rather, it is generally angled in relation to the spine. When the hammers are further away from the nut than the treble hammers,[217] the sound is 'fuller' and richer because there is a more pronounced fundamental in combination with lower overtones. If the hammers are closer to the nut, the sound is brighter—even somewhat 'hard'—because there are more pronounced upper overtones.

Table 2 provides data concerning string lengths, striking points, and striking points as a percentage of string lengths on a Walter grand piano dated ca. 1790;[218] the data shows Walter's attempt to equalise the tone of the extreme treble with that of the combined high bass and bass: the striking point of hammers in the extreme treble (the top octave: f^2–f^3) register and in the combined high bass and bass (the bottom note to the F below middle C: FF–f) registers are generally closer to the nut than the striking point of hammers in the middle (F below middle C to C an octave above middle C: f–c^2) register. This creates the lack of tonal evenness across the compass that is typical of Viennese pianos.

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[210] See fn. 51.
[211] Cole, *The Pianoforte in the Classical Period*, 223.vv
[212] See fn. 64.
[213] Michael Latcham, *Verzeichnis der Europäischen Musikinstrumente im Germanischen Nationalmuseum Nürnberg* [Catalogue of European Musical Instruments in the German National Museum in Nuremberg] (Wilhelmshaven: Heinrichshofen-Bücher, 2016), 7:298–305.
[214] See fn. 150.
[215] The 'strike line' is the line-up of hammer heads between the top and bottom hammer heads.
[216] The 'spine' of a grand piano is "the long, straight case wall". Lancaster, *Culliford, Rolfe and Barrow*, 711.
[217] See fn. 150.
[218] Data concerning string lengths and striking points is taken from Latcham, *Verzeichnis*, 305.

Table 2. Striking points as a percentage of string lengths on a grand piano by Walter, dated ca. 1790.

In order to compensate for the weaker treble, Walter's instruments are triple strung in the treble register from a#^{1} up to the top note f^{3}, and double strung from a^{1} down to the bottom note FF; despite triple stringing, however, the treble remains weaker than the bass.

Walter's grand piano dampers

The dampers in Walter grand pianos were typical of the Viennese piano. Unlike Broadwood's grand piano dampers, Viennese dampers were extremely efficient, and provided the player with absolute control over the length of each note. The dampers were raised by a knee lever.

The sound of Walter's grand pianos

In summary, the scaling and striking points in Walter's grand pianos combined to produce a strong bass register with a weaker treble register, all with a generally clear, bright and focussed sound. The attenuation of the sound was generally on the shorter side, unlike English pianos. Because of the instrument's extremely efficient dampers, the relatively short attenuation of the piano's sound could nevertheless be performatively subjected to a nuanced range of note lengths.

Composition – Analysis

Joseph Haydn: Fantasia in C major (Hob. XVII:4) (1789)

For most musicians, scholars and/or music lovers, the history of Joseph Haydn's life and work does not reside in obscure realms—it has been extensively researched. For this reason, a *precis* of Haydn's life and work is not deemed necessary at this point in the study.

Register

Unlike the English, Viennese composers rarely use the extreme treble and bass registers simultaneously—or near simultaneously; nor do they range, within a musical gesture or phrase, rapidly between the two extremes. Rather, they move musical material into one or the other register, staying there—'localising' it—in order to exploit the register's sonic character.

For example, in Figure 19, Haydn localises the extensive first half of the melody—bars 1–8—and nearly all the musical accompaniment material in the treble half of the piano's compass. The consequent eight bars (bars 9–16) are similarly localised in the treble half of the piano.

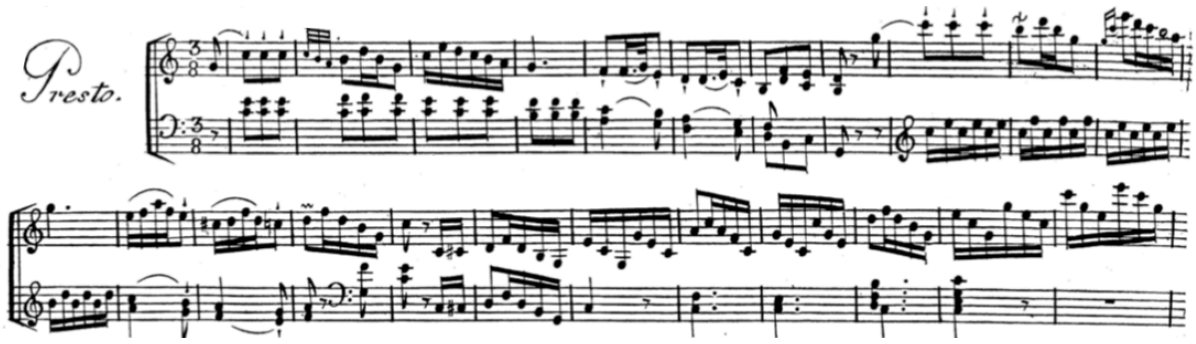

Figure 19. Joseph Haydn (1732–1809), Fantasia in C major (Hob. XVII:4) (1789), bars 1–23. *Source:* "Haydn, Joseph," IMSLP Petrucci Music Library, accessed August 1, 2020, http://imslp.org/wiki/Fantasia_in_C_major,_Hob.XVII:4_(Haydn,_Joseph)

Texture

Haydn's use of texture is vastly different from its use by English composers. Typically, the melodic line in Viennese piano music comprises a single-note-texture. If, for example, a melodic line in the extreme treble register was positioned as the top voice in a series of parallel thirds, sixths or first inversion chords, the weak treble of the Viennese piano would be unable

to give prominence to the melody—the melodic line would be 'drowned out' by the note(s) immediately underneath.

Figure 19 above shows Haydn's single-note-texture melodic line. In bars 9–12, the consequent phrase of the principal theme is transposed into the extreme treble. In order that the melodic line—with its single note texture—not be 'drowned out' by a transposed accompaniment in parallel thirds and fourths—the texture used in bars 1–4, prior to these bars being transposed up an octave—Haydn 'breaks' the accompaniment material into alternating semiquavers. This means that each of the single notes comprising the melodic line are simultaneously accompanied by a single note, not a parallel third or fourth. The same process can be seen in Figure 20.

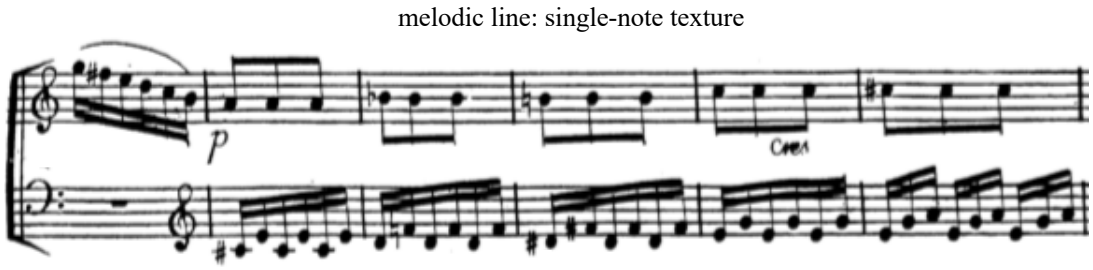

Figure 20. Joseph Haydn (1732–1809), Fantasia in C major (Hob. XVII:4) (1789), bars 61–6. *Source:* "Haydn, Joseph," IMSLP Petrucci Music Library, accessed August 1, 2020, http://imslp.org/wiki/Fantasia_in_C_major,_Hob.XVII:4_(Haydn,_Joseph)

Articulative variety

Unlike the usual touch in English piano playing—that is, *legato*—the usual touch in Viennese piano performance was *non-legato*. Haydn exploits the efficient damping of Viennese grand pianos—and the consequent precise performative control over note length—with notated signs indicating *staccato* (wedge), *staccatissimo* (dot) and small slurs—the note at the end of a slur was performatively to be shortened in value[219] (Figures 21 and 22).

[219] See Rosenblum, *Performance Practices in Classic Piano Music*, 159.

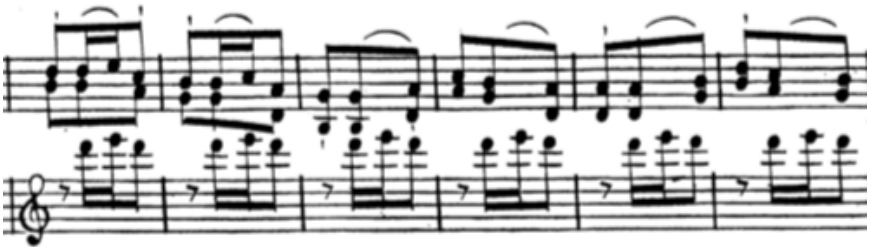

Figure 21. Joseph Haydn (1732–1809), Fantasia in C major (Hob. XVII:4) (1789), bars 74–9. *Source:* "Haydn, Joseph," IMSLP Petrucci Music Library, accessed August 1, 2020, http://imslp.org/wiki/Fantasia_in_C_major,_Hob.XVII:4_(Haydn,_Joseph)

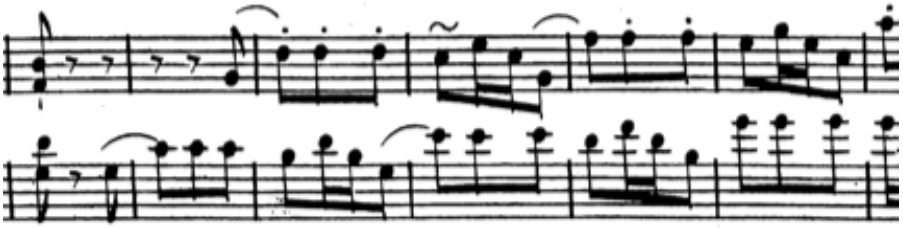

Figure 22. Joseph Haydn (1732–1809), Fantasia in C major (Hob. XVII:4) (1789), bars 365–70. *Source:* "Haydn, Joseph," IMSLP Petrucci Music Library, accessed August 1, 2020, http://imslp.org/wiki/Fantasia_in_C_major,_Hob.XVII:4_(Haydn,_Joseph)

W. A. Mozart: Fantasia in C minor (KV 475) (1785)

Like Joseph Haydn, W. A. Mozart's life and work has been the subject of extensive research, and is not unfamiliar to musicians, scholars and/or music lovers; furthermore, Mozart's music is a prominent part of the musical canon of repertoire.[220] For these reasons, a *precis* of Mozart's life and work is not regarded as a necessary part of this study.

Register

As with Joseph Haydn's piano music, W. A. Mozart's piano music does not generally exploit the extreme treble and extreme bass registers simultaneously—or near simultaneously—nor does his music range, within a musical gesture or a phrase, rapidly between the two extreme registers.

In the except given as Figure 23, with the exception of the 'punctuating' bass octaves in bars 11–15, the registral range is contained within the central area of the piano's compass.

[220] See fn. 95.

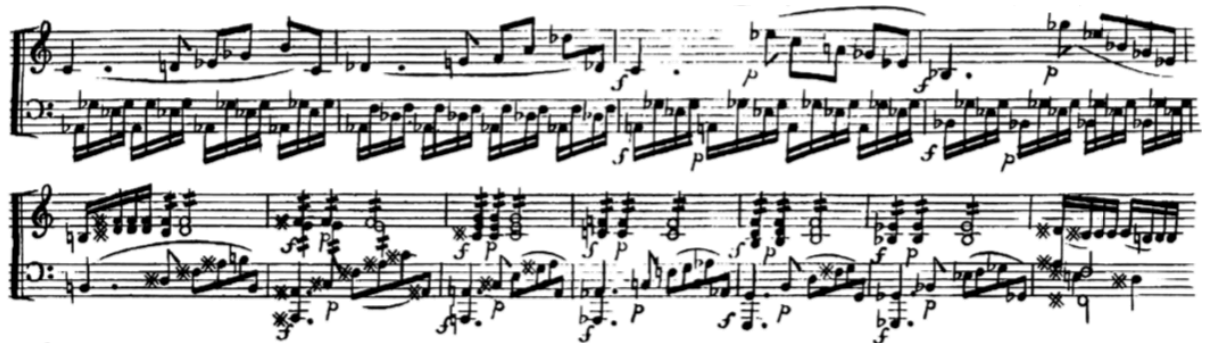

Figure 23. W. A. Mozart (1756–1791), Fantasia in C minor (KV 475) (1785), bars 6–16. *Source:* "Mozart, Wolfgang Amadeus," IMSLP Petrucci Music Library, accessed August 1, 2020, http://imslp.org/wiki/Fantasia_in_C_minor%2C_K.475_(Mozart%2C_Wolfgang_Amadeus)

Texture

Figures 23—above—24 and 25 show a single-note-texture melodic line. Such a melodic line texture is commonly found in Mozart's keyboard music; this is in alignment with normal late eighteenth-century Viennese textural practice.

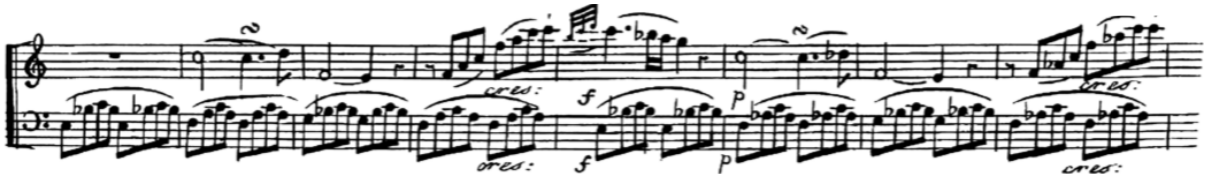

Figure 24. W. A. Mozart (1756–1791), Fantasia in C minor (KV 475) (1785), bars 61–8. *Source:* "Mozart, Wolfgang Amadeus," IMSLP Petrucci Music Library, accessed August 1, 2020, http://imslp.org/wiki/Fantasia_in_C_minor%2C_K.475_(Mozart%2C_Wolfgang_Amadeus)

Articulative variety

As previously mentioned, the Viennese piano has extremely efficient dampers; these provide the player with a wide range of nuanced articulation.

Figure 25 contains slurs and wedges. As a result of the Viennese piano's extremely efficient damping, the 'crisp', 'sharp' *staccatissimo* notated by the wedge is available to the player—in contrast with the less short *staccato* notated by a dot.

Another notated articulation mark is, as stated previously, the slur—the note at the end of a slur should be shortened. Figure 25 shows a profusion of slurs.

That degrees of articulation are so specifically notated performatively creates the 'speech-like' delivery that characterises the Viennese aesthetic.

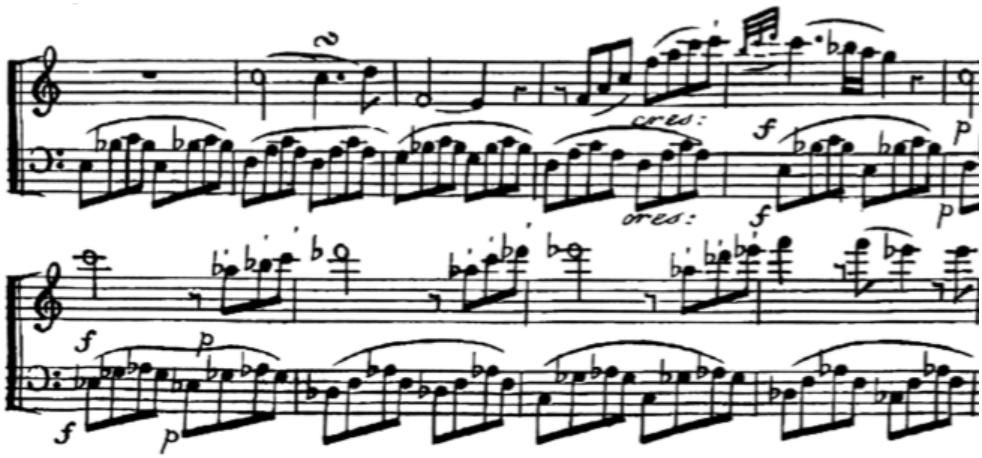

Figure 25. W. A. Mozart (1756–1791), Fantasia in C minor (KV 475) (1785), bars 61–72. *Source:* "Mozart, Wolfgang Amadeus," IMSLP Petrucci Music Library, accessed August 1, 2020, http://imslp.org/wiki/Fantasia_in_C_minor%2C_K.475_(Mozart%2C_Wolfgang_Amadeus)

Summary of Viennese compositional aesthetic

In many ways, the Viennese compositional aesthetic was the antithesis of that of the English.

In summary, the Viennese compositional style includes:

1. The 'localising' of material in a particular register of the piano.
2. A single-note-texture melodic line.
3. The frequent use of a wide range of articulation markings—including slurs, *staccatissimo* wedges, and *staccato* dots.

CHAPTER 4

Principal findings and conclusions

Introduction

This study, to reiterate, sought:

1. To describe the technical principles underlying grand piano design in relation to scaling, striking points and dampers in late eighteenth-century London and Vienna.
2. To identify the realisation of these principles in the late eighteenth-century grand pianos of John Broadwood and of Anton Walter.
3. To identify the sonic result of the realisation of these principles in the late eighteenth-century grand pianos of John Broadwood and Anton Walter.
4. To analyse and compare selected late eighteenth-century English and Viennese solo keyboard repertoire in relation to the compositional elements of register, texture and articulative variety.
5. To identify the relationship, if any, between the sonic result of scaling, striking points and dampers in grand pianos of John Broadwood and Anton Walter and the compositional aesthetic in relation to register, texture and articulative variety in late eighteenth-century London and Vienna.

Therefore, this study sought answers to the following questions:

1. What were the design principles underlying the scaling, striking points and dampers in late eighteenth-century grand pianos?
2. What was the sonic result of the realisation of these design principles in grand pianos by Broadwood and Walter?
3. What relationship, if any, might there be between grand piano design, sound and compositional aesthetic in late eighteenth-century London and Vienna?

Principal findings

During the late eighteenth century, two distinct traditions of piano design and compositional aesthetic emerged—one in England and the other in Austria. The focal points of these traditions

were, respectively, London and Vienna. Traditions of grand piano design in these cities were exemplified in the instruments of John Broadwood in London and Anton Walter in Vienna. In London and in Vienna, piano design features—particularly scaling, striking points and dampers—resulted in pianos with different sonic qualities.

During the late eighteenth century, pianist/composers had their preferred piano makers, and wrote with the instruments of these makers in mind. Clementi and Dussek wrote for pianos made in London by, for example, Broadwood. In Vienna, Joseph Haydn and W. A. Mozart wrote for the pianos of Viennese makers such as Walter. These pianist/composers embraced the sound of grand pianos that were identified with the city in which they worked; such sonic characteristics were compositionally exploited using a number of elements, including register, texture and articulative variety. These elements were significant aspects of the musical aesthetic associated with, respectively, England (London) and Vienna.

Conclusions

Relationship between English and Viennese grand piano design and English and Viennese compositional aesthetics

No study is by itself definitive, but it may be concluded from the findings of this study that during the late eighteenth century, there was a direct and dynamic relationship between the design and sound of English and Viennese grand pianos and the English and the Viennese compositional aesthetic.

In England, grand piano design features such as purposely inefficient dampers, scaling, the split bridge and striking points resulted in instruments that had a resonant, full, complex and even sound; these sonic features catalysed a compositional aesthetic which exploited the sound of English grand pianos—use of the extreme treble and extreme bass registers, thick textures, and expansive *legato* phrases. Melodic lines were often presented as the top voice of parallel thirds, sixths or first-inversion chords.

On the other hand, the Viennese grand piano not only had a clear, bright and focussed sound, but unlike the English piano, had extremely efficient dampers; these catalysed the emergence of a compositional style characterised by nuanced articulative variety. Moreover, the inherent weakness of the treble register had ramifications for compositional texture, especially in relation to the melodic line—which normally comprised a single-note texture.

The sonic characteristics of the two types of grand piano highlight the fundamental difference between the aesthetic values represented by the two . . . [styles] of piano . . . [design, making and composition]: Viennese pianos 'speak', and English pianos 'sing'".[221]

Recommendations

Pursuant to the findings and conclusions of this study, it is recommended that research be undertaken in several related areas; it is therefore recommended:

1. That this study be replicated in relation to the late eighteenth-century English and Viennese square piano.
2. That this study be replicated with late eighteenth-century London- and Vienna-based piano makers other than Broadwood and Walter.
3. That this study be replicated in relation to design features of late eighteenth-century English and Viennese pianos other than scaling, striking points and dampers.
4. That this study be replicated with late eighteenth-century London- and Vienna-based composers other than Clementi, Dussek, Joseph Haydn and W. A. Mozart.
5. That this study be replicated in relation to compositional elements other than register, texture and articulative variety.
6. That this study be replicated in relation to genres of late eighteenth-century solo piano repertoire other than the fantasia.
7. That this study be replicated in relation to solo piano repertoire conceived in England and in Vienna calculated specifically for domestic or for public performance.
8. That this study be replicated in relation to the 'accompanied' piano sonata.
9. That this study be replicated in relation to late eighteenth-century French pianos, composer/pianists and repertoire.

From these recommendations, it is evident that there is great scope for further research into the relationship between late eighteenth-century piano design, sound and compositional aesthetic.

[221] Lancaster, *First Fleet Piano*, 1:192.

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APPENDIX A

The term 'piano'

During the seventeenth, eighteenth and first half of the nineteenth centuries, 80 terms (at the least) were used as titles for the piano.[222]

- *Arpicembalo col piano e forte*
- *Arpicembalo che fa' il piano, e il forte*
- *Arpicembalo del piano e forte*
- *Bandlony*
- *Bekielter Flügel*
- *Bienfort*
- *Cembalo à martellino*
- *Cembalo a piano e forte*
- *Cembalo con martelli*
- *Cembalo di Forte Piano*
- *Cembalo Forte-Piano*
- *Cembalo senza penne*
- *Cimbalo a martello*
- *Cimbalo con martelletti*
- *Cimbalo del piano, e forte*
- *Cimbalo di piano e forte di martelletti*
- *Cimbalo di piano e forte volgarimento di martellato*
- *Cimbalo piano e forte*
- *Clave de martillos*
- *Clave piano*
- *Clavecin*
- *Clavecin à maillets*
- *Clavecin à marteau*
- *Clavecin à piano e forte*

[222] The following list is found in Lancaster, *The Book of Beck*, n. pag. Lancaster's list includes material drawn from Badura-Skoda, *Eighteenth-Century Fortepiano Grand*, 7, 26, 79, 82, 83; Clinkscale, *Makers 1700–1820*, 397; Hubbard, *Three Centuries of Harpsichord Making*, 293; Maunder, *Keyboard Instruments*, 9–12, 14–16 ; Pollens, *Bartolomeo Cristofori*, 15, 66, 72, 119.

- *Clavecin d'Amour*
- *Clavecinflüg*
- *Claveçin Roïal*
- *Clavessin a piano e forte*
- *Clavi Cembalo d'espressione*
- *Clavicordio de piano*
- *Cravo de martelos*
- *Cymbal-Clavir*
- *Flügel*
- *Flügel-fortepiano*
- *Fortbien*
- *Forte e piano*
- *Forte piano*
- *Fortes piano*
- *Fortepiano*
- *Fortepianoe*
- *Forte-piano*
- *Forté-piano*
- *Forte-piano-Clavecins*
- *Fortepiano-Clavier*
- *Fortepiano-Flügel*
- *Fortipiano*
- *Forto piano*
- *Fuerte-piano*
- *Grand piano*
- *Gravecembalo à martelli*
- *Gravecembalo col piano e' forte*
- Hammer harpsichord
- *Hammerflügel*
- *Hammerklavier*
- *Hämmer-pantalone*
- Hammer spinet
- *Hämmerwerke*
- Harpsichord

- *Nuovo cimbalo*
- *Nuovo stromento*
- *Pandoret*
- *Pantalon*
- *Pantaleon*
- *Pantalone*
- *Piana-forte*
- *Piano*
- *Piano en forme de clavecin*
- *Piano et forte*
- *Piano ex Forte*
- *Piano forte*
- *PianoFort*
- *Pianoforte*
- *Pianoforte-Clavecin*
- *Pianoforte-Flügel*
- *Piano-forte*
- *Piano-Forte-Clavier*
- *Piano ordinaire*
- *Piano fortes*
- *Pyano forte*
- *Tafelklavier*

APPENDIX B

Predominant types of piano in England and on the continent during the late eighteenth century

During the eighteenth century, two types of piano were predominant: the 'grand piano' and the 'square piano'.

Grand piano

The late eighteenth-century 'grand piano' is "a large horizontal wing-shaped . . . [stringed keyboard instrument,] the form of which is directly derived from that of the harpsichord",[223] with a fairly deep case, open at the top—closed by a lid that is hinged to the spine—a horizontal keyboard—whose bass end meets the instrument's spine at a right angle—and a bent-side following the line of the bridge; horizontal strings run parallel with each other and the spine, passing over up-striking pivoted hammers and the soundboard—rare exceptions have down-striking hammers.[224] The instrument has dampers—unlike some continental square pianos and keyboard pantalons.

Square piano

A 'square' piano is superficially similar to a clavichord, and comprises a fairly shallow rectangular box, open at the top—closed by a lid that is hinged to the spine—with an inset keyboard towards the left at the front long-side of the instrument, a soundboard at the treble end, and horizontal strings running obliquely from the back of the instrument at the bass end to the front at the treble end—the bass strings being nearest to the player—the strings passing over up-striking hammers and the soundboard.[225] Square pianos usually have dampers—unlike keyboard pantalons.[226]

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[223] Edwin M. Ripin, "Grand pianoforte," in *The New Grove Dictionary of Music and Musicians*, ed. Stanley Sadie (London: Macmillan Publishers, 1980), 7:635.
[224] See Christopher Clarke, "The English piano," 254–5. See also Cole, *The Pianoforte in the Classical Era*, 379.
[225] See Clarke, "The English piano," 254–5. See also Latcham, "The stringing, scaling and pitch of pianos", 2, fn. 2.
[226] "A keyboard pantalon (pantaleon, pantalone or bandaleon) is a small rectangular or harp-shaped keyboard instrument whose horizontal metal strings run obliquely from the keyboard. The soundboard extends the entire length of the instrument. . . . Typically, a pantalon has a single string for each note. Usually, the strings are struck by bare wooden pivoted hammers. Commonly, there are no dampers (in such instances, there were never meant to be any). Because the action of a pantalon has no escapement, the range of dynamic nuance that can be achieved through touch is limited. A variety of timbres is available to the player via 'mutation' stops. A

mutation (in eighteenth-century German writings, *Veränderung* or *Mutation*) alters or modifies the timbre of the sound using a mechanical device that is incorporated into the instrument, . . . [for example], an s-shaped wooden batten suspended above and following the line of the bridge, with a teased-cloth covering attached to the underside that, when lowered, rests lightly on the strings (producing a characteristically *pizzicato* sound). A pantalon may have as many as five or more mutations. Because the scope of dynamic nuance that can be achieved through touch is limited, the sense of dynamic shading is mostly created through changes in tone colour that result from the use of mutations". Lancaster, *First Fleet Piano*, 1:45–6.