

## GAFFURIUS ON PULSE AND TEMPO A REINTERPRETATION

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Many musical writers of the Renaissance and Baroque discuss a connection between the human pulse and musical measure. Whether or not such passages from the Renaissance convey precise information about authentic tempo remains a matter of dispute, with Auda and Bank supporting a literal interpretation, Dahlhaus questioning it, and Kümmel seeming to straddle the issue.<sup>1</sup> The first music theorists to develop this topic are Ramos and Gaffurius, and of these Gaffurius is probably the more important because he treats the matter more extensively. There can be little doubt that Gaffurius's treatment of pulse influenced many later writers who take up the issue.

Gaffurius's discussions of pulse have generally been interpreted in a literal manner,<sup>2</sup> the view being that he specifically equates the tempo of the normal semibreve with the pulse of a healthy person who is breathing evenly. This paper will attempt to show that there are several reasons why Gaffurius's comments should not be interpreted in this manner.

Three passages in Gaffurius's *Practica musicae* discuss the pulse. The first of these reads as follows:

<sup>1</sup> Antoine Auda, "Le 'Tactus' dans la Messe 'L'homme armé' de Palestrina," *Acta Musicologica* 14 (1942): 27–73, especially p. 31; also by Auda, "Le tactus principe générateur de l'interprétation de la musique polyphonique classique," *Scriptorium* 4 (1950): 44–66, especially pp. 58–59; J.A. Bank, *Tactus, Tempo and Notation in Mensural Music from the 13th to the 17th Century* (Amsterdam: Annie Bank, 1972), particularly pp. 13, 123; Carl Dahlhaus, "Über das Tempo in der Musik des späten 16. Jahrhunderts," *Musica* 13 (1959): 767–769; also Dahlhaus, "Zur Theorie des Tactus im 16. Jahrhundert," *Archiv für Musikwissenschaft* 17 (1960): 22–39; Werner Friedrich Kümmel, "Zum Tempo in der italienischen Mensuralmusik des 15. Jahrhunderts," *Acta Musicologica* 42 (1970): 150–163.

<sup>2</sup> See, for example, Bank, *Tactus, Tempo and Notation*; Irwin Young, trans. and ed., *The "Practica musicae" of Franchinus Gaffurius* (Madison: University of Wisconsin Press, 1969); Clement A. Miller, trans. and ed., *Franchinus Gaffurius: Practica musicae*, Musicological Studies and Documents, no. 20 (n.p.: American Institute of Musicology, 1968); also Miller, "Gaffurius's *Practica musicae*: Origin and Contents," *Musica Disciplina* 22 (1968): 105–128, especially 120–121; also Miller's article "Gaffurius, Franchinus," in *The New Grove Dictionary of Music and Musicians* 7 (1980): 77–79.

Rectam autem brevis temporis  
 mensuram Physici aequis  
 pulsuum motibus accomodandam  
 esse consentiunt: Arsim &  
 thesim quas Diastolen &  
 Sistolen vocant in  
 vniuscuiusque pulsus mensura  
 aequaliter comprobantes:  
 Constat tamen  
 febricitantium pulsus  
 inaequali diastoles &  
 sistoles proportione  
*accessionem*<sup>3</sup> seu alterationem  
 suscipere quod ipsis physicis  
 curae est. Diastole  
 graece dilatatio seu  
 elleuatio interpretatur  
 latine: Sistole vero  
 contractio.

Physicians agree that proper  
 measurement of a short unit of time  
 should be fitted to equal motions  
 of pulses, [the physicians] establish-  
 ing arsis and thesis (which they  
 call “diastole” and “systole”)  
 equally in the measurement of  
 each individual pulse.  
 Nevertheless it is well known  
 that the pulses (diastoles  
 and systoles) of fevered  
 persons undergo *an increase*<sup>3</sup>  
 or alteration in an unequal  
 proportion, which is of concern  
 to these physicians. (“Diastole”  
 in Greek means “dilation”  
 or “elevation” in Latin,  
 and “Systole” [means]  
 “contraction”).<sup>4</sup>

The above language occurs in the immediate context of a rather long discussion of metrics – that is, the measurement of poetry in short and long syllables, and by different kinds of poetic feet. This discussion is interrupted briefly with the observation that musicians, like poets, have used a variety of time units, and by the passage just quoted, which notes that physicians also have an opinion on the measurement of time.

These views of the physicians have a broader context, one which has recently been clarified by Nancy Siraisi.<sup>5</sup> The connection of music and pulse apparently originated in the theory of medicine, and was an important topic in a tradition of Renaissance and medieval medical writings which extends back at least to Galen (and, through him, to Herophilus). While the many writers treating this subject disagreed as to certain details, the general idea was that music, in the form of

<sup>3</sup> Italics here and elsewhere in the quotations have been added by the author to highlight certain words to be discussed in the text.

<sup>4</sup> Franchinus Gaffurius, *Practica musice* (Milan, 1496), 2.1, fol. aai<sup>v</sup>.

<sup>5</sup> Nancy G. Siraisi, “The Music of Pulse in the Writings of Italian Academic Physicians (Fourteenth and Fifteenth Centuries),” *Speculum* 50 (1975): 689–710; see also Werner Friedrich Kümmel, *Musik und Medizin: Ihre Wechselbeziehungen in Theorie und Praxis von 800 bis 1800*, *Freiburger Beiträge zur Wissenschafts- und Universitäts-geschichte*, no. 2 (Freiburg/München: Verlag Karl Alber, 1977), pp. 23–62.

harmonic or rhythmic proportions, was inherent in the pulse, and that physicians should study music in order to be able to recognize different proportions in the pulse of patients as a way of diagnosing illness, since different diseases would produce different “musical” proportions in the pulse. By contrast, references in *music* theory to a connection of music and pulse occur only incidentally as a part of the larger concept of *musica humana* or as a weak reflection of the medical discussions. So far as I have been able to determine, no musical writer before Ramos and Gaffurius gives this topic more than a passing reference.

In view of this context for his discussion of pulse, Gaffurius may be seen to present (in this first passage, quoted above) what appears to be a novel idea – that physicians feel that equal pulse motions can be useful for time measurement – along with the traditional view that disease causes various unequal proportions in the pulse. (In reading the passage one should also note that *accessionem* has a specific medical meaning: it might thus be rendered here not as “an increase” but as “an attack of disease.”)

Gaffurius’s second pulse reference occurs in his discussion of the notes. After dealing with the long and the breve he comes to the semi-breve, concerning which we read as follows:

Neoterici postremo  
*rectae* semibreui temporis  
 vnius mensuram ascripserunt:  
 diastolen & sistolen  
 vnius cuiusque semibreuis  
 sono concludentes.  
 Cumque Diastole & Sistole  
 seu Arsis & Thesis quae  
 contrariae sunt ac  
 minimae quidem in pulsu:  
 solius temporis mensura  
*consyderentur*:  
 semibreuem ipsam  
 integra temporis  
 mensura dispositam:  
 duas in partes aequas  
 distinxere: *quasi* altera  
 Diastoles in mensura  
 pulsus tanquam  
 in sono: altera

Finally, modern [musicians] have assigned to the *regular* semibreve a measure of one unit of time, including diastole and systole in the sound of each individual semibreve. And since diastole and systole, or arsis and thesis (which are opposites and indeed the smallest [parts] of the pulse), *are considered* the measure of a single unit of time, [musicians] have divided that semibreve (regularly arranged in an integral measure of time) into two equal parts, *as if*, in [the measurement of] sound just as in the measurement of the pulse, one [part] *were to contain*

Sistoles quantitatem  
*contineat.*  
 Huic enim minimam  
 vocis plenitudinem  
 ascripserunt ipsam inde  
 minimam nuncupantes.

the quantity of a diastole [and] the  
 other [part] that of a systole.  
 To this [part] they have assigned  
 the minimum fullness  
 of voice, naming it, because  
 of that, “minima.”<sup>6</sup>

This is the passage which is most crucial to the view that Gaffurius equates the speed of the pulse with the tempo of the semibreve. That interpretation, though, rests on a reading or translation of the passage which differs from the one presented above in that the last section of the excerpt is interpreted as absolutely equating the time value of the pulse with that of the semibreve.

The issue here is largely that of the significance of the subjunctive mood. Latin subjunctives seem often to be neglected or ignored by persons interpreting or translating music theory. Sometimes this is quite understandable, and also fairly trivial in its effect on interpretation, as for example in the case of discussions entitled, respectively, “*Quid est musica?*” versus “*Quid sit musica.*” These both really mean “What is music?” but the second version is shaded or qualified by the subjunctive. The author who addresses the topic “*Quid sit musica*” promises only to tell us what music *is considered to be*, what people *think* it is, not what it *actually* is. Reproducing this hedging in an English translation can be difficult, and clumsy, especially if the subjunctive continues to be used over an extended time. But it must be remembered that many times the Latin subjunctive expresses *conditions contrary to fact*, and if we do not observe it and reproduce its effect in such situations, we can fundamentally distort the meaning of a passage. In my opinion, this is what has happened with this second pulse discussion of Gaffurius.

To be sure, this discussion does begin by stating, in the indicative mood, that “a measure of one unit of time, including diastole and systole,” has been assigned to the semibreve. And while the next clause, beginning with *Cumque*, has its verb in the subjunctive, this kind of “*cum*” clause is not one of the “contrary-to-fact” situations, and it requires an indicative translation. But although Gaffurius thus uses here what amounts to the indicative mood in English, he nevertheless provides a sort of subjunctive significance through his choice of

<sup>6</sup>Gaffurius, *Practica musice*, 2.3, fol. aa.iiij.

verb: he says that diastole and systole *are considered* the measure, not that they *are* the measure. And finally, after noting that the semibreve is divided into two equal parts, he compares these to the two parts of the pulse in a clause introduced by *quasi* – “as if” – which has its verb, *contineat*, in the subjunctive. This particular construction is described in a standard Latin grammar<sup>7</sup> as an “imaginative comparison.” It is something apt for presenting an analogy, but not for the statement of fact.

Gaffurius’s third reference to pulse comes at the beginning of his treatment of dissonances in counterpoint:

Qvae vero in contrapuncto admittendae sint discordantiae breui descriptione duximus exprimendum. Semibreuis enim recta plenam temporis mensuram consequens: in modum scilicet pulsus <i>aeque respirantis</i> : in contrapuncto discordantiae subiacere non potest: vt artis posuere magistri.	We thought we should certainly outline, in a brief description, which discords are considered admissible in counterpoint. For a regular semibreve equalling a full measure of time, namely, in the manner of the pulse of [ <i>someone</i> ] <i>breathing evenly</i> , cannot lie under a dissonance in counterpoint, [just] as the teachers of the art have maintained. <sup>8</sup>
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Notice that here also, the pulse and the semibreve are presented as simply analogous, not as equivalent. The semibreve *is* equivalent to a full measure of time, but this in turn is merely similar to – “in the manner of” – the pulse. And it may be that the reference to respiration, or breathing, is not really what Gaffurius intends, for in the medical tradition upon which he is calling, the true function of the heart was not understood, and it was, along with the pulse, considered to be linked with respiration. Since respiration involves the visible dilation and contraction of the chest, *aeque respirantis* here may simply refer, as Irwin Young has rendered it,<sup>9</sup> to the even throbbing of the pulse. If this reasoning seems persuasive, the above translation should be amended to read thus: “For a regular semibreve equalling a full

<sup>7</sup>William Gardner Hale and Carl Darling Buck, *A Latin Grammar*, Alabama Linguistic and Philological Series, no. 8 (University, Ala.: University of Alabama Press, 1903 [reprinted 1966]), p. 264.

<sup>8</sup>Gaffurius, *Practica musice*, 3.4, fol. ddiij<sup>r</sup>.

<sup>9</sup>Young, *Gaffurius*, p. 137.

measure of time, namely, in the manner of a pulse *dilating and contracting evenly*, cannot lie under a dissonance in counterpoint.” Even if one prefers to maintain the view that we have here a reference to someone *breathing evenly*, this passage does not seem to justify the conclusion (as stated in *The New Grove*<sup>10</sup>) that Gaffurius defines normal tempo in terms of breathing.

In investigating further the significance of the pulse discussions of Gaffurius it will be helpful to compare them with those of Ramos de Pareia. Ramos presents two such discussions, the first of which reads as follows:

<p>Consideratione temporis accepta,          quae in pulsus noscitur          palpitatione, scire nos          oportet, utrum duplari          aut triplari . . .</p>	<p>Having undertaken an examination of          the unit of time (which is recognized          in the palpitation of the pulse), we          ought to know whether it is subject          to doubling, or tripling, or [etc.].<sup>11</sup></p>
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After some discussion of mensuration at different levels, Ramos elaborates his view of a relationship between pulse and the mensural time unit thus:

<p>Mensura enim, ut diximus,          est illud tempus sive          intervallum <i>inter</i> diastolen          et systolen corporis          eucraton comprehensum.          De cuius inaequali alteratione          insurgunt inaequales musicae          proportiones, de quibus paulo          post dicturi sumus.          Cum igitur cantor          recte et commensurate          cantare desiderat,          instar pulsus istius pedem          aut manum sive digitum tangens</p>	<p>For “measure” is, as we have          said, that interval or time          span contained <i>between</i> the          diastole and systole of a          well-tempered [human] body.          (From [the pulse’s] unequal          alteration arise unequal musical          proportions, of which we shall          speak a little later).          When, therefore, the singer          especially desires to sing accurately          and with equality of measure,          let him set in motion a likeness          of such a pulse while singing, [by]</p>
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<sup>10</sup> David Fallows, in “Tempo and Expression Marks,” *The New Grove* 18 (1980): 680b.

<sup>11</sup> Bartolomeo Ramis de Pareia, *Musica practica* (Bologna, 1482), 3.1.1; ed. Johannes Wolf, *Publikationen der Internationalen Musikgesellschaft: Beihefte 2* (Leipzig: Breitkopf & Härtel, 1901): 77. Cf. Clemente Terni, ed., *Música práctica de Bartolomé Ramos de Pareia*, *Viejos libros de música*, no. 16; 2 vols. (Madrid: Joyas Bibliográficas, 1983), 2 (Comentario): 126. Quotations here follow Wolf’s edition.

in aliquem locum canendo  
moveat.

striking his foot, hand, or finger  
somewhere.<sup>12</sup>

If one wishes to view these discussions of Gaffurius and Ramos as having a bearing upon tempo, there arises a major discrepancy: Gaffurius compares the semibreve to the entire pulse – diastole *and* systole, while Ramos compares the measure (which, he explains later, is normally also the semibreve) to the interval *between* diastole and systole. If these are really statements of tempo, then these two authorities – separated by only 14 years – disagree by a factor of two! And if one should reply to this that these authors must simply have disagreed about appropriate tempo, it must be noted that Gaffurius wrote extensive marginal notes in the copy of Ramos’s treatise upon which Wolf’s edition is based, and that in these notes Gaffurius freely criticized views of Ramos with which he did not agree. But though he thus was afforded the opportunity to record for us any disagreement with Ramos’s treatment of pulse and measure, he did not write any notes – critical or otherwise – concerning these passages.

If we grant, though, that neither Ramos nor Gaffurius was discussing tempo, we find that they do not disagree. Both cite a pulse having equal motions as a useful analogy to musical measurement which proceeds regularly and accurately by even beats. They both emphasize this factor of regularity, and if that is indeed the point of the analogy of pulse and musical measurement, it matters not at all whether the measure is compared to only the interval between diastole and systole or to a full pulse containing both.

As noted above, medical writers had long maintained that music could be found in the pulse, and that the physician should try to identify “musical” proportions in the pulse in diagnosing illness. The pulse discussions of Ramos and Gaffurius build on this tradition, but involve a new emphasis and a change of direction. In my view these passages from Gaffurius and others probably find their true

<sup>12</sup> Ramis, *Musica practica*, 3.1.2; Wolf ed., p. 83; Cf. Terni ed., 2 (Comentario): 130.

significance less as guides to tempo than as manifestations of the new humanistic climate, for just as medieval medical writers had advocated making music the measure of man, so do Renaissance music theorists advocate making man the measure of music.

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