background ecclesiastical and liturgical knowledge is expected of the reader. Finally, a small point: the present reviewer had not previously seen the word 'witness' used instead of source. This volume is highly specialised, but can be recommended to anyone interested in music and liturgy and the world of the late medieval Church in England and Wales.

ROBERT MANNING

Meantone Temperament on Lutes and Viols
DAVID DOLATA
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If you are really fussy about tuning, this is the book for you! Such fussiness has always affected a minority of players. Those who spend a lot of time listening to the sounds of their instruments tend to be the most fussy. The issue involves the reaction to when two notes sound together. When the notes are nearly in unison or an octave apart, things are simple, with the closeness of the notes to each other being obvious. If they are near enough, the interval has been considered consonant (it sounds good); not near enough, it is considered dissonant (it sounds harsh).

Concerning other intervals, things became more complicated, with what was consonant or dissonant often being a matter of fashion. Passing notes can be ignored, but important notes need to be consonant, except when dissonance is wanted as a special effect. As Dolata explains, in early medieval times, fourths and fifths were considered consonant and thirds dissonant. By the Renaissance, thirds became of utmost importance, with fourths becoming dissonant: a fourth became consonant only when it dropped to a third.

Medieval monks used a scientific musical instrument to measure consonance: the monochord, a primitive instrument with a single string. One can shorten a vibrating string by half, and it sounds an octave higher; shorten it by a third, and it is raised another fifth; by a quarter, a fourth; by a fifth, a major third and by a sixth, a minor third. Music was thus mathematical.

The sounds produced in this way were considered true, pure or just. The rationale for consonance is that each note has harmonics in its sound, and if the interval between two notes is not true, there are harmonics in each that are dissonant. When they are dissonant, there are beats between those harmonics. This is more obvious with metal than with gut strings.

Piano tuners are trained to hear these beats, so they can tune pianos to modern equal temperament; most listeners are not burdened by such sensitivity. One can tune all the fourths and fifths to be true, but then the major thirds would be very sharp, to the amount known as the 'syntonic comma'; the result is called 'Pythagorean intonation'. The job of temperaments has been to allow fifths to become somewhat narrower than 'pure', so that thirds become closer to consonance.

If we reduce the fifth by ¼ comma, the major third becomes pure; this is known as 'standard meantone'. If it is reduced by one eleventh of a comma, one arrives at equal temperament, our modern standard, which could be considered a type of meantone, although it isn't. In equal temperament the major thirds are still quite wide, and the purpose of meantone temperaments is to narrow them further to become closer to pure. A rare meantone temperament reduces the interval of a fifth by one third of a comma; a minor third then becomes pure. More common types of meantone are ⅕ comma, ⅙ comma and ⅛ comma.

All this has to do with notes in a scale when combined in chords. With instruments

such as lutes and viols, which have at least five different open-string pitches with straight frets crossing all of them, it would seem very difficult to organise the fretting to achieve more purity of thirds than the ubiquitous equal temperament allows (as exemplified by the fretting of modern guitars). But many musicians in the Renaissance and Baroque eras, as well as nowadays, have found ways to do this, and this book shows us how.

In the various temperaments, diatonic semitones (i.e. between those with different note letters) are wider than chromatic semitones (between those with the same note letter). In Pythagorean tuning, the opposite is true. The placing of the frets shows these differences rather clearly. On lutes especially, the notes on the highest-pitched string are the most important, and the fret-spacings of the temperament usually apply to highest string.

This book is divided into three parts: history, theory and practice. The history section begins by examining the written sources. Here we learn that Bermudo (1555) advocated Pythagorean tuning, following the theory of the ancients, but admitted that practice might differ. Agricola (1545) complained that most lutenists and bowed instrumentalists used equal-temperament fretting, ignoring the difference between the two types of semitones. Valentini (*c.* 1642-5) said essentially the same thing.

Galilei (1581) specified the equal-temperament 'rule' that the next fret should be located at one eighteenth of the distance from the previous fret to the bridge. Gerle (1532) and Dowland (1610) described a fretting (called by Dolata a 'utilitarian' tuning) that does not conform to any regular system. But significantly, most authors stated that ultimately, fretting was determined by the ear.

The most convincing evidence for early meantone fretting is from the fingerboards of surviving wire-strung instruments. Some of these fingerboards have slots with brass strips in the bridge side, while the rest of each slot is filled with a wooden backing which is often colour-coded. Forrester has studied the many citterns in museums, and has concluded that in most, the fretting is ⅙ comma meantone, while some Italian citterns are closer to ⅓ comma meantone.

Dolata analysed the fretting pattern of the Palmer orpharion and concludes that the first seven frets tend towards ⅙ comma meantone (with much variation) but the higher frets tend towards equal temperament. His analysis of the Rose orpharion/bandora led him to conclude that its fretting comes very close to equal temperament (though Dolata suggests that this was intended to be a subtle form of meantone temperament).

The final historical chapter examines the fretting patterns found in early paintings and drawings. Dolata discusses exhaustively the problems involved. Some depictions appear to show meantone tempering; more show equal tempering and very many would be impossible to convert into normal sounds. It seems that the artist and the intended viewers were not particularly concerned about this.

The second section of the book, concerning 'theory', is presented in two chapters entitled 'Inside the Numbers: How Tuning Systems Work and Why We Need Them' and 'Tour through Tuning Systems'. The style is that of a textbook, intended to provide the reader with enough experience to select appropriate temperaments in varying performance environments.

The final section, on 'practice', is a detailed discussion of practicalities concerning the lute, theorbo and viol. Mundane issues such as open-string tuning, string attachment and the effects of humidity are covered. Strategies to improve intonation in the fretting are described: these include placing a fret in a compromise (or middle

ground) position, slanting a fret, splitting a double fret, adding an extra tied fret, sticking a piece of fret on the fingerboard under some of the strings (*tastino*) and pushing or pulling the string with the fingering finger (Dolata appears not to mention ornamenting a note to obscure its awkward pitch). How to solve tuning problems when playing continuo is also discussed.

This book is well written in a friendly style, and it fulfils its tutorial intention very well. Since my ear is not particularly sensitive, I am not unduly troubled by the sharp thirds in equal temperament. If the sensitivity of my ear were to increase, however, I would take the contents of this book very seriously indeed.

EPHRAIM SEGERMAN

the activities of Italian guitarists, primarily Francesco Corbetta, Giovanni Paolo Foscarini and Angelo Michele Bartolotti, as teachers and performers in Italy and beyond, after they had settled abroad. There is an interesting section about the Dutch scholar, Constantijn Huygens, who played the lute and guitar, and corresponded with Foscarini in Paris and Sébastien Chièze, the Prince of Orange's ambassador, in Madrid.

The third chapter is a useful summary of academic research into of the role of the guitar in accompanying early seventeenth-century Italian song. Ch. 4 is a survey of the solo repertoire. Spain's 'unwritten repertoire' is briefly outlined. Solo music from some Italian sources of the first half of the century is then discussed, including Montesardo's *Nuova invenzione* (1606)