SØREN MØLLER SØRENSEN

… as Phryne from the bath

The debate on musical temperaments in the 18th century. Werckmeister, Mattheson, Rameau, Sorge, Marpurg, Heinse, and others

Kapellmeister Lockmann tunes the piano

Wilhelm Heinse's *Hildegard von Hohenthal* (1795-96) is a strange hybrid between an erotic novel, a treatise on music theory and a guide to erudite conversation on contemporary musical life. Its opening scene is frankly erotic. The young Kapellmeister Lockmann secretly watches the beautiful Hildegard swimming naked in a pond in the garden. As the story develops this erotic theme is woven together with the other subjects of the book: a relatively well-informed music theory and survey of the music of the time, mainly opera and vocal music.[1] At the first encounter between Hildegard and Lockmann, who are to engage in a kind of love affair, the couple discuss in a lively manner physiological aspects of singing during a walk in an idealised German landscape surrounding the castle of the noble Hohenthal family. Their second encounter is at a dinner at the Hohenthal's. They dine, and after the meal the company goes to the music room where Lockmann takes his seat at the piano, an English grand with pedals like an organ. Lockmann tests the instrument, which he finds excellent, except for its temperament:

> Nur die Stimmung billigte Lockmann nicht so ganz. Er meinte: es sollte in der gleichschwebenden Temperatur gestimmt seyn. Jedoch sey dies das Unglückliche von dem Instrument überhaupt, und die größten Meister wären hierüber noch nicht einig …[2]

We understand that Kapellmeister Lockmann is no friend of equal temperament. He declares:

1 On the music aesthetics and musical preferences of Wilhem Heinse, see Ruth E. MÜLLER, 'Wilhelm Heinses *Hildegard von Hohenthal*: Spätausläufer der rationalistischen Ästhetik' in Ruth E. MÜLLER, *Erzählte Töne. Studien zur Musikästhetik im späten 18.Jahrhundert* (=Beihefte zum Archiv für Musikwissenschaft, Band XXX), Stuttgart 1989; Kerstin JAUNISCH, 'Tonsysteme und Tonartencharakteristik in Wilhelm Heinses musikalischen Schriften' in: W. KEIL & Ch. GOER (eds.), *„Seelenaccente" – „Ohrenphysiognomik". Zur Musianschauung E.T.A. Hoffmanns, Heinses und Wackenroders*, Hildeshein 2000; Werner KEIL, 'Heinses Beitrag zur romantischen Musikästhetik' in: Gert THEILE (ed.), *Das Maß des Bacchanten. Wilhelm Heinses Über-lebenskunst*, Langewiesen 1996, pp.140-58.

2 Wilhelm HEINSE, *Hildegard von Hohenthal* (= HEINSE, *Sämmtliche Werke*, im Insel Verlage zu Leipzig 1903, Vols. V-VI), Vol. V, p. 51 (first issued 1795/96).

„Nehmen wir hier den harten Dreyklang von C. Die Quinte ist ein wenig zu niedrig, und die Terz E zu hoch; obgleich vielleicht treflich abgemessen nach der gleichschwebenden Temperatur."[3]

Lockmann starts retuning the piano and at the same time enters into a description of the timbral qualities of perfect intervals that forms a metaphorical bridge back to the erotic scene at the beginning of the novel:

„Jetzt hab' ich die Quinte und große Terz vollkommen rein gestimmt, wie sie die Natur schon selbst angiebt auf der tiefen Saite. Gewiß hat der Accord einen andern Ausdruck, und die höchste Reinheit vollkommner Existenz lebt und regt sich, wie ein Alkibiades, eine Phryne aus dem Bade nur je dem Auge könnte, für ein zartes Ohr in der Luft."[4]

Hearing the perfect thirds and fifths we experience through the ear "the ultimate purity of perfect existence" just as we do though the eye when we watch Alkibiades or "Phryne from the bath". Alkibiades was a Greek warrior incarnating the ideal of male beauty. Phryne was a Greek hetaera of whom it is told that she was to be convicted by the court, but that she was saved in the very last moment by her attorney who stripped off her clothes and made the judges change their minds by the sight of her naked beauty.

As Lockmann's extensive digression on temperament develops, we gradually understand that for him the crucial matter is the intonationally determined individual sound qualities of intervals in different keys that disappear in equal temperament but are retained in irregular systems[5] of the kind that were favoured by many theoreticians in the 18th century.

This issue calls for florid metaphorical play, which for a great part is structured by the basic opposition 'nature/culture'. For instance, 'excessive' temperament of musical intervals can be likened to the excessive tempering of natural human dispositions or excessive legal regulation of societal life:

„Um diese Kinder der Natur, die reinen Quinten, großen und kleinen Terzen nach dem schlechterdings nothwendigen bürgerlichen Gesetz unsrer Kirchen, Theater und Konzertsäle zu modeln und zu erziehen: haben Philosophen und Meister der Kunst verschiedne Methoden angegeben; und die der gleichschwebenden Temperatur hat so ziemlich die Oberhand gewonnen. Man hat in der Verzweiflung

3 *Ibid.*

4 *Ibid.*, pp. 51-52.

5 I refer to the terminology applied in Mark Lindley's article 'Temperaments' in the *New Grove Dictionary*. In irregular temperaments "different 5ths are tuned differently, but none are rendered unserviceable." In equal temperament all fifths are tempered equally (they are lowered by 1/12 of the Pythagorean comma). This creates a regular circular system with interval classes of identical size in all keys. Irregular systems "… enabled the more frequently used 3rds to be tempered less than those used infrequently" and gave the keys "… a diversity of intonational shading that was highly valued by connoisseurs and formed a prominent aspect of 18th-century musical thought." Mark LINDLEY, 'Temperaments' in S. SADIE (ed.), *The New Grove Dictionary of Music and Musicians,* Second Edition 2001, Vol. XXV, p. 249.

> den Knoten aufgehauen, nicht gelöst, und alles muß in das Bett des Prokrustes passen."[6]

Equal temperament furthermore is scorned as "galant und bewandt",[7] as an equivalent to the emptiness and superficiality in mundane social life, or as an instance of an undesirable 'making equal' that obliterates valuable essential differences:

> „Kein Accord ist mehr oder weniger als der andre. Die verworfnen Bösewichter Ges dur und Es moll treten so heiter und sanft wieder einher, wie Unschuld, Friede und zärtliche Rührung in C dur und A moll."[8]

And – as we understand from the passage quoted above – in the universe of Heinse's Kapellmeister Lockmann the issue of temperament is naturally linked to the issue of 'keys affects'.[9] Actually these issues are two faces of the same coin. Due to the intonational differences the 12 major and 12 minor keys express: "…schon allein durch ihre bloßen Accorde vier und zwanzig Arten verschiedener Existenz …",[10] and for instance C major expresses "… Stand der Natur; jungfräuliche Keuschheit und Reinheit, holde Unschuld des Jünglings, patriarchalisches Leben, goldnes Zeitalter."[11]

The ontology of music that speaks through Lockmann's advocacy of irregular temperament and key characteristics determined by intonational differences still allows us to believe that certain and important parts of music's symbolic content are inherent in the tonal material prior to the work of the composer. And as a typical participant in the 18th-century temperament debate Wilhelm Heinse's Kapellmeister Lockmann, in his attempt to account for this symbolism, borrows from a heterogeneous gaggle of discourses on existential issues. Also a theological influence can be traced:

> „Ein musikalischer Shakespear sollte den verschiednen Ausdruck der Terz in den verschiednen Accorden von dem geringsten Grad ihrer Kleinheit, wo sie an die Sekunde grenzt, bis zur höchsten Größe, die sie verträgt, aus seinem Herzen schildern: die tiefste Angst und Bangigkeit, die rührendste Zärtlichkeit, die Heiterkeit gesunden frohen Lebensgenusses, und die höchste Süßigkeit, dann Muth und Tapferkeit bis zur Wuth, welche Batterien stürmt beym wilden Schall der Kriegstrompete. Die Terz ist gleichsam das Herz, der Sitz der Leidenschaft; und die Quinte der himmlische Geist, den der Schöpfer dem Menschen einhauchte. Sie verträgt gar wenig Veränderung, wenn sie nicht aus einem Engel des Lichts zum Teufel, oder zur elenden kranken Kreatur werden soll."[12]

6 Heinse*: Hildegard von Hohenthal*, pp.53-54.
7 *Ibid*., p. 56.
8 *Ibid*., p. 54.
9 Key affects – specific expressive values attributed to various keys – was another disputed issue in the 18th century.
10 *Ibid*., p. 59.
11 *Ibid*., p. 57.
12 *Ibid*., p. 60.

The pure and the mixed

The extensive digression on musical temperament in the first volume of Wilhelm Heinse's *Hildegard von Hohenthal* mirrors the discussion on musical temperament as it was shaped by music theorists, acousticians and mathematicians in the 18th century and gives some clues to how the technicalities of musical temperament metaphorically connect with other issues of general human interest.

Heinse's most important immediate source is the article *Temperament* in Jean-Jacques Rousseau's *Dictionnare de Musique* (first issued 1768) that draws on Jean Philippe Rameau and accounts for Rameau's famous change of position towards equal temperament from contra to pro. Lockmann represents Rameau's first stance, Hildegard the second.[13] But as we shall experience, older layers of the temperament discussion are also echoed in Heinse's novel.

Most present-day readers will presumably find the issue of musical temperament extremely esoteric for the elaboration of a piece of imaginary literature. Of course it is impossible to judge exactly how strange this appeared to contemporary readers, but there are reasons to believe that musical temperament was at least closer to mainstream erudite discourses in the 18th century than nowadays. Heinse's novel witnesses to a historical situation where temperament was still a number one issue in discourses on music, and we are allowed to think that this fact also points to a situation in the history of musical listening marked by a sensibility towards the sound qualities and expressive potentials of different systems of temperament that has been lost by the dominance of equal temperament in mainstream musical cultures of our time.

The present article is based on a reading of some sources central to the temperament discussion in the 18th century. I have deliberately chosen texts where the advantages and drawbacks of equal temperament compared to irregular systems are discussed. These texts I read as documents to a history of musical listening and to a history of the conceptualization of the experience of sound.

And I wish to maintain that the original 18th-century sources on this issue really are documents of these histories – even if this most often is not at the core of their own interest, and even if they have traditionally been interpreted with other lines of historical development in mind: scientific, technological, stylistic, performance practice related, etc.

But as the extracts from *Hildegard von Hohenthal* allowed us to foretaste, the 18th-century discourse on musical temperament was not insulated from other issues of general human interest. Indeed it was not. The florid allegorical and metaphorical elaboration of the theme changes the discussion of temperament into much more than a matter of interval sizes and customs of musical listening. Through their allegorical and metaphorical elaboration these themes are woven into a tight discursive tissue with theo-

13 Kerstin Jaunisch has documented the very close proximity between Heinse's text and the text in Rousseau's dictionary; Jaunisch, 'Tonsysteme und Tonartencharakteristik', pp. 251-52. Further on the Temperament article in *Dictionnaire de Musique* below, p. 85.

logical, moral and even political nodal points. It is a main objective of this article to botanize exactly here, where the issue of sound experience and other issues of human existence are so inextricably linked.

A brief consideration of the etymological meaning of the word 'temperament' will give us a preliminary idea of the basic concepts and values that are negotiated alongside the negotiation of how we should preferably tune our keyboard instruments.[14] The word *temperament* is derived from the Latin *temperatura* which means 'mixture', 'equilibrium' or 'the best blend'. As a technical term it is known from both psychology and music. In psychology it traditionally referred to the individual emotional disposition that was conceived of as depending on the specific mixture of the four basic body fluids (humours): blood, phlegm, black bile and yellow bile. The Danish dictionary *Ordbog over det Danske Sprog* defines musical temperament as "… the in practical music used, by tuning caused, deviation from the perfect, mathematical or acoustical purity of the intervals (so that one – on the same instrument – can play approximately in tune in all keys, without re-tuning). Also about the organization of the tonal system in accordance with this deviation."[15] The word 'temperament' thus basically conveys the notion of 'a mixture of pure or essential substances', and in the temperament discussion the basic dichotomy *pure/mixed*[16] is translated into the relationship between the perfect intervals expressed with the simple string length ratios 1:2; 2:3; 3:4; 4:5 etc. and tempered intervals deviating from this 'perfection'.

Werckmeister's theology of temperament

Andreas Werckmeister (1645-1706) – organist, organ-expert, cantor and theorist within the Lutheran German baroque tradition to which J.S. Bach also belonged – devised throughout his long career a greater number of systems of temperament. In his posthumous *Musikalische Paradoxal-Discourse* he for the first time explicitly advocates equal ("gleichschwebende") temperament.[17]

> Wir … / wißen, wenn die *Temperatur* also eingerichtet wird / daß alle Quinten 1/ 12 Commat: die Tert: *maj*: 2/3 die *min*: 3/4 Comm. schweben und ein *accura*tes Ohr dieselbe auch zum Stande zubringen / und zustimmen weiß / so dann gewiß

14 The importance of the issue of temperament is at a maximum where the musicians' freedom of intonation is at a minimum. The temperament debate at issue in this article is mainly concerned with the temperaments of organs, pianos and other keyboard instruments. It is a commonly accepted view that (approximations to) equal temperament was standard for fretted instruments long before it was ever proposed as standard for keyboards. How singers and freely intonating instrumentalists have intonated is a matter of performance practice.

15 *Ordbog over der danske Sprog*, issued by Det danske Sprog- og Litteraturselskab, Copenhagen 1946, translation by the author.

16 In German and Danish the adjective "rein/ren" means both "pure", "clean" and "being in tune".

17 Andreas WERCKMEISTER, *Musikalische Paradoxal-Discourse. Oder Ungemeine Vorstellungen wie die* Musica *einen hohen und Göttlichen Ursprung habe …*, Quedlinburg 1707. Reprint in Andreas WERCKMEISTER, *Musiktheoretische Schriften*, Vol. II, Laaber 2003.

> eine wohl *temperirte Harmonia*, durch den gantzen *Circul* und durch alle *Claves* sich finden wird.[18]

Werckmeister's position appears surprisingly modern in its reference to the perfect circularity of the tonal system and the harmonic equality of all pitches, which are obtained if the 12 fifths of the circle of fifths are all diminished by a 1/12 of the Pythagorean comma ("… a well-tempered harmony through the whole 'Circul' …"). A much more conservative spirit speaks out of his arguments for this 'progressive' tuning system. In the *Musikalische Paradoxal-Discourse* Werckmeister draws his lines of thought from the tissue of Lutheran theology, numerology, and Pythagorean-Platonic cosmology that experienced a late blooming in Werckmeister's and Bach's conservative 'Kantorenwelt'.

In this universe the issue of musical temperament is unavoidably also a theological issue, as are all matters of music theory. "GOtt selber [ist] *Autor* und *Fautor* [protector, promoter] der *Music*",[19] he has ordered everything "… in Zahl / Maß und Gewichte … / und die Welt also erschaffen",[20] music is sounding numbers, and the row of proportional numbers 1:2:3:4:5:6 from which the consonances are derived is part of the divine cosmos. The row constitutes a declining scale of 'perfection' which is allegorically interpreted in a heavy-handed way: 1:1 = God; 1:2 octave = His Holy Word = Jesus Christ; 2:3 fifth = the Holy Spirit; 3:4 fourth = the Angels; 4:5 major third = man; 5:6 minor third = animal.

In this context the need to deviate from these simple ratios must be a difficulty! How can we allow ourselves to fiddle these divine numbers? Werckmeister knows the answer! He defines musical temperament as

> … *subtiler* Abschnitt / von der Vollkommenheit der *Musicali*schen *Radical*-Zahlen / welchen der *Sensus* in der zusammen Stimmung der *Harmonia* nur wenig mercken kan / dadurch auch das Gehör ein Vergnügen hat / und behält …[21]

and very soon it is revealed that there is space in his theological universe for both sides of this two-sided statement: that the tempered intervals deviate from perfect intervals *and* that we humans do not take any greater notice of this, but appreciate the tempered intervals in practical music as pleasing and satisfactory. Both circumstances refer to the

18 Werckmeister, *Musicalische Paradoxal-Discourese,* p. 110. Maybe Werckmeister had different commas in mind. The fifths in equal temperament are diminished approx. 2 Cents or approx. 1/12 of the Pythagorean comma (23.5 Cents). The major 3rds of equal temperament are augmented approx. 14 cents or approx. 2/3 of the syntonic comma (21.5 Cents). The minor thirds of equal temperament deviate approx. 16 cents or 3/4 of the syntonic comma from the perfect interval. The Pythagorean comma is the interval between the perfect octave 2:1 and pitch you reach at when superimpose 12 fifths and transpose the obtained pitch 7 octaves down. The syntonic comma is the interval between the perfect major third 5:4 and the interval you reach at when you superimpose 4 perfect fifths and transpose the obtained pitch two octaves down. It is, however, not certain that Werckmeister distinguished between these commas. The difference is very small.

19 *Ibid.*, p. 19.

20 *Ibid.*, Werckmeister quotes the apocryphal "Wisdom of Salomon" (11.21.) like countless music theorists before him.

21 *Ibid.*, p. 105.

Platonic distinction between the noumenal and phenomenal translated into Christian theology. Only God [noumen] is perfect. All creation [phenonomena] is imperfect:

> … in Geistlichen Himmlischen Dingen kan sich kein Mensch der Vollkommenheit rühmen: So ist auch nichts vollkomenes [sic!] und reines in den natürlichen Dingen zu finden: Nur allein der wahre GOtt und sein ewiges Wort / welches in der Music durch die Proportional-Zahlen 1. 2. ist abgebildet worden / ist allein vollkommen / und bleibet auch in seiner Bewegung / wodurch alles regieret / und erhalten wird / rein / und gerechet.[22]

Nothing 'perfect and pure' is to be found 'in natural things', and as such the phenomenal intervals of practical music (except the octaves!) cannot claim perfection. Thus Werckmeister finds weighty ontological reasons both for the imperfection of the tempered intervals and for their usability in practical music. And he adds a further theological quibble. Temperament is not only a regrettable necessity or a kind of emergency measure. It is also a gift from the Almighty, a tool for the acknowledgment of human imperfection: "… ein unempfindlicher lieblicher Betrug unsers Gehöres in der Zusammenstimmung / wodurch uns GOtt unsere Unvollkommenheit will zu verstehen / und zu erkennen geben."[23] Arguing like this Werckmeister does his best to convince us that the need for temperament in practical music does not contradict the 'high and divine origin of music'. The need for temperament as well as the temperament itself are parts of God's creation, parts of his master-plan, and both can be subject to allegorical interpretations of the sort we already became acquainted with in the interpretation of the perfect intervals.

In the chapter *Wie die Temperatur vollkommen und unvollkommen sey und mit dem Christenthum verglichen werden* Werckmeister interprets equal temperament in accordance with the general principle which also governed his interpretation of the perfect intervals: "Je näher ein Ding seinem Uhrsprunge ist / je vollkommener [ist] es."[24] According to this principle the fifths must be more perfect, less tempered, than the thirds, and the octaves must be left un-tempered. A temperament on the basis of this principle corresponds to a word in which all creatures accept their sinful imperfection and bow in awe of the perfection of God. Consequently equal temperament can function as

> … ein Vorbild ….wie alle fromme / und wohl *temperirte* Menschen / mit GOtt in stetswährender gleicher / und ewiger *Harmonia* leben / und *jubilire*n werden. Denn Gott ist *diapason*, in ihn leben / weben und sind wir.[25]

Inherent in this interpretation, however, is another difficulty. We are taught that the fifths are the allegorical representation of the Holy Spirit, so how can we justify the tempering of this interval? According to Werckmeister by the assumption of an unexpected diabolical influence!

22 *Ibid.*, pp. 105-06.
23 *Ibid.*, pp. 114-115.
24 *Ibid.*, p. 13.
25 *Ibid.*, p. 110. The Greek word diapason literally means "through everything".

> Gleichwie durch 1-2. GOtt und das ewige *harmonische* Wort und durch die Zahl 3. als 2-3. der Geist Christi verstanden wird / so hat sich *Lucifer* an statt des Geistes Christi gesetzet / und ist alzu hoch hinaus gefahren / dahero er mit dem wahren und ewigen GOtte nicht *harmoniren* können / und ist also verworffen worden: wie aber zu helfen?[26]

The spirit of Lucifer has taken over the space of the spirit of Christ! How can this be remedied? Through the right temperament of course:

> Gleichwie dem allzuhoch [sic!] herausfahrenden Uberschuß bey allen Quinten 1/12 Commatis abgenommen wird / daß alle Quinten in etwas / doch in gantz erträglicher und lieblicher *Harmonia* herunter schweben: Also hat sich der Geist Christi gedemüthiget / den Lucifer ausgestossen / und verworffen / und allen 12. Stämmen / und Aposteln / das ist allen Menschen zu gute hernieder gelaßen / und Knechts-Gestalt an sich genommen / damit der ewige Vater versöhnet würde…[27]

Werckmeister repeatedly in his *Paradoxal-Discourse* connects the issue of temperament with the issue of human imperfection, and stresses how it can help us to know our place as sinful, imperfect beings who only can hope for redemption through the contemplation in the divine perfection.

This deep-rooted conviction of the inherent imperfection of all creation also lays the ground for his construction of the relation between music as theory and music as practice. Werckmeister represents a continuation of the Pythagorean-Platonic tradition and hereby inherits an unsolved problem. Within this tradition the harmonic numerical organisation of the cosmos always has ontological priority to any sensual perception of this same order. This is beyond doubt. Doubtful is, however, how sensual evidence relates to noumenal truth. In musical discourses this basic doubt translates into the question if, or to what degree, sensual perception of the sounding musical phenomenon can lead to a true acknowledgement of the noumenal cosmic order that music incarnates.

The hierarchic ontology of Platonism necessarily implies a split between music as a theoretical-metaphysical edifice and music as an audible phenomenon. This is reflected also by Werckmeister even if he clearly is kindly disposed towards some kind of compromise or mediation or, indeed, 'paradox'.

Werckmeister refers to Andreas Kepler's well known theory of the analogous organisation of the planetary system and tonal system. According to Werckmeister, Kepler demonstrates how:

> … der ganze Himmels-Lauf mit denen *Musicali*schen *Proportionibus* , und der *Scala Musica* übereinkome / und wie ein jeglicher *Planeta* insonderheit seinen Lauf mit der *Scala Musica* übereinführe. Er zeiget auch allerdinges den *Defect* in der *Scala Planetarum* , welchen wir in unserer *Music-Scala* haben / und befinden: und set-

26 *Ibid.*, p. 107.
27 *Ibid.*

> zet dabey / wie der Allmächtige Schöpfer diese *Dissonantien* so weißlich wiße zu *Temperiren*, daß dadurch alles Böse von den Creaturen abgewendet werde …[28]

This noteworthy (and surprising?) information – that also the planetary system, according to Werckmeister's reading of Kepler, is 'defective' and in need of temperament – is followed by a statement of decisive ontological significance. Even if the need for temperament is part of God's plan, the tempered intervals and their arithmetical proportions are not to be understood as the true essences.

> Weil er aber mit dem *Pythagora, Platone, Euclide* und andern *Musicis* so bißhero in der Welt gelebet / die *Radices* 1.2.3.4.5.6. // 8. und derer *Compositas* 10.12.16 *etc*. vor die rechten und wahren *harmoni*schen Zahlen hält / und alle *Judicia* in der *Composition*, und andern Dingen daraus fließen / so saget er es sey ein höchst schädlich und verführisch Ding/ wenn man durch die *temperirten harmonischen* Zahlen *in rebus Musicis* ein *Judicium* anstellen wolte / das rechte Wesen des Gesanges dadurch zuerlangen.[29]

Notwithstanding how legitimate temperament might be, we are not allowed to take the tempered intervals we hear in practical music for 'the thing itself". Even if it is commonly accepted that other – more complicated, less 'pure' or 'perfect' – relations than those between the "*Radices* 1.2.3.4.5.6. // 8." and their "*Compositas* 10.12.16 *etc*." are expressed in the intervals of practical music, it would be "most highly damaging and seductive" if we based our judgements in musical matters on these tempered numerical relations. "The true essence" ("das rechte Wesen") of music is still acknowledged through contemplation on the ideally pure 'radices' and their relations. Legitimate musical judgement is based not on what we hear but on knowledge given either 'ex lumine fidei' (through revelation) or 'ex lumine naturae' (through reason).[30]

Theory as cultural practice

The relation between theory and practice is precarious not only under the auspices of Platonic ontology. In modern musicology it is an often heard objection to music theory, be it historical or contemporary, that it is out of touch with practical music. This is also the case when temperament is the issue. In his contribution to the series *Geschichte der Musiktheorie* Carl Dahlhaus ridicules 18th century theoreticians' inventiveness in this field with he finds exorbitantly excessive.[31] Mark Lindley in his article in the *New*

28 *Ibid.*, p. 17.

29 *Ibid.*

30 Rolf DAMMANN, 'Werckmeister, Andreas' in F. BLUME (ed.): *Die Musik in Geschichte und Gegenwart*, Kassel 1968, Vol. 14, pp. 476-80.

31 To Dahlhaus tuning and temperament is an 'obsession' in music theory from the 16th to the 18th centuries. The large numbers of systems developed by J.G. Neidhardt represent an extreme "… die ans Absurde Grenzen, weil die Mittel in einer grotesk schiefen Relation zum Zweck stehen." Carl DAHLHAUS, *Die Musiktheorie im 18. und 19.Jahrhundert. 2 Deutschland*, Darmstadt 1989 (= F. ZAMINER (ed.), *Geschichte der Musiktheorie*, Vol. 11), p. 17.

Grove Dictionary more mutedly warns us from making premature conclusions about temperament in historical performance practice on the basis of the theoretical literature. Customs of tuning and temperament in daily musical life is a complicated field for historical research and for a scholarly-trained historian it is out of the question to judge on the basis of one source category only. What the theorists wrote is not necessarily what musicians, instrument-makers and tuners actually did. Maybe the practitioners simply did not want to do as theorists proposed, and if they did, practical obstacles would unavoidably come in the way. One thing is to calculate a certain system of temperament and express it in string length ratios, quite another to apply this temperament to a piano or an organ. No rule of thumb, no directions for practical tuning can fully eradicate this difficulty, nor can technical devices such as tuning forks and pipes, monochords or even the electronic tuning machines of our times.

No objections can be made to appropriate warnings against the confusion of theoretical discourses on music and practical music. But it is equally relevant to warn against a too heavy-handed way of dealing with the dichotomy of theory and practice. Both to compose and perform music and to engage in discourses of music theory are to engage in cultural practices, and it is naïve to think that the discourse of music theory only makes its cultural effects known through its impact on musical composition and performance. The idea of music theory in the role of the obedient servant of musical practice is rather new and obviously out of touch with centuries of European musical thought. Actually, the discussion of the relation between theory and practice itself has always been an important part of the *quid sit musica* discussion in Europe.

Obviously, the creativity and inventiveness in the field of music theory always also served other ends than the regulation of musical practise, so too in the history of musical temperament. Here mathematical perfection was one of these 'other ends'. The professional ambition of mathematicians and mathematically-inclined music theorists is the most obvious motive for a mathematical creativity that often produced calculations of an accuracy exceeding by far what was needed for tuning in practice. In the book *Tuning and Temperament*[32] J. Murray Barbour remarks about Marin Mersenne's calculation of equal temperament, which Mersenne arrived at through improvements on Vincenzo Galilei's system, that it was better "… than the temperament our contemporary tuners give our own pianos and organs. So there is nothing more that needs to be said, as far as practice is concerned".[33] Vincenzo Galilei presented his calculation in *Dialogo della musica antica e moderne* in 1581. Mersenne's improvements were made during the 1640s, and as we know they in no way put an end to the theorists' ambitions. If Barbour is right, the problem's practical solution predated lots of hard theoretical labour!

The history of tuning and temperament is a fascinating example of discursive interaction. Discourses of mathematics, metaphysics, instrument-making and music-making mingle and interact, and the historian must carefully avoid imposing arbitrary or prejudiced hierarchic schemata to this network of relations or to conceive its developments as simple matters of cause and effect.

32 J. Murray BARBOUR, *Tuning and Temperament. A Historical Survey*, New York 1972.
33 *Ibid.*, p. 61.

As cultural practices, both the performance of music and theorizing on music take part in the negotiation of central cultural values. This negotiation can – as the Heinse and Werckmeister exegesis demonstrated – engage in a wide and heterogeneous field of cultural topics. But necessarily it will also touch upon the cultural value of music itself and more specifically the central issues of all discourses on the ontology of music: Where in the complex and heterogonous phenomenon 'music' can the central cultural value be located? Where do we find the locus of the identity of the musical work? Where do we have to focus our attention when we listen to music? What is to be given priority? What is to be set aside or even neglected? The 18th-century debate on musical temperament takes part in this negotiation.

Essential or relative values

As mentioned above, the frontline in this struggle divided proponents of equal temperament and proponents of various irregular systems. Irregular systems are systems of temperament that are circular in the sense that they allow the use of all they keys in the circle of fifths but which – unlike the equal temperament – gives priority to the purity of intervals in certain keys on the expense of other. Such systems avoid the definite wolf-fifths known from the mean-tone systems that dominated in the 17th century, but they still do not produce interval classes of exactly the same size regardless of key, thus giving, for instance, a C major triad another intonational quality than, for instance, a D flat major triad.

Jean Philippe Rameau is famous for having changed his mind concerning the question of the desirability of such differences. In his *Nouveau Système de musique theorique* (1726) he argued for an irregular system:

> Car il est bon de remarquer que nous recevons des impressions differentes des intervales, à proportion de leur differente alteration: Par exemple, la *Tierce majeure* qui nous excite naturellement à la joye, selon ce que nous en éprouvons, nous imprime jusqu'à des idées de fureur, lors qu'elle est trop forte; & la *Tierce mineure* qui nous porte naturellement à la doceur & à la tendresse, nous attriste qu'elle est trop foible.
>
> Les habiles Musiciens sçavent profiter à propos de ces differens effets des Intervales, & font valoir par l'expression qu'ils en tirent, l'alteration qu'on pourroit y condamner.[34]

34 Jean-Philippe RAMEAU, *Nouveau Système de musique theorique,* Paris 1726, p. 110 (reprint in J.-Ph. RAMEAU (E.R. Jacobi, ed.), *Complete theoretical writings*, Vol. II, American Institute of Musicology 1967). The passage is translated in M.Lindley's article 'Temperaments': "… it is good to note that we receive different impressions from intervals in keeping with their different [degree of] alteration. For example the major 3rd, which [in its] natural [state] excites us to joy, as we know from experience, impresses upon us ideas even of fury when it is too large; and the minor 3rd, which [in its] natural [state] transports us to sweetness and tenderness, saddens us when it is too small. Knowledgeable musicians know how to exploit these different effects of the intervals, and give value, by the expression they draw therefrom, to the alteration which one might [otherwise] condemn." (p. 256).

The core of Rameau's argument from 1726 is that differing interval sizes in different keys are valuable contributions to the expressive means of the composer, and this is echoed in much later 18th-century writing, as is his argument for the opposite view: that equal temperament with identical interval classes throughout the circle of fifths is fully sufficient for all plausible musical ends. In 1737, in his *Génération harmonique*, Rameau lets us know that he hopes that those who believe that the musical impressions obtained from various key are based on intonational differences will give the issue a second thought:

> Celui qui croit que les différentes impressions qu'il reçoit des différences qu'occasionne le Tempéramment en usage dans chaque Mode transposé, lui élevent le génie, & le portent à plus de variété, me permettra de lui dire qu'il se trompe; le goût de variété se prend dans l'entrelacement des Modes, & nullement dans l'altération des intervales, qui ne peut que déplaire à l'Oreille, & la distraire par conséquent de ses fonctions.[35]

The subtleties of temperament that Rameau conceived in 1726 as a material contribution from the acoustic quality of the sound to the musical expression, is now rejected as irrelevant to the true musical experience, which only knows the keys as they are defined through their immediate relations ("l'entrelacement des Modes"): that is as a set of relations to a tonic.

The physics of sound

The opposition expressed in Rameau's contradictory stances appears to have governed most of the 18th-century discussions on this subject. None of the writings that I have had in my hand totally avoids this way of slicing the cake. One single author, however, doesn't accept the equals sign between equal temperament and the absence of essential key-individuality.

Like most of his contemporaries Johannes Mattheson in his *Exemplarische Organisten-Probe* (1719) is not in favor of equal temperament. But he avoids the argument typical for the proponents of irregular systems: that equal temperament obliterates the individual qualities of the keys. In a sarcastic passage typical of his style he argues that even if equal temperament should be implemented this very day as standard, we would not need to fear for the expressive qualities of various keys. Every tone, he continues, that can be used as the "Fundament eines Modi" has already

> … qua sonus … solche Eigenschafften an sich / die ihn von allen andern Klängen

35 Jean-Philippe RAMEAU, *Generation harmonique*, Paris 1737, p. 104 (reprint in Rameau: *Complete theoretical writings*, vol. III) The passage is translated in M. Lindley's article 'Temperaments': "He who believes that the different impressions which he receives from the differences caused in each transposed mode by the temperament [now] in use heighten its character and draw greater variety from it, will permit me to tell him that he is mistaken. The sense of variety arises from the intertwining of the keys [l'entrelacement des Modes] and not at all from the alteration of the intervals, which can only displease the ear and consequently distract it from its functions." (p. 258).

> völlig und sattsam unterscheiden / ihm eine ganz andere Art / Figur / Nahmen / Krafft und Natur ertheilen / wenn auch die gleichschwebende *Temperatur* heute diesen Tag / durch Kayser- und Königliche Verordnungen / allenthaben eingeführet werden solte / so daß man deswegen nicht befürchten darff / es werde bey solcher Einrichtung ein *Modus* wie der andre klingen und nichts gewonnen seyn.[36]

According to Mattheson the tone "qua sonus" – the tone as physical sound – prior to any musical definition represents an individual quality, and he does his best to convince us of the substantiality of this individuality. Even in equal temperament each of the 12 semitones would be "… ein rechtes und ächtes ORIGINAL …." Each and every tone has its "wesentlichen / uhrsprünglichen / unaussetzlichen und beständigen Unterschied / von allen andern / in sich selbst und in seiner eigenen unumgänglichen Formierung." And this inerasable individuality is based on the "… *vibrations, battemens, ondulations, allées & venuës, elancemens, oscillations*, Anschläge / Bebungen / *diadromos, tremores &c.*", that is, on the physical phenomenon of vibration, which we experience as sound.[37]

By this somewhat awkward and terminologically confused argumentation Mattheson places himself in the middle of an epochal turn. In the Pythagorean-Platonic tradition where Werckmeister still had his footing, musical tones and intervals were conceived of as 'numeri sonori' and they were dealt with in terms of arithmetic and numerology. From the renaissance and onwards this paradigm was challenged by the emerging discipline of acoustics that interprets sound as a physical phenomenon and, ontologically speaking, reduces numbers from the status of Platonic ideas to tools for the analysis of the physical fact.[38] 'Universalia ante rem' became 'universalia post rem'.

The achievements of early acoustics entered by drips and drabs into the discourse of music theory and gradually substituted the Pythagorean-Platonic explanation of the consonances – the simpler ratios being closer to perfection than the more complex – with a physical: the consonant tones are the first tones in the series of overtones and they are as such already present in the sounding tone itself. It is well-known that Rameau's theory of 'basso fundamentale' was informed by this new conception. It is probably also well-known and commonly accepted that neither the ancient Pythagorean

36 Johannes MATTHESON, *Exemplarische Organisten-Probe*, Hamburg 1719, p. 101.

37 *Ibid*., p. 111.

38 Important steps in the development of this modern physical paradigm as recorded in the article 'Physics of music' by S. Dostrovsky, M. Campbell, J.F. Bell and C Truesbell in Sadie, *The New Grove Dictionary* (2001), Vol. 19, pp. 635-648: Galileo Galilei's (1564-42) discovery that pitch corresponds to frequency and that musical intervals can be characterized by frequency ratios. Marin Mersenne's (1588-1648) developed the first mathematical formula for the relation between frequency and the length, mass and tension of a sounding string (Mersenne's law) and he was among the first to realize the importance of the overtones. In 1677 the mathematician John Wallis (1616-1703) was able to demonstrate that the harmonic overtones of a harmonic string are associated with the existence of nodal point on the string, but more then half century had to pass before Leonhard Euler (1707-1783) and Daniel Bernoulli (1700-1782) – in the 1730s – were able to give the explanation of the overtones that we still held as valid: between the nodal points that Wallis reported the string is vibrating in the form of a sine wave, which simultaneously produces frequencies following the series 1-2-3-4 ….

nor the modern physical model offers plausible criteria for a rigid qualitative distinction between consonance and dissonance. The overtone-theory can just as well be used as an argument for the absence of any qualitative difference between consonance and dissonance like Arnold Schönberg did in his plea for 'the emancipation of the dissonance'.

Mattheson's writing in the year of 1719 is an episode in the history of a paradigm shift. As a music theorist he tries the best he can to learn from contemporary scientific discourse. Exactly how successful he was in this project is hard to judge. The terminological excess in the passage quoted below might point to some problems. However, the sources for his reflections on the physical nature of sound were the best. He explicitly refers to contemporary research in acoustics as reported from the French academy of science, he quotes the French acoustician Saveur, and in the very definition of sound he explicitly refers to this authority. When we assume that the physical properties of the sound, he writes, secure the identity of the individual tone ….

> … so müssen wir erstlich fest setzen / was eigentlich *per sonum* verstanden werde / und wie derselbe in diesem Fall zu definiren sey. Darinn habe ich nun schon einen Vorgänger an den vortrefflichen Saveur, welcher die Sache also beschreibet: *on entend par un son ou ton le nombre des vibrations qu'une corde fait dans un temps determiné,* d.i. Durch den Klang oder Ton wird nichts anders verstanden, als die Anzahl der Schläge oder Bebungen / die Z.E. eine Säite (oder anderes Werckzeug) in einer gewissen / gesetzen Zeit verrichtet.[39]

Judged from the viewpoint of more recent theories of musical listening, Mattheson drew the wrong conclusions on the right premises. Or he forgot the second part of the question that he posed and attempted to answer. The fact that absolute pitch relies on the frequency of the sound wave that reaches the ear does not imply that the human ear is capable of perceiving absolute pitch as an essential quality. It is even dubious that Mattheson's theory could be rescued by reference to the sense of absolute pitch by a gifted minority. Modern psychology of tone perception assumes that the sense of absolute pitch is based on a long-term pitch memory. Apprehending absolute pitch by relating to a long-term-memorized pitch is not the same as perceiving a physical structure.

Mattheson in his *Exemplarische Organisten-Probe* connected the temperament debate with advanced contemporary acoustic research. The immediate outcome of this might be considered fallacious and insignificant. But the ontological consequences that he drew, truly document a paradigmatic shift. Numbers are no longer Platonic ideas, they are no longer the origin, even if they are still of importance when you define the tone as frequency.

True is, writes Mattheson, that every tone

> … *qua sonus* darinn seinen eignen *numerum* hält / der zu seiner Formirung dienet und damit unser Ohr gerühret wird; (dabey doch der Klang den *numerum*, nicht aber der *numerus* den Klang macht) …[40]

39 Mattheson, *Exemplarische Organisten-Probe*, p. 105.
40 *Ibid*.

Music is no longer sounding numbers. The physical sound has been given ontological priority. This shift opens the door to a new and ample source for the metaphoric treatment of temperament; a new content to the concept of nature enters into the discourse, which will later be utilized, for instance, in Kapellmeister Lockmann's linking of the appreciation of perfect intervals and female nakedness.[41]

The theology of temperament – continued

With Werckmeister we met the temperament discussion couched in a florid baroque rhetoric and we saw an allegorical elaboration conditioned by the close relations between church, music and music theory that was specific to Werckmeister's time and place. Compared to this Mattheson's style represents a degree of 'frühbürgerliches' cooling down, allthough it is still erudite, and references to authorities from ancient and medieval times still play an important role. Even parts of the theological interpretation of the need for temperament survive the (partial) modernisation and secularisation of the discourse by Mattheson and his successors. Mattheson also follows theological lines of thought and applies basic theological concepts in his account for the necessity of temperament. The circular-tempered system corresponds to the mortality of man, he argues, while the un-tempered system, where the Pythagorean comma repeats itself each time you superimpose 12 fifths, corresponds to the divine and infinite. "Gott und die Natur der Sache" have ordered it so, he writes, that

> … wenn ich Z.E. im A anfange / und stimme meine 12. Quinten: E, H, fis, cis, gis, dis, b, f, c, g, d, a mit allem Fleisse rein / so bekomme ich lange keine juste *Octavam* mit dem ersten A, sondern bin weit davon und viel zu hoch. So geht es aber *in infinitum* hinein / ohne zum rechten Ruhepunct zu kommen. Weil wir inzwischen in … [der] Sterblichkeit unser Wissen nicht auf das ewige beziehen mögen / so bringt man es aus Noth durch die *Temperaturam Quintarum* dahin und in solche Schrancken / daß sich die Octaven gleich verhalten ...[42]

41 Interpretations of this paradigm shift already have a long history within musicology. For instance Hans Heinrich Eggebrecht in his speculative account for the specific quasi-linguistic expressive capacities of European music, 'Musik als Tonsprache', links the new physical conception ("Tonus qua sonus") and its implications in music theory and aesthetics with a new dynamism and new capacities for subjective expression in 'post-medieval' ("Neuzeitliche") music. Scholastically speaking: music is not longer conceived of as static 'natura naturata' (created nature) but as dynamic 'natura naturans' (creative nature). Hans Heinrich EGGEBRECHT, 'Musik als Tonsprache' in *Archiv für Musikwissenschaft* XVIII (1961), pp. 73-100.

Mattheson's conceptions of musical expression and communication as presented in his *Der vollkommene Capellmeister* are (partially) based on the idea of resonance between vibrating bodies (human and instrumental). This diminishes the importance of mathematics. No reasonable man would deny "… den Nutzen der Meßkunst in der Harmonik …, wol aber dieses, daß der ganze Musik darauf gründe." This also deprives temperament of any genuine aesthetic value: "… wenn die Temperatur, … auch nöthig und nützlich wäre, so machte doch ihre richtige Stimmung so wenig eine Musik aus, als ein feingedeckter Tisch ohne Speisen eine Mahlzeit seyn kann." Johann MATTHESON, *Der vollkommene Capellmeister*, Hamburg 1739, p. 465.

42 Mattheson: *Exemplarische Organisten-Probe*, p. 110.

Georg Andreas Sorge (1703-1778) – organist, composer, theorist and an industrious contributor to the temperament literature – published his A*nweisung zur Stimmung und Temperatur* in Hamburg in 1744. But even if this book is more than 20 years later than Mattheson's *Exemplarische Orgel-Probe,* it is even closer to Werckmeister's theological interpretation. Sorge's work is remarkable for its ample practical information for the tuner and the strikingly immediate proximity between practical and theoretical considerations. It is written in the form of a pedagogical dialogue, and the passage quoted below appears in the decisive moment when the teacher has led the pupil to *experience* the need for temperament by a practical demonstration of the lesser and the greater diesis.[43] Learning by doing, the pupil has acknowledged that neither three superimposed perfect major thirds nor four superimposed minor thirds create a perfect octave and he must recognize that he has to give up his desire for perfect fifths and thirds:

> [Studioso musices:] So sehe ich wohl, daß ich mir den Appetit zu völlig reinen Quinten, Tertien und Sexten muß vergehen lassen.
>
> [Musico theoretico:] Ja; den laß dir nur vergehen, wenn du anders nicht wilst, daß dir die *anarmoni*schen Orgel- und *Clavier*-Wölfe sollen schaarenweise auf den Leib gehen.
>
> [Sm:] Das werde ich auch thun, denn ich kann ihr Geheule übel vertragen.
>
> [Mt:] Bist du nun überzeuget, daß man außer dem *Unisono* und *Octava* keine C*onsonantie* mehr vollkommen rein haben kan?
>
> [Sm:] Ja, vollkommen; und gemahnet mich diese Sache eben, als wie die Evangelisch-Paulinische Lehre, daß der Mensch durch des Gesetzes Werke nicht gerecht und seelig werden kan?[44]
>
> [Mt:] Du bist auf keinen schlimmen Gedanken gerathen, denn die vollkommen reinen *Consonantien* vergleichen sich dem Gesetz; die gezeigte Unmöglichkeit mit selbigen zu *procediren,* dem Menschen wie er nach dem Fall beschaffen, und diese Erkenntniß lehret uns nun, uns nach einem Mittler umzusehen, und dieser ist die *Temperatur.*
>
> [Sm:] Ich verwundere mich zum höchsten über diese Sachen. Steckt doch eine ganze *Theologie* in der *Music*.
>
> [Mt:] Ja, allerdings: studire nur fleißig, du wirst mehr finden, und die Evangelische Religion aus der *Music* beweisen lernen, wenn es an der Bibel nicht genug wäre. Nun haben wir in der Bibel Beweises genug. Allein, wer wird uns übel auslegen, wenn wir Gott und seinen heiligen Willen auch aus dem Buche der Natur su-

43 The lesser diesis is the interval between the perfect octave and the pitch you reach, when you superimpose 3 perfect major thirds (41.1 cents). The major diesis is the interval between the perfect octave and the pitch you reach, when you superimpose 4 perfect minor thirds (62.6 cents).

44 Paul's Letter to the Romans 3.20: "Because by the works of the law, no flesh will be justified in his sight. For through the law comes the knowledge of sin."

> chen zu erkennen. Zumahlen, wenn wir handgreiflich merken, daß sich uns Gott auch durch dieses Mittel immer besser und überzeugender will offenbahren.[45]

Undeniably this text is stylistically tempered compared to Werckmeister's *Musicalische Paradoxal-Discourse.* In this case, of course, it also has to do with the obvious pedagogical purpose. But as far as the content is concerned we are not far from Werckmeister's 'theology in music'. All sources of the temperament debate that I have seen document that the negotiation of the symbolic significance of temperament was an indispensable part of the matter. In the mid-18th century theology still played an important part in this negotiation.

Two dictionaries

The discussion of temperament and key individuality in which Mattheson and Rameau and many others engaged in the first half of the 18th century by no means lost its impetus in the second half of the century. This is reflected both in specialized literature on the subject and in widely distributed dictionaries of the time. Both Jean-Jaques Rousseau's *Dictionnaire de Musique* (1768) and J.G. Sulzer *Allgemeine Theorie der schönen Künste* (1771-74) take up the issue and none of them are in favour of equal temperament.

Rousseau's *Dictionnnaire de Musique* offers the reader a brief sketch of the history of temperament accounting also for Rameau's positions in his *Nouveau Système* and *Génération Harmonique* respectively. The author respectfully refers – and partially quotes – Rameau's arguments in both cases but energetically rejects Rameau plea for equal temperament in the later of his books. Despite "l'air scientifique"[46] that surrounds this system it is to the taste of neither musicians nor instrument makers.

The musicians reject the system because they do not want to "… se résoudre à se priver de l'énergique variété qu'ils trouvent dans les diverses affections des Tons qu'occasionne le *Tempérament* établi" and because they do not see any contradiction between key qualities defined through "… l'entrelacement des Modes ou dans les divers Degrés des Toniques, …" and key qualities defined "… dans l'altération des Intervalles …."[47]

The instrument makers find the system inferior because of the "[l]es Tierces … dures & choquantes", because they are not able to suppress the heavy beating of this interval (especially on organs), and because "… par la nature des Consonnances la Quinte peut être plus altérée que la Tierce sans choquer l'oreille & sans faire des battemens, …."[48]

The line of argument in the article *Temperatur* in Sulzer's *Allgemeine Theorie* is strikingly similar to the article in Rousseau's *Dictionnaire*. Again we are confronted with a sketchy historical narrative that places equal temperament as the logical goal. But the apparent superiority of equal temperament is unmasked as make-believe:

45 G.A. SORGE, *Anweisung zur Stimmung und Temperatur*, Hamburg 1744, pp. 19-21.
46 J.-J. ROUSSEAU, *Dictionnaire de Musique*, Vol. II, Geneve 1782 (first issued in Geneve 1768 = *Collection complete des oeuvres de J.-J. Rosseau*, Vol. 18), p. 299.
47 *Ibid*., p. 298.
48 *Ibid*., pp. 299-300.

> Da nun durch diese Temperatur alle Consonanzen beynahe ihre völlige Reinigkeit behalten, so scheinet sie allerdings vor allen andern den Vorzug zu verdienen. Es läßt sich auch erweisen, daß keine Temperatur möglich sey, durch welche gar alle Consonanzen ihrer Reinigkeit so nahe kommen, als durch diese. Daher ist es ohne Zweifel gekommen, daß sie so viel Beyfall gefunden hat.
>
> Untersuchet man aber die Sache etwas genauer, so findet man, daß diese Vortheile der gleichschwebenden Temperatur nur ein falscher Schein sind.[49]

The creative tuning horn dismissed

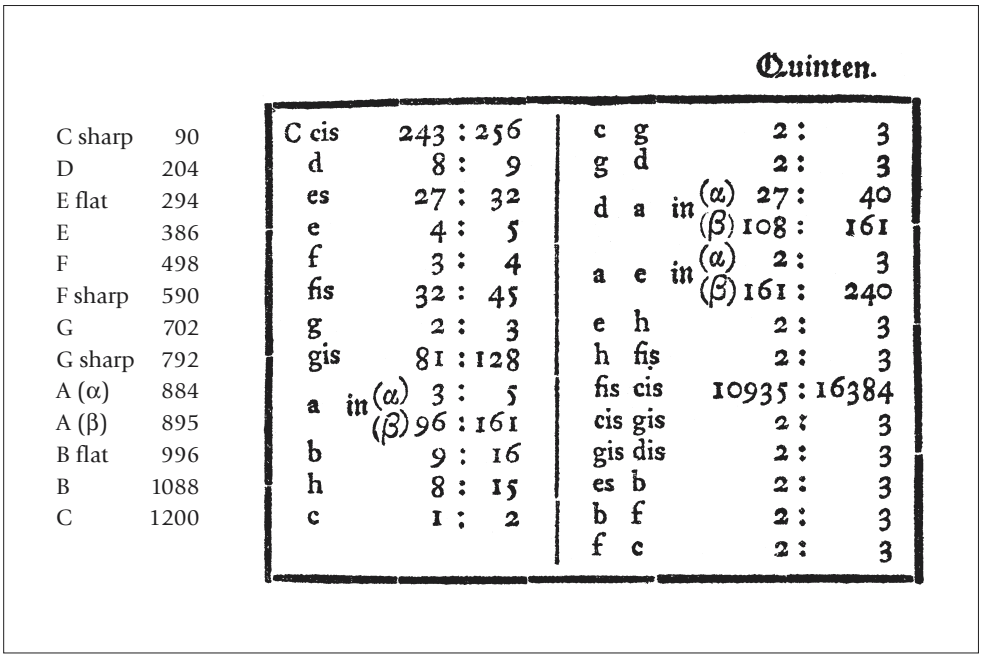
The lexicographer Sulzer had no professional musical training, and the articles on music in his dictionary are written by the composer and theorist J.P. Kirnberger and his pupil J.A.P. Schulz. The articles following the letter "S" (except for the article 'System') were written by Schulz alone.

But even if the article 'Temperament' is from the pen of Schulz, it faithfully expresses the views of Kirnberger and explicitly refers to Kirnberger's principal theoretical work, *Kunst der reinen Satzes in der Musik* (Berlin & Königsberg 1771-79). The article's identification with the views of Kirnberger was so strong that even a well informed contemporary reader did not recognize that it was actually written by his pupil. The theorist F.W. Marpurg was an ardent proponent of equal temperament, and on 37 pages of his *Versuch über die musikalische Temperatur* (Breslau 1776) he energetically and circumstantially argued against the stance taken in Sulzer's dictionary and by Kirnberger in his *Kunst der reinen Satzes in der Musik*. Among the arguments against equal temperament by Sulzer were the old favourites that equal temperature is too difficult for practical tuning and that equal temperament erases valuable key characteristics. The first argument Marpurg dismisses with reference to instructions for practical tuning in equal temperament given by "… dem illüstren Lambert …"[50] or to the possible (but not preferable) use of a monochord. The second argument he discusses at length. He ridicules the article for lack of precision. Could the honoured author please inform us precisely what sort of characters are inherent in the 24 keys? And by the way, the two Kirnberger temperaments in question produce not 24 but only 10 respectively 13 acoustically different keys! More important than such pedantry, however, is the total lack of understanding of the adversaries' arguments that Marpurg displays. The intonational subtleties that were of central aesthetic importance to the proponent of irregular systems seem to be simply non-existing for the aesthetic sensibility of Marpurg!

In 1737 Rameau argued that differing interval sizes "… displease the ear and consequently distract it from its functions", and his text immediately answered the implicit question: what function? In question is the function of apprehending "the intertwining of the keys". In a more general discussion on the ontology of music one could appro-

49 Johann George SULZER, *Allgemeine Theorie der Schönen Künste*, Leipzig 1794, (first issued 1771-74), p. 518.

50 Friedrich Wilhelm MARPURG, *Versuch über die musikalische Temperatur*, Breslau 1776, p. 137.



C sharp	90
D	204
E flat	294
E	386
F	498
F sharp	590
G	702
G sharp	792
A (α)	884
A (β)	895
B flat	996
B	1088
C	1200

Quinten.

C cis			243 : 256	c	g		2 :	3
d			8 : 9	g	d		2 :	3
es			27 : 32	d	a	in (α)	27 :	40
e			4 : 5			(β)	108 :	161
f			3 : 4	a	e	in (α)	2 :	3
fis			32 : 45			(β)	161 :	240
g			2 : 3	e	h		2 :	3
gis			81 : 128	h	fis		2 :	3
a	in	(α)	3 : 5	fis	cis		10935 :	16384
		(β)	96 : 161	cis	gis		2 :	3
b			9 : 16	gis	dis		2 :	3
h			8 : 15	es	b		2 :	3
c			1 : 2	b	f		2 :	3
				f	c		2 :	3

Two Kirnberger temperaments represented as string length ratios by Marpurg. Marpurg adds a survey of the fifths of these temperaments where only the pitch 'a' differs. Friedrich Wilhelm Marpurg: *Versuch über die musikalische Temperatur*, Breslau 1776, p. 185. For convenience the interval sizes expressed in the logarithmic cent-scale are added at the left side of Marpurg's table.

priately focus on the concept of distraction and ask: distraction from what? The answer then would be: distraction from the locus of the identity of the musical work.

The temperament debate in the 18th century is a part of that discussion. Are the subtleties of temperament part of the aesthetic object or are tuning and temperament a purely pre-aesthetic issue? Are the intonational shadings parts of the 'aesthetic object'?

Marpurg has no doubts. For him the issue of tuning and temperament has nothing to do with aesthetically valuable differences. It is a simple matter of either/or: of being, or not being in tune! In this respect he is fully in line with idealistic 19th-century conceptions of the relation between the musical artwork and the acoustic materiality of sound and tonal systems. To Marpurg the key characteristics of irregular systems represent a threat to the ideal content of the musical work and the authorial control of the composition: "… wenn in der That der Ausdruck von dem Stimmhammer abhängen sollte, so würde der Stimmer zum Capellmeister werden."[51] The authority of the artist is seriously threatened by the practise of the artisan if the temperament is granted a genuine aesthetic significance. To secure the ideal content of the musical work its aesthetic significance must rely on the composer's creativity not on the creative power of the "Stimmhammer[s] oder Stimmhorn[s]".[52]

51 *Ibid.*, p. 195.
52 *Ibid.*

Equal temperament and the idealization of Western art music

It is a condition of historical research that some historical discourses in some respects will appear profoundly paradoxical. Confronting oneself with historical sources, one will necessarily be confronted with thoughts that can no longer be thought,[53] beliefs that cannot be shared and truths that can no longer be accepted as truths. For instance, it is not realistic to believe that many present-day readers will be able to follow Werckmeister, when he compares "die unrichtige Temperatur mit dem falschen Christenthum". We read that the practitioners of mean-tone temperament are to be condemned as heretics and sinners. We read, and we understand as far as understanding is possible when it is not based on shared beliefs. Perhaps we smile and wonder whether Werckmeister is serious or joking. Perhaps we ask ourselves what sort of punishment the Almighty will devise for such scoundrels. But we attribute neither truth nor plausibility to Werckmeister's argument, even if they are fully in accordance with *his* logic.

Anyhow, we do our best to account for the foreign ideas and the foreign world to which they belong. It is still a simple duty of the historian to do his or her best to let the foreign voices be heard – and the duty of his or her readers to do their best to listen. Narrow-mindedness is the mortal enemy of history, and we historians must be able to report far beyond the limits of our own beliefs, logics, truths. We also must be willing to be moved – but not to expect miracles! Notwithstanding how faithfully we report a foreign logic, it cannot be denied that the historical account will be judged mainly on the basis of its coherence and plausibility, which again depend on the construction of relations, interactions, consequences, and causalities that can be accepted as valid by the author and his contemporaries. Even if it owes its existence and its distinctive generic character to a methodologically controlled relation to a past, the success and effectiveness of historiography is obviously a matter of the relation to the present. Carl Dahlhaus expressed this beautifully in his reflections on the perspectivic nature of historiography in his classic text on music historiography, *Grundlagen der Musikgeschichte*. Just as historical facts are constructed by the historian on the basis of the available data, historical structures and lines of connection only appear filtered through the conceptual systems of the historian. Attempts to escape this condition are doomed to failure as are attempts to jump out of your own shadow.[54] I have no intentions to engage in that sort of acrobatics, but find it useful to consider the situation that conditions my approach to the historical subject. In such professional self-reflection there will be blanks and voids of course, but still there are much than can be known and said:

53 See Gary Tomlinson's reflections on this sentence from Michel Foucault: "What does it mean, no longer being able to think a certain thought." Gary TOMLINSON, *Music in Renaissance Magic*, Chicago & London 1993, p. 247. And my reflections on the limits of dialogical understanding in Søren Møller SØRENSEN, '»Unser Denken ist schechterdings nur eine Galvanisation …« Om mødet mellem naturvidenskab, diftningsteori og musikæstetik hos Novalis', *Danish Yearbook of Musicology* 31 (2003), pp. 61-80 (64-66).

54 Carl DAHLHAUS, *Grundlagen der Musikgeschichte,* Köln 1977, p. 71.

Post-Hegelian music aesthetics effectively divorced acoustics and music aesthetics, effectively drew a dividing line between the investigation of the physicality of sound and the contemplation of musical art.[55] Eduard Hanslick and Th.W. Adorno are two of a piece as far as this divorce is concerned. Both exerted great authority to establish that the concerns of acoustics have nothing at all to do with the concerns of music aesthetics. Consequently, a major source for reflection on the material aspect of music was cut off, or at least the concerns of acoustics were marginalized as a field for specialists only. This marginalizing was part of the multi-facetted background for the concept of the musical artwork which was the decisive guiding idea for mainstream Western musicology in the 20th century. Here it became an aspect of what we, with appropriate care, could call 'the idealization of western art music'. This idealization meant the accentuation of the ideal content of the composed musical artefact on the expense of all other aspects of music making, the confidence in the creative power of the composer,[56] and the distrust in the dignity of all other creative powers: nature, chance, the instrument maker, the tuner, the audience etc.

I willingly admit that I find this idealism narrow-minded and reductive. Music minus practical, performative, situational aspects is a strange anaemic intellectual construct. Fortunately, I have strong partners in this view and excellent sources of inspiration in the post-world-war II avant-garde with its strong interest in the reality of the material realm 'behind' the representative capacities of music. Music of La Monte Young has taught me the temperament of the instrument of a performance can very well be part of the aesthetic object – and it has made me ask: perhaps it always is?

In the temperament debate of the 18th century the idealism of western art music was negotiated and, as it has been made clear, most of the participants were not in favour of the neutralisation of the pre-compositorial significance of the sound. The majority of musical connoisseurs found no reason to assume that appreciation of the immediate effect of the ears, hands and tools of the tuner as part of the aesthetic experience of music would threaten the dignity of music. Do we?

The framing of aesthetic experience is subject to chance and to – more or less decisive – discursive regulation. It is one of the lessons to be learnt from the history of musical temperaments. Apparently it also can be experienced.

> Equal temperament … is virtually considered an inherent characteristic of the modern concert piano. Indeed the ideals of sonority in the acoustic design of the modern piano and in all but the more radical forms of modern pianism are as intimately bound to the acoustic qualities of equal temperament as any previous keyboard style ever was to its contemporary style of intonation. The enharmonic

55 From the perspective of the disciplines of musicology this is a stepwise development. Roughly: the 19th century divorced music theory and music aesthetics, which in the 18th century was one disciplinary practice. Gradually also music theorists could no longer successfully claim that their theories were based on laws of nature and that theories based on laws of nature were relevant for aesthetic judgement.

56 The composer as an empirical individual, the abstract creativity of the genius, 'objectiver Geist', and/or other speculative constructs.

> facility of Brahms or Fauré, the hovering sonorities of Debussy, the timbral poise of Webern, the slickness of the most urbane jazz chord progressions, all rely implicitly on the hue of equal temperament as much as on the other normal characteristics of the instrument's tone. An 18th-century tuning usually sounds as inappropriate for this music as the piano would seem visually if its glossy black finish were replaced by an 18th-century décor.[57]

These are the words of Mark Lindley at the end of the paragraph on equal temperament in the period from 1737 and onwards in his article in *The New Grove Dictionary*. Lindley's words call to mind that process of de-automation, which can be experienced by the researcher, engaged with the history of tuning and temperament. From being in a certain sense inaudible, the specific sound quality of the equally tempered modern grand is changed into an aesthetically relevant aspect of music that calls for conceptualization and metaphorical elaboration.

57 Lindley: 'Temperaments', p. 259.