

Introduction

My interest in Bartolomeo Cristofori began in the early 1970s while serving an apprenticeship in harpsichord making with John Challis in New York. I had taken an afternoon off to visit the newly installed André Mertens Galleries of Musical Instruments at The Metropolitan Museum of Art, and as I was examining the harpsichords on exhibit, I heard the most beautiful sounds coming from what I thought was a harpsichord further down the gallery. The instrument that I heard was being played by Edwin Ripin, an associate curator in the Department of Musical Instruments, who was giving a tour to a group of students. As soon as they moved on, I read the instrument's label, and to my amazement discovered that I had not been listening to a harpsichord but to the earliest known piano made by that instrument's inventor, Bartolomeo Cristofori. I vowed then and there that the first instrument I would make upon completing my apprenticeship would be a copy of The Met's Cristofori piano. The instrument that I finally managed to complete was not what one would today call an "exact replica," for I had not been granted direct access to the instrument by the then head of The Metropolitan Museum of Art's Department of Musical Instruments, Laurence Libin, but was only permitted to measure an action model and to consult some general measurements and catalog descriptions in the department's files (by then Edwin Ripin had left the museum, and though I never had the pleasure of meeting him, I did speak with him over the telephone about the Cristofori piano). In 1976, the fortepianist Steven Lubin made an informal recording on my copy that was featured on "The Laughing Cavalier," a classical-music program on WBAI in New York.

Shortly after completing the copy, I began working as the conservator of musical instruments at The Metropolitan Museum of Art and had greater access to the original instrument. Not only did I then learn the error of my ways, but I discovered how the original instrument had been greatly altered in the course of its long history. The changes to its keyboard range, scaling and striking points, as well as to the hammer-action geometry and action parts, were later compounded by an unfortunate restoration carried out at the museum in the late 1930s, in which the original sound-board, bridge, wrestplank, case bottom, and other parts were removed,

discarded, and replaced with new ones, thereby rendering the original piano about as inauthentic as my copy! A research grant awarded by the museum provided an opportunity to examine the other two Cristofori pianos, in Rome and Leipzig. This enabled me to compare the hammer actions of the three instruments and to verify the authenticity of various idiosyncratic aspects of case structure that I had discovered in The Metropolitan Museum's piano – notably the use of a secondary internal bentside and a form of structural bracing that isolated the soundboard from the stress-bearing parts of the case. This innovative case design was as remarkable as Cristofori's invention of the escapement mechanism, as it foreshadowed many features of the modern piano, including the ubiquitous cast-iron plate that hovers over the soundboard much like Cristofori's suspended hitchpin rail. In 1984 I published these findings in the *Journal of the American Musical Instrument Society*.

In 1995, Cambridge University Press published my book *The Early Pianoforte* (reissued in paperback in 2009). In that work, Cristofori makes his entry in Chapter 3, as I believed then and still do that Cristofori was not actually the inventor of the piano, but that its history extends back as far as the harpsichord and clavichord. Though the idea of striking strings with hammers or tangents seems to have fallen by the wayside sometime after the mid-fifteenth century, it may have made a brief reappearance in the sixteenth century, as I documented in my study of a sixteenth-century pentagonal spinet by Franciscus Bonafinis that was converted to a tangent-action piano. Nevertheless, Bartolomeo Cristofori is still universally credited with the invention of the piano, and it is clear that his concept of the instrument's pivoted hammer and escapement mechanism, his recognition for the need of greater string tension than in the harpsichord or clavichord, as well as his development of a new form of case construction, led the way to the development of the modern piano. The declaration "inventor," which emblazons Cristofori's nameboard inscriptions, is entirely justified.

While Cristofori's fame derives from the fact that he is widely recognized as the inventor of the pianoforte, his ingenuity is manifest in virtually every other type of instrument he constructed, including clavichords, spinets, and harpsichords. For example, the new form of case structure that he developed for use in his pianos was also employed in his large harpsichords. He was the first keyboard instrument maker to make use of lamination and kerf-bending to decrease stress on delicate sound-producing parts of the instrument. He designed new shapes of cases, such as for his "oval" spinets, a large spinet, termed the *spinettone*, that was specially designed for use in the opera orchestra, and an upright harpsichord whose soundboard was

unencumbered by a conventional case. He also developed clever types of stop actions and experimented with unusual string layouts, the double-pinning of bridges and hitchpin rails, and the use of divided bridges in both the bass and treble.

Cristofori worked in the Medici court in Florence between 1688 until his death in 1732. His position there was unique: he worked under the protection of Grand Prince Ferdinando de' Medici and received a monthly stipend, which had never before been granted to an instrument maker. His duties included the general maintenance of the court's growing keyboard collection (which included tuning, adjusting, and major restorations), as well as the construction of new instruments. As someone trained as a harpsichord and organ builder who spent over thirty years working as the conservator of musical instruments at The Metropolitan Museum of Art (an institution that comes about as close to a "royal court" as we have in the United States), I often flattered myself in comparing my position to that of Cristofori, for my duties were similar to his: restoring, tuning, and otherwise maintaining a large collection of fine musical instruments. When I discovered that this distinguished historical figure had often been involved in the ignominious task of carting instruments to and from his workshop and various concert venues in Florence and beyond, I took heart, as I too spent much of my time moving keyboard instruments around the vast museum for concerts, special exhibitions, social events, gallery renovations, and storeroom relocations – so frequently did these moves take place that I often joked that the freight elevator was my office.

In 2010, Cambridge University Press published my book entitled *Stradivari*. Though Antonio Stradivari may be the most famous musical instrument maker of all time, I have always believed that Bartolomeo Cristofori should share the podium with him and that a stand-alone biography was well deserved and long overdue, as there had never been a comprehensive study that integrated biographical information, his work as a harpsichord maker, his invention of the pianoforte, and his official duties as Medici court restorer, tuner and custodian of its collection of musical instruments, with the above placed in the context of musical life in Florence during his years of service there. In writing *Bartolomeo Cristofori and the Invention of the Piano*, it has been my goal to recount Cristofori's life and to describe all of the instruments he is recorded as having made, as well as the few that survive, in a format that is not only readable but also includes sufficient detail to satisfy makers, restorers, and serious historians of early keyboard instruments. In addition to my own archival research and examination and analysis of all his extant instruments, I have attempted to draw together

and integrate information derived from doctoral dissertations, obscure *Festschriften*, conference preprints and proceedings, century-old museum catalogs, and other long-out-of-print publications (often in foreign languages) that deal with Cristofori's life and work, invariably in a piecemeal fashion. I was specially guided by the dissertations and writings of Stefania Gitto, Warren Kirkendale, James Samuel Leve, Giuliana Montanari, Michele Nisoli, Michael Kent O'Brien, Paola Romagnoli, Kirsten Schwarz, Robert Lamar Weaver, and Denzil Wraight, nineteenth-century studies of Cristofori and piano history by Ferdinando Casaglia, Cesare Ponsicchi, and Leto Puliti, and of course Scipione Maffei's 1711 account of the newly invented piano – the first published interview of a musical instrument maker, which stunningly reveals how Cristofori's radical concept of keyboard instrument structure was derived from his understanding of acoustics. More broadly, Maffei's article reveals that musical instrument makers of his time were not simply skilled woodworkers, but were sophisticated individuals with an understanding of performance practice, temperament theory, materials science, and engineering, and who could bring this knowledge to bear in designing their instruments.

The following institutions have kindly made their collections, archives, and services accessible to me over the years: Grassi Museum für Musikinstrumente der Universität Leipzig (formerly the Musikinstrumenten-Museum der Karl-Marx-Universität); Germanisches Nationalmuseum, Nuremberg; Stiftung Preußische Schlösser und Gärten Berlin-Brandenburg (formerly the Staatliche Verwaltung der Schlösser und Gärten, Potsdam); Freies Deutsches Hochstift, Frankfurter Goethe-Haus; Muziekinstrumentenmuseum, Brussels; Museu da Música, Lisbon; Museo Provincial de Bellas Artes, Seville; Museo Nazionale degli Strumenti Musicale, Rome; Museo degli Strumenti Musicali del Conservatorio "Luigi Cherubini" di Firenze; National Music Museum (formerly the Shrine to Music), Vermillion, South Dakota; Accademia Bartolomeo Cristofori, Florence; Archivio di Stato, Florence; Galleria dell'Accademia, Florence; Opificio delle Pietre Dure, Florence; Biblioteca del Conservatorio di Musica "Luigi Cherubini" di Firenze; Archivio Diocesano, Cremona; Biblioteca Capitolare, Verona; Bibliothèque nationale de France; Library of the University of California, Berkeley; The Metropolitan Museum of Art, New York; New York Public Library; and Beinecke Library, Yale University. I would also like to acknowledge Harold Lester and the late Bartolomé March for allowing me to examine their rare Portuguese and Spanish pianofortes,¹ as well as the late Alan Curtis who provided photographs

¹ Lester's anonymous Portuguese piano has since been sold to a private collector in Switzerland.

of his Jean-Henri Silbermann piano. Thanks must also go to Donatella DeGiampietro, Michael Latcham, Emanuele Marconi, and Luisa Morales for their generous assistance over the years.

Having gradually come to the realization that a book can never serve as a “virtual” instrument, I have refrained from overburdening readers with minutiae, such as tabulating every string length, plucking point, and striking point – data that the original makers themselves probably never possessed (string lengths, for example, were not plotted string by string, but rather by setting down a few wayposts for the Cs and Fs and allowing the natural fairing of the bridge to take care of those in between). Back in the 1970s, when I made my “copy” of the 1720 Cristofori piano, I believe I was able to capture the spirit of the original using fewer measurements than have been tabulated here.

Readers familiar with my previous work on the topic, *The Early Pianoforte*, will find that some of the material in Chapters 4 through 7 of that book reappears in Chapters 3 and 5 of *Bartolomeo Cristofori*, though a considerable amount of new information has been added in the new work (notably recently discovered biographical material on the Florentine makers del Mela and Ferrini, and possible connections between Cristofori and instrument makers Eugen Casparini, Giovanni Solfanelli and Sébastien Erard). Included in Chapter 3 of *Bartolomeo Cristofori* are technical studies of all his known instruments (including the pianos, harpsichords, spinets, and a clavichord) – the first time all of his instruments have been described and illustrated in a single publication. Some material from *The Early Pianoforte* does not reappear in Chapter 5, such as the discussion of the supposed earliest square piano by Johann Socher, which I dismissed as fraudulently mislabeled in my earlier book, and the full texts and translations of published material relating to the inventive work of Jean Marius and Christoph Gottlieb Schröter, both of whom mistakenly claimed to have developed the hammer action before Cristofori. Chapter 5 of *Bartolomeo Cristofori* thus focuses attention on Cristofori’s immediate influence on ultramontane makers, rather than more broadly exploring the early history of the piano. Cambridge University Press has fortunately kept *The Early Pianoforte* in print so that the material, data, and illustrations that I have refrained from including in *Bartolomeo Cristofori* are concurrently available. Throughout *Bartolomeo Cristofori*, the reader will discover new observations and conclusions that supplant those in the earlier work.

I must add that I am indebted to John Challis, the pioneering American harpsichord maker (and innovator in his own right) for giving me my start in the profession of instrument making. His working models of

early piano actions crafted after the drawings in Rosamund Harding's *The Pianoforte* initially caused me a great deal of head scratching, though eventually they inspired me to explore and understand the development and workings of the piano. The unknown individuals who need to be gratefully acknowledged are the legions of Medici record keepers and generations of archivists in Florence, Padua, Verona, and other locales who made it possible to look back some 300 years and reconstruct Cristofori's life in vivid detail. And of course, I must thank my wife, Stephanie Chase, for her encouragement, enthusiasm, and patience.

I have often been asked to define and distinguish between the terms "clavier" and "cembalo," as well as "piano," "pianoforte," and "fortepiano." "Clavier" and "cembalo" were (and are) generic terms that may refer to any type of stringed keyboard instrument (i.e., harpsichord, spinet, clavichord, or piano). The term "piano" is actually an unfortunate contraction of "pianoforte," which is derived from the original expression used to indicate Cristofori's new invention: *cembalo che fa piano e forte* (It. "keyboard instrument that makes soft and loud"). I say "unfortunate," because the contraction misses the point entirely: the piano is not only capable of playing softly, but of playing loudly, as well as everything in between. Furthermore, this capability is conveniently placed at the player's fingertips. Dynamic flexibility, which is a feature of most instruments, was not shared by the harpsichord, which in comparison to the newly invented piano was suddenly viewed as being hobbled by its fixed or terraced dynamics.² Today, we use the term "fortepiano" to denote wood-framed pianos, specifically those with German- or Viennese-style hammer actions that were made from around 1760 until the adoption of iron framing around the mid-nineteenth century. For some reason, pianos made with English-style hammer actions (be they of English, French, or American manufacture) during this same period are generally referred to as "pianofortes." There is no logic to this distinction, only convention. Throughout this book, I have attempted to retain original spellings when quoting foreign-language texts, even when they are inconsistent (such as *spineta*, *spinetta*, *cembalo*, *cimbalo*, *gravecembalo*, *gravicembalo*, etc.).

All of the instruments described in this book were examined first-hand by the author. Unless otherwise indicated, measurements, photographs, and technical drawings are by the author.

² The idea that the harpsichord was musically limited by its dynamic inflexibility is disputed in Stewart Pollens, "The Pianoforte in the Performance of Scarlatti's Sonatas," in *Domenico Scarlatti en España: Actas de los Symposia FIMTE 2006–2007* (Garrucha, 2009), pp. 301–311.

Florentine Units

The *braccio* (arm length) used in Florence in Bartolomeo Cristofori's day was approximately equivalent to 551.2 mm. This is at variance with the metric equivalent that is commonly associated with the Florentine *braccio* (583.6 mm); the larger value reflects a change in the length of the *braccio* enacted in 1782. The *braccio* was divided into 2 *palmi* (approximately the width of an outstretched hand) and 20 *soldi* (*soldo* means “coin” or “penny,” and was thus approximately equal to the diameter of a coin then in use). The *palm* is approximately equal to 275.6 mm, and the *soldo* is approximately equal to 27.56 mm.³

Florentine unit of weight

1 *libbra* = 12 *onci* = 0.34 kg⁴

Florentine currency

1 *scudo* = (approx.) 7 *lire*

1 *lira* = 20 *soldi*

1 *soldo* = 12 *denari*

Abbreviations

ASF	Archivio di Stato di Firenze
DP	Depositeria Generale
GM	Guardaroba Medicea

³ Angelo Martini, *Manuale di metrologia* (Turin, 1883), p. 206. Grant O'Brien, “Il percorso di un'idea: dal progetto allo strumento,” in *Bartolomeo Cristofori: La spinetta ovale del 1690*, ed. Gabriele Rossi-Rognoni (Florence, 2002), p. 66. See also Stewart Pollens, *The Manual of Musical Instrument Conservation* (Cambridge, 2015), s. v. “historical metrology,” and “Historical Metrology in the Service of Organology: Some Caveats,” in *Unisonus: Musikinstrumente erforschen, bewahren, sammeln* (Vienna, 2014), pp. 510–537.

⁴ Bruno Kisch, *Scales and Weights: A Historical Outline* (New Haven, 1965).