

silver leaf, and the 14th-century manuscripts of Machaut's works presenting a flawless balance on each page of text, notation and painted miniature) jostle alongside some of the scrappiest—yet arguably most interesting—examples of medieval writing: pen-trials and doodles in margins and on flyleaves that can reveal a great deal about the concerns of those engaged in writing or rewriting the book.

The presentation of *L'image musicale* is sumptuous, and a long and useful bibliography forms the last of four appendices. If one criticism may be made of the production, it is that the image captions give the manuscript shelfmark and folio number, together with the title of the musical piece illustrated, but not the manuscript's date or type (missal, psalter, etc). For many of the plates this information is supplied in the commentary on the facing page, but for others, the reader must refer to the table of manuscripts at the back of the book (between the glossary and the bibliography). For the student and non-specialist reader—the most likely users of this book—it would have been more useful to present this information in the captions themselves, even if that had meant consigning the bibliographic details to an appendix. The first appendix includes transcriptions of 12 items illustrated in the plates, but the logic of the decision to include such a small fraction of the total, and to show only the texts and not the musical notation of these, is not immediately clear.

Although some of the illustrations have been frequently reproduced in histories of medieval music, many are from less well-known manuscripts held in French provincial libraries; of the more familiar images, some are available for the first time in colour here. As a teaching tool and an introduction to the world of medieval manuscripts, particularly given its low price, this book forms a welcome complement to Nicolas Bell's slender volume *Music in medieval manuscripts* (London, 2001).

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Ibo Ortgies Not quite just

Ross W. Duffin, *How equal temperament ruined harmony (and why you should care)* (New York: Norton, 2007), £17.99/\$25.95

Temperament, tuning and intonation are recurrent topics in music theory and performance practice. Yet deeper

understanding about them is to be found only in a limited circle of musicians, instrument makers and musicologists—mainly those who tune or research instruments with fixed pitches (keyboard instruments, harps or lutes). The theory and history of temperament and intonation are well covered in thousands of publications. Most musicians, however, tend to avoid this reading, since presentations of the matter are often quite dry and mathematical. Hands-on advice is rare and does not regularly appear in music education. But the practice and theory of intonation should be a central subject in the curriculum of all music courses, for this would eventually improve performances greatly. Any book whose author achieves wider awareness of the topic, as Ross Duffin aims to do, is very welcome, and Duffin largely succeeds in his goal. The title, however, is somewhat misleading, as it implies that the book deals only with temperament, when in fact it also covers the historical development of intonation of freely intoning musicians. Actually, this is the main point of his book, as stated on p.151. It would have helped if this had been reflected in the title, even if the wording were somewhat less catchy.

Duffin explains the basics of intonation and temperament in physics (using the harmonic series), just intervals, just intonation and the small but audible discrepancies (commas) that require on any instrument with all notes tuned in fixed pitches a choice between a tuning based on a selection of just intervals or a tempered tone system based on just intervals and/or tempered intervals. The presentation of the basic principles is lucid, as one would hope to find in an easily accessible introduction to the field.

Instruments with flexible intonation and the voice, however, are as a matter of principle free from restrictions of temperament. Over the centuries there has been much discussion of how their intonation is or should be related to the fixed-pitch instruments that accompany them. Duffin refers to printed teaching manuals for singers and instrumentalists of the 18th and 19th centuries from all over Europe, as well as to other historical reports. His presentation of evidence from the 19th century is especially noteworthy, as it is not generally known that well into the 19th century older principles of pure intonation were widely taught and applied.

Duffin's hypothesis is that since the 18th century the gradual introduction of equal temperament (12 equal steps per octave, henceforth 12-ET) undermined the knowledge and abilities of professional musicians about the principles of intonation, which led finally to the (un)musical result that good intonation has by and large

vanished from our musical life. One can certainly agree with the basic outline of the hypothesis. I would question, though, whether 12-ET in the required precision existed before well into the middle of the 19th century, and the claimed predominance of 12-ET in classical music today is also doubtful. What we hear from all kinds of professional ensembles is neither 12-ET nor anything close to it. It is in most cases a hotchpotch of pitches without any discernible intonation principle at all (the permanent vibrato producing a 'grey area' of tone around many pitches), or an exaggerated Pythagorean intonation (with excessively high leading notes and likewise high major 3rds, thus indeed ruining harmony). In practice we seldom hear 12-ET except on professionally tuned pianos and electronic instruments. Yet even if not everyone in our culture grows up only or even mainly with 12-ET, the notion that 12 equal pitch classes per octave are sufficient must be seen as a major factor in the deterioration of our sense of intonation.

I have a number of criticisms of Duffin's approach, and will concentrate on the essential ones. Like many other authors writing on the history of temperament and intonation, he makes little distinction between the theoretical concepts and the actual practices of tuning and temperament at a given time. Depending on the region, the date and the type of instrument, there could be long chronological overlaps and the simultaneous existence of several tone-systems.

Although Duffin presents an interesting and useful selection of historical evidence, I find his attitude to the historical material is insufficiently critical and that this lack of discrimination undermines even his main conclusion and advice to musicians. His main claim rests on an already historical misinterpretation of the division of the octave into 55 equal parts, an equal temperament of 55 steps (55-ET: Duffin calls it 'extended meantone', because of certain resemblances to a variant of standard meantone temperament). The older music theory defined a chromatic semitone as comprising four 'commas' and the (larger) diatonic semitone as comprising five. The octave, containing seven diatonic semitones and five chromatic ones, must then consist of 55 commas, and Duffin correctly points out that two different whole tones result: a major whole tone (ratio 9:8) comprising nine 'commas', and a minor whole tone (10:9) consisting of eight such commas. Both whole tones together form the pure major 3rd, 5:4, so crucial for harmony.

However, if one takes the historical explanatory model of 55-ET at face value, as do Duffin and his historical forerunners until well into the 19th century, it appears—

arguably—as a rather precise indication of an actually applied or applicable intonation principle, based on 5ths that are virtually short by $\frac{1}{6}$ of a Pythagorean comma. (The Pythagorean comma is the difference of 12 stacked pure 5ths minus seven octaves—a small interval approximately $\frac{1}{8}$ of an equal-tempered whole tone. In a circle of twelve 5ths, the Pythagorean comma always needs to be subtracted, either as a whole or in fractions, from one, several or all of the 5ths.) Tunings and temperaments based on this fraction, although useful in constructing various theoretical temperaments (as in many 18th-century treatises), have the great disadvantage that the major 3rds sound already audibly out of tune (though less than in 12-ET), while the 5ths fare little better than in $\frac{1}{4}$ -syntonic meantone temperament (the standard temperament in many regions in Europe until well into the 19th century).

By contrast, a division of the octave in 53 parts, known since the first half of the 17th century, provides in all musically relevant intervals a much better approximation to purity. Its 5ths and 3rds are in practice indistinguishable from purity. 53-ET did not become the basis of intonation theory and musical education of the 17th to 19th centuries, probably because it did not fit the aforementioned, axiomatic, earlier 'comma-theory'. Similar reasons may have prevented the success of 31-ET, which is certainly easier to handle, with its excellent major 3rds, and with 5ths that in ensemble intonation are indiscernible from 55-ET. After all, 31-ET was advocated in the 16th and 17th centuries, and keyboards equipped with 31 notes per octave were used in Italy, at the Habsburg court chapels in Austria, in Spain, probably in the Netherlands, and maybe in Germany. Instruments with 19 notes per octave, however, were much more common until the 17th century to support intonation. Most often an extended variant of classical meantone seems to have been applied to them instead of 19-ET. And subsemitones as a means to widen the range of meantone temperament were found on many stringed keyboard instruments and organs throughout Europe.

Duffin does not explain this theoretical or historical background, or the advantages and disadvantages of the different models and approaches. While it is perfectly legitimate to concentrate on the 55-ET from a historical viewpoint, 53-ET, 31-ET, or in practice a 19-note/octave keyboard will serve much better if one wishes to educate musicians in improving their intonation. Even if one follows Duffin and his famous historical forerunners such as Telemann, one wonders why Duffin is less pragmatic than his predecessors. Telemann made perfectly clear that

55-ET was meant only as a theoretical approximation of the pure intonation of professional musicians that one heard daily in his time. Yet Duffin omits this important clue from Telemann, despite quoting other passages from his work (p.74).

The historical sources do not ask of the performer what Duffin advises, namely an intonation that follows as closely as possible the defined out-of-tuneness of 55-ET intervals. By far the majority of writers on the subject in the 18th century agreed that the freely intonating musicians should not adhere to the inflections of any tempered interval, whether 5ths, 3rds or anything else. It is, moreover, impractical for a player to achieve and control the required minute deviations. In the practice of pure intonation during previous centuries, it apparently did not matter that the theoretical basis was flawed. The result in professional music-making was what counted, namely intonation as pure as possible above the bass note.

Duffin's discussion of 55-ET, and thus his focus on an intonation dependent on a fraction of the Pythagorean comma, relegates the role of the syntonic comma. (The syntonic comma is the difference of four consecutive pure 5ths minus a major 3rd and two octaves, resulting in a small interval approximately $\frac{1}{9}$ of an equal-tempered whole tone. It is the amount by which a pure major 3rd is smaller than a major 3rd built up from pure 5ths.) Yet historically and systematically the syntonic comma was more important for non-keyboard intonation, with the 3rds being a crucial component of harmony.

Duffin's book contains much additional information in the form of excursuses. About a fifth of the volume consists of biographical information, each filling often two-thirds of a page, leaving the rest blank. An appendix, or references to encyclopedias, might have been more appropriate for this material. By contrast, the few digressions on specific topics could easily have been increased in number and depth.

Duffin's book cannot be unreservedly recommended to an interested reader unfamiliar with the subject. Although in general it aims in the right direction and undoubtedly offers valuable and useful advice, it does not fully achieve its stated purpose because the background of some important historical and tone-systematical principles of intonation is not correctly presented. The book is most useful if read in consultation with a colleague or teacher who can put the historical evidence in context and can also handle the deeper theoretical aspects of intonation.

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Bridging Renaissance and Baroque

European music, 1520–1640, ed. James Haar
(Woodbridge: Boydell, 2006), £75/\$145

Recent years have seen a rebirth of the single-author survey of the major periods of music history. In this context Leeman Perkins's *Music in the age of the Renaissance* (New York, 1999) or John Walter Hill's *Baroque music* (New York, 2005) stand out, not to mention Taruskin's magisterial *Oxford history of Western music* (Oxford, 2005), the first two volumes of which span the medieval to Baroque eras. These books provide the student and professional with expert, updated and accessible surveys of these periods, yet they may also reinscribe period boundaries that appear more and more illusory upon closer examination. James Haar's *European music, 1520–1640* represents one attempt to approach the transition between 'Renaissance' and 'Baroque' with a more sensitive ear for continuities across the traditional dividing year of 1600. Haar assures us in his preface that 'the dates chosen, 1520–1640, were not and are not arbitrary: 1520 marks the establishment of the *ars perfecta* represented (for Glareanus) by the completed work of Josquin; 1640 is an appropriate if approximate terminus for a late-Renaissance/early-Baroque period including the career of Claudio Monteverdi' (p.vii). If Josquin and Monteverdi appear here as bookends for a rather new kind of periodization, these essays by a stable of leading international scholars focus more on geography and genre than the biographies and achievements of a few great figures.

The time frame, of course, would seem to call into question the status of 'Renaissance' and 'Baroque' as guiding terms in the first place, and indeed the first three essays, by Gary Tomlinson ('Renaissance humanism and music'), Haar ('The concept of the Renaissance') and Tim Carter ('The concept of the Baroque'), address these problems directly. Some scholars have dispensed with these terms altogether, preferring the broader designation 'early modern' derived from historians of the 16th to 18th centuries. The periodization offered in this book might seem more consistent with that term, but Haar's essay amounts to a rescue operation for the 'Renaissance' in music, achieved by defining precisely what the term encompasses—the revival of ancient philosophies of music, the linkage of music and rhetoric, religious renewal,

performance—not something that I was addressing in this instance. However I have a companion article entitled ‘Forqueray *Pieces de viole*: a rich source of mid-

eighteenth-century French string technique’ shortly to be published in the *Journal of the Viola da Gamba Society of America*, xliii (2006), pp.5-31.

1 In Italian music it can already be found as a thoroughbass signature around 1650.

2 Jean-Henry D’Anglebert, *Principes de l’accompagnement*, included in *Pièces de clavecin* (1689) Le pupitre/Heugel, ed. K. Gilbert, p.145.

3 *Traité d’accompagnement pour le théorbe et le clavecin* (1690); trans. C. Mattax, *Accompaniment on theorbo & harpsichord: Denis Delair’s treatise of 1690* (Bloomington, 1991).

4 *Regle pour l’accompagnement par M^r. Couperin organiste Du Roy &c^o*, c.1690.

5 St Lambert, *Nouveau traité de l’accompagnement de clavecin, de l’orgue, et des autres instruments* (Paris, 1707); trans. J. S. Powell, *A new treatise on accompaniment* (Bloomington, 1991), p.30.

6 *Methode pour l’accompagnement du clavecin* (1733) facs. edn Minkoff.

7 Although François Couperin explains the 6/5/3 chord he does not yet call it the *grande sixte*!

8 Including Jean-François Dandrieu’s *Principes de l’accompagnement du clavecin* (1719)

and Michel Corrette’s *Le maître de clavecin pour l’accompagnement* (1753).

9 ‘On aura la bonté de faire attention qu’il faut rapprocher l’accompagnement du Clavecin le plus près de la basse qu’il sera possible, afin qu’il ne se trouve point plus haut que la *Pieces de Viole*.’

10 Ancelet, *Observations sur la musique, les musiciens, et les instruments* (Amsterdam, 1757), p.24.

Quite un-just—a response

In his review of *How equal temperament ruined harmony (and why you should care)* (‘Not quite just’, *Early Music*, xxxv/3, 2007, pp.452–4), Ibo Ortgies says many nice things about my book, and for that I am grateful. Any time someone with his specialized knowledge and experience finds something positive to say about a work in his field—especially a contentious field like tuning and temperament—it is a cause for celebration. However, his specific criticisms of my ‘approach’ seem to me so arbitrary that I cannot let them go without some sort of response.

He criticizes, first of all, my focus on 55-ET (or extended sixth-comma meantone) because the resulting system’s ‘major 3rds sound already audibly out of tune (though less so than in 12-ET)’ and its ‘5ths fare little better than in quarter-comma syntonic meantone temperament’. So, it is subjectively easy for me to beg to differ and say that its major 3rds are gratifyingly better than 12-ET and its 5ths are substantially better than in quarter-comma meantone—not at all ‘indiscernible’ as he characterizes them. If you accept, first of all, the principle that string players tune to the accompanying keyboard at least as far as their open strings are concerned (and that certainly seems to be the practice among early musicians today), then ask those string players why they do not like to play with a keyboard tuned in temperaments like Werckmeister or Kirnberger. It is because the approximately quarter-comma 5ths on the open string notes are excruciatingly narrow—too narrow for the tolerance of most string players. Sixth-comma 5ths, though narrower than ET, are better than

quarter-comma 5ths, and as I point out in the book, the major 3rds are half-way between ET and pure major 3rds. It is a compromise, but the justification (if I can use that word) is that the tritones and diminished 5ths of the system—the driving force of most complex harmonies in the tonal period—are acoustically pure.

Ortgies, in fact, says that non-keyboard players would have been and should be now trying to tune all of their chords—5ths and 3rds—pure above any bass note. I have been an outspoken advocate of Just Intonation in the performance of Renaissance music (see my article in *Music Theory Online*, xii/3 (2006)) but I simply do not think it works for much later music and I do not think that is what performers were doing, are doing or should be doing. Modern musicians, such as string quartet players and trombonists, for example, sometimes protest to me that they play in Just Intonation all the time. My guess is that they are probably simply tuning pure chords when the opportunity presents itself—not a bad thing, but not Just Intonation. So, my usual response is to ask them how they handle the large and small whole tones. If you play in Just Intonation, then you must have pure major thirds consisting of one large and one small whole tone. If you do not have that, then you are not playing in Just Intonation. If you have pure major 3rds throughout without the large and small whole tone, then you are averaging the size of the whole tone and you are playing in extended quarter-comma meantone (roughly 31-ET), which is basically what Ortgies is recommending, even though the 5ths are even narrower than they are in

extended sixth-comma meantone, or 55-ET. And of course, tuning individual pure chords is equally possible and perhaps even easier to accomplish from 55-ET than from 12-ET.

In fact, Ortgies points out (incorrectly attributing the comment to me) that 55-ET contains the possibility of a 9-comma whole tone and an 8-comma whole tone—large and small, exactly as in Just Intonation. But no writers of the period who talk about 55-ET consider a viable 8-comma whole tone and, in reality, in the 55-ET system such a tone would be very small—about a quarter of a semitone smaller than a 12-ET whole tone. Combined with the already smaller 9-comma whole tone in 55-ET, this 8-comma tone would create a major 3rd that is so narrow as to be basically unusable. The whole point of 55-ET is a 9-comma whole tone of *uniform* size that is divided into large and small semitones. Such a system is easy and consistent and I believe it was the standard for a very long time: a 5th tempered slightly narrower than in 12-ET, a major 3rd that is narrower and thus closer to pure than in 12-ET, a smallish whole tone of uniform size and semitones that were of two consistent sizes in *predictable* places—large for the diatonic (scalar) semitones, and small for the chromatic semitones. That is it. And why do I think that the system lasted so long? Well, in part because many of the prevalent keyboard tuning systems from the 18th century onwards use sixth-comma narrow 5ths over the open strings of the violin family. And because frequency analysis of the recordings of the great 19th-century violinist Joseph Joachim in 1903 shows open-string 5ths that average a sixth-comma narrow. Ortgies, while criticizing my lack of practical application ('Duffin is less pragmatic than his predecessors'), fails to note this crucial practical evidence.

He proposes moreover that '53-ET [a Just Intonation approximation], 31-ET [an extended quarter-comma meantone approximation] or in practice a 19-note/octave keyboard will serve much better if one wishes to educate musicians in improving their intonation'. I fail to see how the 53-ET system, with its large and small whole tones, or the 31-ET or 19-ET systems, with their narrower 5ths than in 55-ET, are so superior to what I am proposing. 31-ET, 19-ET and 43-ET (an extended fifth-comma meantone approximation that Ortgies does not mention) are all, indeed, variants of the same kind of system as 55-ET, with exaggerated differences in the size of the semitones. And how a '19-note/octave keyboard', a rare instrument even in the early music community (whether tuned in 19-ET or partially extended quarter-comma meantone), is going to help musicians everywhere improve their intonation in

practical terms today is baffling to me. I know of only four such instruments in the world for sure, though there may be a handful of others. One of the four is owned by Ortgies, which explains why he finds its use in learning intonation so practical. Any musician wanting to learn to use extended sixth-comma meantone in practice, on the other hand, could do so at a website I developed, and which is cited on p.172 of my book.

Ortgies notes that Telemann, one of my predecessors as an advocate of 55-ET, 'made perfectly clear that 55-ET was meant only as a theoretical approximation of the pure intonation of professional musicians that one heard daily in his time', yet complains that 'Duffin omits this important clue from Telemann'. Aside from the gratifying acknowledgment that 55-ET was heard daily among professional musicians in the 18th century—a stunning endorsement—I suppose he means I should have said something like 'In reality it's not essential, or even possible for that matter, to meet the exact cents figures for these intervals ... Any movement in the direction indicated will make the harmonies better', as I did on p.152.

He also protests that, contrary to historical sources, I am insisting on 'the defined out-of-tuneness of 55-ET intervals'. I have already mentioned extended sixth-comma meantone's pure tritone and diminished 5th that, in the more complex harmonies of the 18th and 19th centuries, more than compensate for the narrower 5th in my opinion, and its major 3rd is unquestionably better than in 12-ET. Ortgies prefers the 53-ET system because it approximates Just Intonation even though he concedes that '53-ET did not become the basis of intonation theory and musical education of the 17th to 19th centuries'. So why are we even having this discussion? And, setting aside the historical and theoretical pedigree for the 17th to the 19th centuries (or lack thereof), what would Ortgies do in practical terms, I wonder, with a pure minor-3rd harmony of B-D, to which is added an F, tuned as a pure minor 3rd to the D. That would push the F about a third of a semitone higher than in 12-ET, making the harmony sound strange and creating melodic problems for whatever comes after. Ortgies is welcome to his theoretical predilection for justly tuned intervals, but I do not think he can sustain his view that Just Intonation is what performers were doing generally in the 18th and 19th centuries, or what performers should be doing in practice today, and his predilection is just as subjective as my own for extended sixth-comma meantone (though I have several period theorists agreeing with me). He even admits that 'it is perfectly legitimate to concentrate on the 55-ET from a historical viewpoint', and I would suggest that the

early writers on this issue did not promote this system from a purely theoretical point of view, but because it was beautiful and practical besides.

Some smaller quibbles: Ortgies questions 'whether 12-ET in the required precision existed before well into the middle of the 19th century' and cautions that modern intonation practices include not just 12-ET, but also 'an exaggerated Pythagorean intonation (with excessively high leading notes and likewise high major 3rds)', implying that I do not make these points in the book, whereas they are fully addressed in my chapters, 'Shouldn't leading notes lead?' and 'Some are more equal than others'. His complaint about my subverting the syntonic comma throughout the book is also baffling, since I explain the various types of comma (p.54) in a way that should make it clear even to the most general reader, and explain (on p.53) how 55-ET and extended sixth-comma (i.e. syntonic comma) meantone are related. And any obscuring of the relationship between the two, furthermore, should be resolved by my comparative 'Table of intervals in cents' (p.163) in which those two similar systems form the two rightmost columns. And his characterization of 55-ET as based on the Pythagorean comma is inexplicable, since the comma of 55-ET is virtually identical to his favoured syntonic comma (within three-thousandths of a semitone), and none of the octave-division systems he is touting are based on commas that come anywhere close to that.

The ultimate complaint, that the 'background of historical and tone-systematical principles of intonation is not correctly presented' and that the book should be read 'in consultation with a colleague or teacher who can put the historical evidence in context' and 'handle the deeper theoretical aspects of intonation' is patronizing in the extreme. The whole point of the book is that many musicians—not just early musicians—do not understand tuning and temperament in the slightest degree, find it boring, impenetrable and irrelevant and, furthermore, think that 12-ET is a Darwinian, naturally selected system appropriate for everything after about 1800. My book was, indeed, not written for Dr Ortgies who can fill in all the 'on the other hand' examples for himself and who can prefer his own tuning theories over mine. But if readers of my book come to the understanding that the exclusive use of ET is a much more recent phenomenon than most musicians have realized, that many musicians up to the early 20th century chose *not* to use ET because they preferred other tunings which have *different* musical advan-

tages, that those advantages have been forgotten by modern musicians because of the total dominance of ET over the last century, and that modern musicians might benefit from learning about and experimenting with other tuning systems, including the extended sixth-comma temperament, or what I term 'harmonic intonation', then they got from the book what I intended, and learned a lot of historically accurate and useful practical information in the process—much more than they would have done by continuing to avoid what Ortgies acknowledges are 'thousands' of 'dry and mathematical' publications on the 'theory and history of temperament and intonation'.

So, I appreciate Dr Ortgies saying that I largely succeed in the goal of achieving 'wider awareness of the topic'—something I am sure we both agree is a good thing. And while he undoubtedly has other criticisms he did not share, the 'essential' ones he presented in his review lead me to submit that what he sees as historical or theoretical inaccuracy is merely his own preferences diverging from mine. I sincerely invite readers of *Early Music* to judge the book for themselves.

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Pasterwitz and Michael Haydn

Readers of Peter Branscombe's review of an 'unknown' Requiem by Michael Haydn (*Early Music*, xxxv/1, 2007, p.156) should be aware that the work in question is actually by Georg von Pasterwitz, the teacher of Franz Xaver Süssmayr; see Petrus Eder, 'Johann Michael Haydn's angebliches mittleres Requiem MH 559', *Kirchenmusikalisches Jahrbuch*, lxxxiii (1999), pp.91-9. The confusion is due to the journalist Olaf Krone, who came across Haydn's incomplete copy of the Pasterwitz Requiem and proclaimed it as a work of Haydn himself. While recordings of this repertory are always welcome, it is unfortunate that Pasterwitz fails to receive due credit for what is a substantial piece of sacred music.

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