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The Toy Piano

From the Playroom to the Concert Platform

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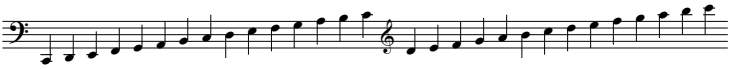
Legend

The table shows the octave numberings corresponding to the indices according to the Italian, English and ISO (International Organisation for Standardisation) definitions. In the text the ISO definition has been used, while the octave numberings appearing in citations of different authors have been left unchanged.



Do1	Do2	Do3	Do4	Do5
C	c	c'	c''	c'''
C2	C3	C4	C5	C6

1. Table of correspondences between the Italian, English and ISO octave numberings.

Introduction

In 1948, John Cage offered the public his *Suite for Toy Piano*. Performed at Black Mountain College (North Carolina), with choreography of dancer Merce Cunningham, it later became a solo piece and the point of reference for all musicians dedicated to the art of the toy piano.

A short time later, in 1951, Charles Schulz decided to add into the *Peanuts* comic strips the toy piano of his daughter Meredith, making Schroeder (friend of the main character, Charlie Brown) a passionate performer of Beethoven on his tiny grand piano.

To clarify, I'm talking in both cases of a miniature piano that up until 1948 was usually only found amongst children's toys, apart from short appearances in jazz music and in vaudeville repertoire of the nineteen thirties. A piano (at least in its external shape) nowadays usually made of wood, no more than sixty centimetres wide in its largest size, with a keyboard range from one and a half to three chromatic octaves and equipped with a very simple mechanism, to which the hammers operated from the keyboard strike small cylindrical metal rods.

In the book I have reconstructed the history of the toy piano to glimpse the possible origins, while investigating the various contexts in which it has been involved from its birth to the present day. The assumption that accompanied me is that the miniature piano, created as a toy to emulate the adult world, has returned to that world, transfiguring (at least partially) the nineteenth 'romantic icon' – the piano – which had generated it.

Available literature on this topic is poor, or at least very fragmented, and extensive dissertations that relate specifically to the toy piano have not been found. Therefore,

my aim has been to build, or rather, to assemble a story, thanks, in large part, to resources on the web and personal contacts with current manufacturing companies or heirs of the manufacturers of the past, as well as composers and performers who today devote part of their activities to this instrument.

At first I tried to understand what cultural and musical contexts have favoured the entry of toy instruments into classical music. This happened in the eighteenth century, a period in which the first examples of repertoire appear and the toy piano again becomes part of this repertoire about two centuries later in the mid-twentieth century.

In the attempt to trace a history of the instrument, the first feasible path seemed to be the one relating to the toy piano as an educational toy imported to the U.S. from Germany in 1870. Albert Schoenhut (1848-1912), a young German immigrant, made the toy piano, as we know it today, in Philadelphia shortly thereafter.

It is difficult to go back to previous times without referring to instruments with mechanics and components very similar to those of the toy piano, but which had nothing to do with the world of childhood. These include Beyer's *forte-piano* à *cordes de verres*, otherwise known as the glasschord (Paris, 1785), Troiger's *Stahlklavier* (Dessau, 1792), the *harmonica à clavier* mentioned by Hector Berlioz in his *Grand Traité d'Instrumentation et d'Orchestration Modernes* (Paris, 1844) and Giuseppe Bisogno's *pianoforte a cristallo* (Naples, c.1860). The comparison with crystallophone pianos is possible because the first samples of toy pianos imported into the United States had glass components rather than metal bars.

Since the beginning of the twentieth century, in parallel with the development of mass marketing plus increasing attention being paid to the world of childhood, several models also spread to Europe and Asia for childish games and for the first rudiments of budding young pianists. In

the second half of the twentieth century, after the debut of John Cage within the context of avant-garde music, the toy piano began to be appear more and more frequently in contemporary art music. Professional pianists were not disdainful about appearing on stage with this curious instrument and its childhood associations, and have often commissioned new scores for their performances.

The timbre of the toy piano – a crystal clear sound with slight distortion of intonation – are elements that have fascinated the music world. And its symbolic value as an instrument created to emulate the adult world, which has now returned to that world, has contributed greatly to its continuing appearance in contemporary classical music. But these origins and especially the toy piano's growing place on the classical music scene, bring different associations and meanings to the listener as the instrument offers its sounds to the music 'game', giving rise to questions which I will try to answer in this book.

I. Characteristics of the instrument

Before discussing the history and repertoire of the toy piano, it is useful to understand, from the very beginning of this story, the characteristics of the instrument in its present form. Here, then, is a profile of information of today's toy piano, also called *petit piano* or *piano jouet* in French; toy piano, toy grand piano or baby grand piano and table top piano, according to its variants, in English; *Kinderklavier* and sometimes even *Spielzeugklavier* in German; and *pianoforte giocattolo* in Italian.

Taken as examples are two models: a baby grand piano (fig. 1) and an upright toy piano (fig. 2) chosen, from the most common instruments offered on the market at present, and played in public by professional musicians, both composers and performers. In the first image is a baby grand piano, currently produced by Schoenhut in Philadelphia. This instrument has 37 keys (three chromatic octaves from F3 to F6), its weight is just over 15 kilograms, its dimensions (DWH) are 68 x 59 x 54 centimetres. The stool is 23 centimetres high.

In the second image an upright toy piano from the same manufacturer is shown. It has 25 keys (two chromatic octaves from C4 to C6), it weighs about 10 kilograms with dimensions (DWH) of 26 x 40.5 x 48 cm and a stool with a height of 20 centimetres.

I.1. Components and mechanism

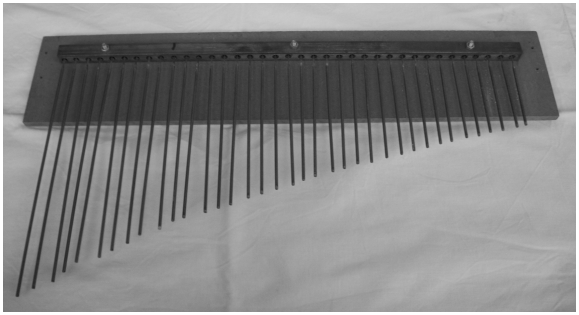
The body of the instrument is of wood. The keys are made of plastic and have approximately the same width as those of a real piano, but a shorter length: the white keys are 2 cm in width and 9/10 centimetres in length (instead of 15 cm); the black keys are about 1 centimetre in width

1. Baby grand piano, Schoenhut 37 Key Concert Grand, Model 379 (Courtesy Schoenhut Piano Company)

2. Upright toy piano, Schoenhut 25 Key Traditional Spinet, Model 6625 (Courtesy Schoenhut Piano Company)

and 5.5 in length (instead of about 10 cm). The hammers are also made of plastic and they strike metal rods instead of strings, steel plates or glass bars that characterized the early toy pianos. Figures 3 to 5 show some of these components of the mechanism in a modern toy piano built by Schoenhut; note that toy pianos do not have dampers. Composers nowadays usually write for toy pianos with these components and building features.

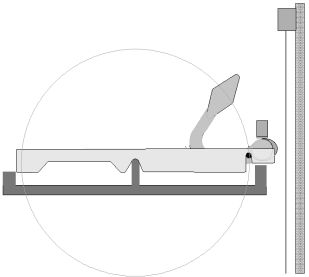
3. Action of the plastic hammers in a Schoenhut Baby grand



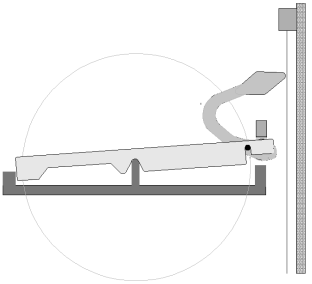
4. Different length metal rods in a Schoenhut traditional spinet

5. Detail of metal rods fixed to a metal bar

Figures 6a and 6b show respectively the toy piano mechanism at rest and in action in an upright toy piano, which is not substantially different from that of a baby grand.

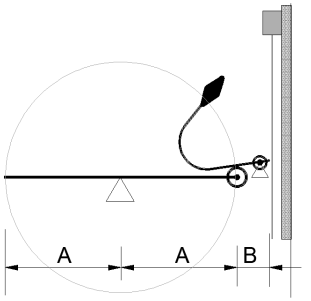


6a. Toy piano mechanism action at rest

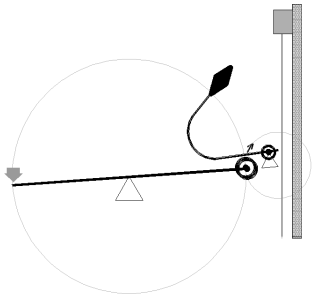


6b. Toy piano mechanism in action

Figures 7a, 7b and 7c highlight the functional scheme. Observing the key, the two arms of the lever are of equal length with respect to the fulcrum/pivot (7a); if the effort of pressing the front end of the key is minimized, the hammer revolves without reaching the sounding rod (7b).

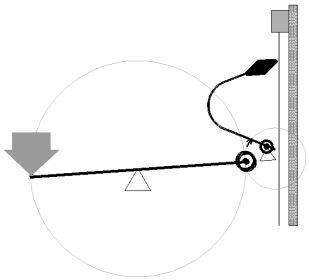


7a. Functional scheme



7b. Functional scheme

With a greater impact force on the lever/key at a speed x, the mass of the hammer is rapidly launched against the metal rod (7c), producing sound, and then freely bounces back.



7c. Functional scheme

Obviously the intensity of sound depends solely on the propulsion that the mass acquires in its rotary motion, which is very difficult to govern with the purpose of obtaining various dynamics. The challenge for the performers (and the intrinsic limit) in achieving soft dynamics – or in varying them into *mezzo-piano, piano, pianissimo* – is precisely to calibrate the touch, without the support of a sophisticated mechanism as in a regular piano, with the risk that the hammer does not reach the sounding rod. *Mezzo-forte, forte, and fortissimo* are relatively easy to realize, while the possibility to fulfill dynamic variances as *crescendo* and *diminuendo* depends on the dynamic range and sound texture.

I.2. The sound – the acoustic and aural perception behaviour

In 2005, Clark University in Worcester (Massachusetts) made available an archive of sound sets (Toy Piano Audio Archive) created on the occasion of a composition competition dedicated to the toy piano. They wished "to make available to the electro-acoustic composition community a free set of recorded samples of a Schoenhut toy piano. In addition to a complete 2-octave chromatic scale (loud and quiet), [they] included trills, clusters, plucked rods, case noises, and m2 dyads; recorded both close miked (duel mono/front & back) and in a hall with natural reverberation (MS stereo)".[1] Just listening to this set of sounds the peculiarity and the timbre richness of the toy piano becomes immediately apparent.

To enable me to arrive at a description of the acoustic behaviour of the instrument, I turned to Professor Sylviane

[1] These samples are available free of charge at: http://www2.clarku.edu/xtp/audio.html (accessed 8 December 2011).

Sapir, who taught at the department of "Electronic Music and Sound Technology" of the Conservatorium "Giuseppe Verdi" in Como and to Alessandro Arban, her student at the time. A preliminary analysis that they carried out on the toy piano models discussed earlier took into account the mechanism of sound induction.

As for the spectral content of the single sound phases, they found that in the attack phase the timbre is very bright and has a significant amount of noise, due to a distribution of energy over the entire spectral band. This, in effect, is mainly due to the noise caused by the method of sound induction, namely the impact between the plastic hammer and the metal rod, which generates an energy concentrated in a very brief amount of time, but extended over a wide spectral band. In the next phase, the noise components disappear quickly, bringing out the components that make 'definable' the height of the sound which fall gradually from the most acute components to the gravest. The gravest partials persist for the entire duration of the release. From the analysis they have also observed a certain degree of harmonicity in the spectrum; various components present an octave relationship with the gravest. However, these are not always equivalent to the fundamental note corresponding to the key played. These partials therefore create a significant ambiguity in height, especially in some areas of the instrument.[2]

The study conducted at the Conservatory of Como confirmed what had been observed in previous research conducted by Akira Nishimura at the Department of Media and Cultural Studies of the Tokyo University

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[2] Arban, A. (2013). *Toy piano: analisi del fenomeno acustico e percettivo.* (Unpublished dissertation, Triennio Accademico di Musica Elettronica e Tecnologie del Suono). Conservatorio Giuseppe Verdi, Como, pp. 25-26.

of Information Sciences and presented at the *20th International Congress on Acoustics* in Sydney in 2010:

> The pitches produced by toy pianos are sometimes perceived to be inaccurate by listeners, some of whom report perceiving the perfect fifth above the nominal note of the pressed key. To investigate these assertions, the overtone frequencies of a toy piano were measured in a frequency range of no more than the eighth harmonic and below 5 kHz, which are considered to be important to the pitch perception of the human auditory system. Time-frequency and time-intensity analyses of the overtones revealed periodic variation in frequency and amplitude, which might be caused by two close vibrational modes. The pitch of a toy piano was found to be tuned to the frequencies of the overtones corresponding [to] the third and fifth harmonics. No fundamental frequency component was observed. The overtone of 1.5 times the missing fundamental frequency appeared above G4. In addition, the overtone of 0.5 times the missing fundamental frequency appeared above G5. The sounds consisting of the prominent overtones corresponding to the 1.5th and 3rd harmonics can be perceived as the perfect fifth above the nominal note. The pitch of the toy piano was perceived as inaccurate in part because the frequencies of the overtones corresponding to the third and fifth harmonics deviated by -4 to +24 cents and +3 to +33 cents from equal temperament, respectively.[3]

As for the time domain, the average length of notes varies from 2 to 3 seconds depending on the model of toy piano, on the notes under analysis and on their acute or low range. Generalizing, the attack phase, is about 1/32 of the whole length, the decay phase lasts on average 1/3 of the whole length and the release phase is the longest, about 2/3 of the entire waveform (it can be up to 4 seconds in the middle

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[3] Nishimura, A. (2010). *Measurement of overtone frequencies of a toy piano and perception of its pitch*. Proceedings from ICA 2010: *20th International Congress on Acoustics*, Sydney.

range of an upright toy piano). The tail of the sounds lasts considerably, due to the absence of a mechanism which stops the vibration of the bars.[4]

In recent years the features described in this chapter have been the subject of attention and interest by many composers, who have often considered this aural ambiguity a strong point in their compositional research. To illustrate, I cite the words used by composer Tom Flaherty in the preface to his *Shepard's Pi for toy piano and electronics*:

> […] as the length of the sounding rods at lowest keys is too short to produce a true bass note, its overtones are louder than its fundamental pitch. Taken out of context the lowest F can sound more like its C overtone, an octave and a fifth higher. This ambiguity is part of the charm of the toy piano.[5]

Flaherty's words highlight the role of the toy piano in the contemporary music scene. In fact, we will see how composers and interpreters have been able to use the 'shortcomings' of this instrument as an opportunity to explore new sounds and new ideas, bringing the toy piano out of the playroom and on to the concert platform.

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[4] Arban, A. (2013), pp. 22-23.

[5] http://tomflahertymusic.com/infopages/Shepard'sPi_infopage-performer_materials.php (accessed 20 June 2016).