Review of Patrizio Barbieri's *Enharmonic Instruments and Music 1470–1900*

Jesper Jerkert
Division of Philosophy, Royal Institute of Technology (KTH), Stockholm
jerkert@kth.se

Patrizio Barbieri: *Enharmonic Instruments and Music 1470–1900: Revised and Translated Studies*. Latina: Il Levante Libreria Editrice, 2008, xii+616 pp (cd included). isbn 978-88-95203-14-0. € 60 (hardbound).

Italian musicologist Patrizio Barbieri has written extensively on historical instruments, temperaments, and acoustics. The book under review is a revised compilation of previously written papers, almost all of which were originally published in Italian.

The concept of enharmonicity arises from the fact that certain tone pairs seem to refer to almost identical pitches. For example, from a given C we can find the fundamental frequency (and hence the pitch) of C♯ – either by using only fifths and octaves in accordance with the Pythagorean schema, or by taking the ratios of fourths, thirds, and maybe even smaller intervals for granted as well – and we can also find the pitch of D♭ in a similar manner. We will find that the pitches of C♯ and D♭ are close to each other (exactly how close will depend on the methods we allow for finding them). C♯ and D♭ are obviously not identical, but they are close enough to be treated as identical in certain musical settings. Therefore, they are enharmonically equivalent.

An enharmonic instrument is an instrument where multiple ways of producing enharmonically equivalent tones are available. For example, an enharmonic keyboard could have separate keys for C♯ and D♭, as well as for each tone in other enharmonic pairs such as D♯/E♭, F♯/G♭, G♯/A♭, and A♯/B♭. An enharmonic keyboard is thus guaranteed to have more than 12 keys per octave. Note, however, that the extra keys need not be found among the sharps and flats. On p. 20 in Barbieri's book, for example, an organ from the end of the 1400's is depicted with no extra black keys but with two E keys, one suitable for use in an E major chord, and another better fitted as the third in a C major chord.

It seems to me that three broad topics could be – and should be – covered in a book about enharmonic instruments and music: the evolution of the instruments, the history of music with enharmonic features (whether intended to be played on enharmonic instruments or not), and theoretical developments in tuning systems; and the interplay between all three areas. Barbieri succeeds admirably in writing about all areas. The book is divided into eleven chapters A–K. Some of these are overviews, whereas others are more detailed studies.

Chapter A gives an introduction to enharmonic instruments, the underlying tuning theories and various instruments presented from the late 1400's up to the

early 1600's. After the invention of split keys, instruments were built with an increasing number of keys per octave. For example, Vito Trasuntino built an instrument in 1606 with 31 keys per octave. Between major seconds such as F and G, keys for F♯, G♭, F♯♯, and G♭♭ were available.

The latter history of enharmonic keyboards is the topic of chapter B. British theorists dominated the scene until the 1860's, when theorists of other nationalities followed the lead. After 1880, the relative popularity of enharmonic tunings diminished rapidly, due not least to the spread of the piano with its equal temperament.

In instruments with free intonation, such as non-fretted strings, the question of proper intonation is particularly entangled with enharmonicity and associated micro-intervals. If the interval C-D (major second) is taken to be 9:8 and C-E is 5:4 (pure major third), it follows that the major second D-E is 10:9. Since there are two kinds of major second, 9:8 and 10:9, it follows that an E played as the third tone in C major should not be equal to an E played as the second tone in D major (or minor), if D is fixed and identical in both scales. More precisely, the E's will differ by one syntonic comma (81:80). A professional violin player has the skill to adjust the intonation accordingly, whereas amateur players might be unable to take such tiny adjustments into account. In chapter C, Barbieri shows that this and related intonational issues have been discussed by many theorists and instrumentalists. Intonation difficulties have also affected the tuning of violins, where some have preferred one or several of the fifths to be flattened. For example, Andreas Werckmeister, in 1691, states that "if the 5ths are tuned purely, the result will be impure intonation" (p. 124). Even today, some string quartets are known to use flattened tuning, particularly in the cello.

Chapter D charts the influence of ratios involving the numbers 7 and 11 in tuning. Especially the number 7 and its inclusion or exclusion from consonant interval ratios is discussed in a historical exposé from Giovanni Battista Doni (1594–1647) to Hermann von Helmholtz.

Chapter E is devoted to the revival of ancient music in the early 1600's, in particular as presented by Doni. It involved the interpretation of greek theories as well as the construction of instruments with which one could play the ancient *tonoi*, in particular the Dorian, Phrygian, and Lydian.

Chapters F and G review the theory and practice of equal tempered systems, of which the system with 12 tones is ubiquitous today.

Chapter H–K are detailed studies of particular enharmonic instruments of greater or smaller significance, their histories and the theories associated with them.

Throughout, Barbieri quotes generously from relevant sources, displaying the quotes both in the original languages (Italian, French, German) and in English translations. The wealth of original quotes and the encyclopedic scope give weight to Barbieri's book and invite researchers to use the book as an inspiration for further inquiries in this field. The book contains over 100 illustrations, in addition to numerous tables and music examples.

On the accompanying mini CD, 18 tracks with digitally created music examples are given. These are very welcome. For instance, the reader will find that harmonic progressions much more daring than mere *chromatic fantasias* were written already in the early 1600's, such as a piece published by Abdias Treu in 1635. Another striking piece is a flute trio by Giovanni Battista Orazi (d. 1804) with several enharmonic/chromatic scale sequences. This music was written for

a particular instrument built by Orazi himself.

My only complaint – admittedly a minor one – is that parts of chapter G seem to be more related to the history of mathematics than to the history of music. Barbieri's volume of course requires some familiarity with the mathematics of tuning systems. Although Barbieri gives some background in chapter A, I believe that many readers might benefit from consulting Barbour (1951) first or, for the mathematically more advanced reader, Benson's (2004) chapters 5–6.

Overall though, Barbieri's book is impressive and very thorough. It should be available in every academic music library and will be rewarding to musicians and composers interested in the intricacies of intonation and micro-intervals, ancient and modern. The book is a most welcome contribution to the history of instruments and tuning theory.

References

Barbour, J. Murray (1951). *Tuning and Temperament: A Historical Survey*. Mineola, NY: Dover, 2004 (originally published by Michigan State College Press, 1951).

Benson, David J. (2004). *Music: A Mathematical Offering*. Cambridge: Cambridge University Press.

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