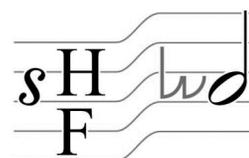


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REVIEW OF PATRIZIO BARBIERI: ENHARMONIC INSTRUMENTS AND MUSIC 1470-1900

Rudolf Rasch

Patrizio Barbieri, *Enharmonic Instruments and Music 1470-1900*. Revised and Translated Studies; CD Included. Latina (Italy): Il Levante, 2008. Tastata - Studi e Documenti TAS 2

One of the most expert and prolific authors on the subject of tuning and temperament of the last quarter century is, without any doubt, the Italian musicologist Patrizio Barbieri. Trained as an engineer, he teaches musical acoustics at the University of Lecce (in the very south of Italy, at the end of the heel of the peninsula) and organology in the stricter sense (meaning the science and history of the organ) at the Pontifical Gregorian University of Rome. Since 1980 he has produced an unbroken stream of articles, books and other contributions on tuning systems from the fifteenth to the twentieth century, often in relation to instruments designed to produce other sounds than just those of equal temperament, the standard temperament of Western music ever since the eighteenth century. Unfortunately, at least for the non-Italian reader, most of his writings have been written and published in Italian periodicals, editions, collective volumes, etc. They found little reception in the rest of Europe or North America. Only a minority of his output has been published in English and in media outside Italy, mostly in the last decade of the bibliography of his writings, that is, from 1997 onwards.

Therefore, one cannot but praise his initiative to forge a book out of the many articles and this not by merely reprinting them in a single volume, but by updating and rewriting them where necessary and in such a way that the result can be read as a single text. The result is impressive. Barbieri explains in his preface which articles were used to produce which chapters, but reading the respective chapters one does not notice at all the boundaries of the articles that are the basis of these chapters. If one would read the book without knowing its origin in a collection of articles, one would not suspect such an origin. Looking backward at Barbieri's twenty-five year production, it is almost as if he wrote all these articles with the intention to merge them at one time into a single text, the book that lies now in front of me on my desk.

The book delivers exactly what its title promises: an account of the various attempts to build enharmonic musical instruments and to write enharmonic music, from the middle of the fifteenth century onwards until about 1900. Enharmonic instruments should be understood as musical instruments presenting a number of pitches per octave that significantly surpasses the twelve notes of the standard western tuning systems (equal temperament, meantone tuning or whatever). This begins with harpsichords or organs with a few split upper keys, goes to keyboards with 17, 19, 31 or 43 notes per octave and ends with theoretical systems and ideas for instruments (less often the instruments themselves) up to far over 100 pitches per octave. Enharmonic music is music that requires such extra pitches and that is mostly to be found in the surroundings of enharmonic instruments. Without those instruments nearby, it makes little sense to produce such music.

Although mention is lacking in most standard texts on the history of music, western music history has produced quite a number of enharmonic instruments or (in other cases) ideas for such instruments, be it that for every enharmonic instruments perhaps a million or more non enharmonic (diatonic and chromatic) instruments were built. They have indeed remained singular attempts and experiments from the beginning of their history onwards, primarily

known to a small circle of cognoscenti or aficionados. Best known outside this in-crowd world is probably the archicembalo devised by Nicola Vicentino in the middle of the sixteenth century. This is certainly due to its description in a respectable book on the theory of music, Vicentino's *L'antica musica ridotta alla moderna prattica* (Rome, 1555). It probably was the first enharmonic instrument to arouse public curiosity and gave Italy an important place in the history of enharmonic instruments. But, at some point after 1550, many other European countries, such as Spain, France, England, the Netherlands and the German-speaking countries, also made significant contributions to the history of this very special branch of music theory and musical practice.

As is to be expected when articles are combined to make up a book, they are not put together just in chronological order, but ordered according to a certain plan, to create a logical succession for the reader. The 550 pages of proper text of this book (the remaining sixty bring a bibliography, a subject index and a name index) are divided into two parts: Part I, dealing with instruments and music that follow 'open-chain systems' of tuning, and Part II, dealing with 'closed-chain systems' of tuning. The open-chain systems are based on the summation of pure intervals and, as is well known, sums of pure intervals never result in circles of intervals, that is a return to the original pitch. In western music, the justness of the octave (frequency ratio 1:2) has been an axiom; the justness of any other interval, the fifth (theoretical ratio 2:3) and the major third (4:5) to begin with, but also the 'harmonic seventh' (4:7), the 'harmonic eleventh' (8:11) and possibly higher harmonics based on prime numbers, is left free to be filled in, and every choice for a certain interval implies problems or compromises for other intervals. That means that the aspect of taste comes into the picture and instead of a simple best solution there is an infinite number of solutions, each with its own advantages and disadvantages.

The two parts of the book are each divided into five chapters, not numbered by consecutive figures (1, 2, 3, ...), but by letters (A, B, C, ..., until K). It is impossible to give a full description of the contents of the entire book. The writing is rather dense and business-like, with very few unnecessary words or phrases. This means that the information density is very high, in fact increased only further by the fact that most subjects are discussed briefly, even where one would expect or wish for a more comprehensive explanation of what is going on. Many of the systems are described, after a brief exposition of the basics, in just a few paragraphs, in fact often too briefly to be understood well in all its details, especially by the non-initiated reader.

Chapter A starts with the application of just intonation on keyboards. Twelve-tone just intonation is possible but inevitably includes a number of very out-of-tune ('wolf') consonant intervals. Therefore, if playing all consonant intervals in tune is the goal, one should add extra keys, making the instrument chromatic or enharmonic. Such keyboards were designed by theorists such as Gioseffo Zarlino in Italy, Francisco Salinas in Spain, Marin Mersenne in France, Joan Albert Ban in the Netherlands and others in the sixteenth and seventeenth centuries. Many of these designs were put into practice by instrument builders. The keyboards are based on the ordinary twelve-note keyboards but with split upper keys, extra keys between E-F and B-C, etc. After the middle of the seventeenth century they disappear from the 'enharmonic scene'. Another way to build enharmonic keyboards as extended open-chain systems are the extended meantone keyboards, of which Vicentino's archicembalo is the prototype.

Chapter B continues the discussion of enharmonic keyboards based on Pythagorean tuning or just intonation. Now, attention is focused on England, the country that has produced the largest number of these instruments in the eighteenth and nineteenth centuries, invented by Robert Smith, Henry Liston, Thomas Perronet Thompson, Henry Ward Poole, Colin Brown, and Robert Holford Macdowall Bosanquet and others.

In Chapter C Barbieri leaves the keyboards aside and discusses enharmonic intonation in melodic instruments, especially the various stringed instruments and woodwinds. As is well known, many authors writing on these instruments, among whom the best-known are Johann Joachim Quantz (flute) and Leopold Mozart (violin), prescribe different intonations for

enharmonically equivalent sharps and flats, and this gives rise to many extended discussions as to which tuning system is followed by players of these instruments. An endless discussion, because harmonic intonation derived from either just intonation or meantone tuning requires low sharps and high flats, whereas melodic intonation, which one cannot say to be derived from Pythagorean tuning but which nevertheless follows its basic properties, requires high sharps and low flats. Enharmonic changes is a particularly difficult field to treat theoretically. I am afraid that most musicians merely employ practical solutions here, that defy all theory.

Traditional tuning theory is based on intervals with frequency ratios consisting of products of the prime factors 2, 3 and 5, in modern times called the 5-limit. Attempts to incorporate into the theory intervals with higher factors, first of all 7 and 11, date, however, already from the seventeenth century. Barbieri discusses, in his Chapter D, various treatments of the 'harmonic seventh' by Giovanni Battista Doni, Christiaan Huygens, Johann Philipp Kirnberger and Giordano Riccati, from the seventeenth and eighteenth centuries. It is, of course, acknowledged that certain intervals of meantone tuning - and, therefore, of 31-note temperament - are very close approximations of septimal intervals, such as the augmented second (nearly 6:7), the augmented fourth (nearly 5:7) and the augmented sixth (nearly 4:7).

The next chapter (Chapter E) deals with the various instruments built in connection with the theories of Giovanni Battista Doni (1595-1647), mostly to revive the Greek modes. Either they are harpsichords with various keyboards (for the various modes) or viols, with several fingerboards and fretting systems (for the same reason). We can name the cembalo triarmonico, the cembalo tetraarmonico, the violino diarmonico, the violino panarmonica, the lyra barberina ampicordus and the chitarra triarmonica. These instruments have inspired a number of composers to create music for them, among them Pietro della Valle with his *Dialogo della Purificazione* (1640).

The second part of the book deals, as said before, with equal tempered systems, ETS in Barbieri's abbreviation. The first chapter of this part, Chapter F, deals with the development of the mathematical theory of equal tempered intervals from Vicentino (1555) to Ivo Salzinger (1721). Especially interesting is the rise of the use of logarithms to calculate the ratios of equal tempered intervals in the seventeenth century (including the first logarithmic units for interval size) and the growing awareness of the relation between equal tempered systems and 'open-chain systems', such as that between 19-note ETS and 1/3-comma temperament, between 31-note ETS and meantone temperament, between 43-note ETS and 1/5-comma temperament, and between 53-note ETS and Pythagorean tuning. From this time onwards many instruments were designed or even actually built to put these correspondences into practice, among them Christiaan Huygens's description of 31-note ETS (1661-1691) as a generalization of meantone temperament and Joseph Sauveur's theories (1701-1711). Chapter G reviews the theories of ETSs in the eighteenth century.

The next chapter, Chapter H, is devoted to two remarkable enharmonic keyboards designed and built in Naples in the first half of the seventeenth century, the sambuca lineca by Fabio Colonna and the tricembalo by Scipione Stella, both described in Colonna's booklet entitled *La sambuca lineca* (1618). Both have 31 pitches per octave, but larger numbers of keys, Colonna's 42 keys, Stella's 53 keys. Chapter I is entirely devoted to the another seventeenth-century archicembalo, the cembalo omnicordo by Francesco Nigetti, an instrument that went through various versions and was elaborately described by its eighteenth-century owner Benedetto Bresciani.

Chapter J is the last chapter on 'closed-chain equal tempered systems' and is devoted in its entirety to the flauto traverso enarmonico designed by Giovanni Battista Orazi toward the end of the eighteenth century and described in Orazi's booklet *Saggio per costruire e suonare un flauto traverso enarmonico* (Rome, 1797). The enharmonic flute is a flute with an extension to low G (so that violin parts can be played upon it) and with extra keys to make possible the chromatic and enharmonic genera. The enharmonic genus is in fact realized by the addition of quartertones to the 12 ETS. Orazi also provided some compositions, for three flutes, for the new instruments, which are transcribed in Barbieri's book, and, indeed, the third flute goes

down to low G frequently and all parts employ quarter-tones, mostly as passing notes or written-out glissandos, sometimes in a more essential way.

From the summary presented above it will be clear that Barbieri very definitively stops his discussions at 1900 and does not pay attention to any twentieth-century development in the area. On the one hand this seems wise, since the musical environment changed radically around or briefly after 1900 with many new ways to approach musical composition, many of them leaving behind conventional harmony, melody, rhythm and metre. But on the other hand many twentieth-century enharmonic instruments seem to follow the leads of the past. The various quartertone instruments, the 31-note keyboards and the just intonation percussion could be perfectly described in the terms developed for the instruments of the previous four centuries.

Barbieri's book is not one to read from beginning to end. Rather, one should read single chapters, digest the information contained in them, and then pass on to another chapter. Or one can use it as a reference work, not to be read in the strict sense of the word, but to be consulted when one wants to know something about a certain theorist, a certain instrument or a certain enharmonic composition. Barbieri's knowledge of sources is amazing. In many cases he not only uses the primary published and often-discussed texts of a certain author, but in addition he is able to cite contemporary letters, references, unpublished manuscripts relevant for the case discussed but rarely if ever cited by previous authors on the subject.

It is true, Barbieri's work is to a certain extent italo-centred: among the most frequently quoted theorists in the index we find many Italian 'enharmonic' authors: Benedetto Bresciani, Pietro Della Valle, Giovanni Battista Doni, Athanasius Kircher, Giordano Ricati, Nicola Vicentino, Gioseffo Zarlino. Except for Ricati, these are all familiar names. Two seventeenth-century Spanish authors, not yet universally known, are quoted often by Barbieri, namely Juan Caramuel Lobkowitz and Joseph Zaragoza. The most often quoted foreign (that is, not Italian) authorities bring no surprises. They include, in alphabetical order, Robert Holford Macdowall Bosanquet, Leonhard Euler, Marin Mersenne, Jean-Philippe Rameau, Joseph Sauveur and Thomas Perronet Thompson, all well-known names in the history of tuning and temperament. Among the modern authors James Murray Barbour and Mark Lindley are most often quoted, and this is no surprise.

The book is, as to be expected, full of formulas, tables, diagrams, illustrations (often from the sources described), photographs of instruments (original or reconstructed copies) and paintings, and so on. Barbieri's style of writing is derived from the sciences: brief and succinct and quickly going from the premises to the conclusions. Each chapter starts with a short overview of the topics to be discussed, as does the book as a whole. Most chapters start with a little theory, if only to introduce the concepts, symbols and quantities used to analyze the various systems to be discussed later on. Chapters are always concluded by a section entitled 'Conclusions', in which the results of the analyses are summed up. Some chapters, such as Chapter F on Equal Tempered Systems, are centred around theoretical discussions, but most often it is the source to be discussed that steers the theoretical discussion and not the other way around. Barbieri rarely creates a framework of his own. The source has the absolute priority, and accordingly the book contains many quotations, sometimes too many to my taste. The book is indeed centred around (and 'controlled by') the enharmonic instruments, rather than the theory of tuning and temperament or the enharmonic musical repertoire.

Despite the theoretical introductions to most chapters this is no book for 'beginners'. It presupposes at least some general knowledge of the subject - otherwise, one is too overwhelmed by the avalanche of information to be able to grasp the tenor of the various chapters - and some experience in dealing with interval ratios, with temperings, with logarithmic measures, and so on is no superfluous luxury. Knowledge of the Italian language is not required. All quotations after Italian authors are given both in the original wording and in English translation. The same is true for the quotations after texts originally written in Latin, Spanish or French. German sources are used every now and then.

As Barbieri has done in some of his earlier publications, this one also include a few source texts in full transcription, such as the documents around Nigetti's cembalo omnichordo on pp. 479-505 and those around Giovanni Battista Orazi's flauto traverso enarmonico on pp. 530-545.

The title of the book also promises a discussion of enharmonic music, not just the instruments. And indeed, wherever music can be connected to the instruments and systems to be discussed, Barbieri provides information on it or even provides a transcription. Not always can such music can be found: many instruments were designed with the goal to play 'normal' music but in better intonation. Sometimes fragments are quoted that illustrate particular advantages of certain systems. It is a pity that not all the musical material (including many 'ordinary' music examples) has been set in a uniform and easily readable way. Now we find computer-set music examples and pieces, music photographed from other publications, facsimiles, handwritten transcriptions and so on, in many cases, to my taste at least, in too small a type. (For the rest the typography is very good, apart from the often rather overcrowded pages due to the many tables, illustrations, quotations, and so on.) I would have like some more analysis and explanation of the pieces of enharmonic music, especially to understand in which way the composition made use of the additional possibilities that the enharmonic instruments made possible. A little CD is added to the book on which most of the more extended music examples can be heard in a synthesized performance, without any aesthetic claim, merely to make audible how they sound.

Barbieri's Enharmonic instruments and music is certainly a book to be possessed, to be consulted and to be read by all those interested in the history of enharmonic instruments. One cannot say or write something about enharmonic instruments or enharmonic music any more without first referring to the information contained in Barbieri's book.