Aristoteles Musicus: Causality and Teleology in Johannes de Grocheio's *Ars musicae* [1)]

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Introduction

The treatise *Ars musicae* by Johannes de Grocheio, a music theorist active in Paris around 1300,[2)] represents a major turning point in the history of Western conception of music. The tradition of the speculative view of music transplanted from the Greek into the Western world by Boethius (ca. 480-ca. 524) was for the first time relativized and received critical consideration here. *Musica* is, defines Johannes, 'ars vel scientia de sono numerato (art or knowledge of numbered sound).'[3)] In explicating 'sonus numeratus,' he makes allusion to the Boethian *musica mundana* and *musica humana*. But he decidedly rejects them, referring to Aristotle. As is well known, Aristotle in his *De caelo* (II, 9) refuted the Pythagorean notion of the harmony of the spheres by means of empirical observations. Supported by this unquestioned authority, Johannes asks rhetorically, 'Quis enim audivit complexionem sonare (Who has heard the combination [of elements in the human body] sound)?' As is evident from this, *musica* for Johannes unequivocally means the activity about audible events.

It is because he was based on such a premise that Johannes de Grocheio was able to devote a full discussion to the contemporary Parisian music practice. The method he employed there was classification, which Aristotle established to subsume particular animal species under more general categories. Johannes is explicit in naming *De animalibus, De historiis [animalium], De partibus [animalium], [De] Generatio[ne animalium]* in this connection.[4)]

Thus, the *Ars musicae* owes its subject and method of inquiry to Aristotelian philosophy. If, then, this work is fruitful in some way, it is at least in part Aristotle's contribution.

1. Johannes de Grocheio's Mode of Argumentation

What first strikes the reader of the *Ars musicae* is its consistent way of argument or *modus*

1) Introduction and Chapter 3 of this paper are partly based on 'Si vero musica/mathematica: Aristotelianism in Grocheio's *Ars musicae,*' written in Japanese and published in *Bigaku-Geijutsugaku-Kenkyu*, 15 (1996). I am grateful to Professor FUJITA Kazuyoshi, co-author of the Japanese version, for permission to use the relevant part.

2) For his dates, see Patricia Alice Mitchell DeWitt, *A New Perspective on Johannes de Grocheio's* Ars Musicae, doctoral dissertation, The University of Michigan, 1973, pp. 5-7.

3) Ernst Rohloff, *Die Quellenhandschriften zum Musiktraktat des Johannes de Grocheio: Im Faksimile herausgegeben nebst Übertragung des Textes und Übersetzung ins Deutsche, dazu Bericht, Literaturschau, Tabellen und Indizes*, Leipzig: VEB Deutscher Verlag für Musik Leipzig, 1972?, p. 122, 8-9. Henceforth quotations from the *Ars Musicae* are indicated by the page and the line of this edition. English translation is mine.

4) *Ars Musicae*, p. 130, 7-14. See also Ellinore Fladt, *Die Musikauffassung des Johannes de Grocheo im Kontext der hochmittelalterlichen Aristoteles-Rezeption*, München /Salzburg: Musikverlag Emil Katzbichler, 1987, p. 5.

procedendi. Not only is practically every statement predicted, summarized, and carefully positioned according to its place in the whole topic,[5] but the order of the arguments follows the pattern from the general to the particular.

Now, Johannes was himself aware of his originality.

(Quotation 1)

Licet enim plures diebus istis practicam huius artis quaerant, pauci tamen de eius speculatione sunt curantes. Et adhuc quidam speculativi suas operationes et inventiones abscondunt nolentes aliis publicare, cum tamen quilibet vir debeat in talibus veritatem manifestare ad laudem et manifestationem veritatis increatae.

Although many people these days make researches into the practice of this art, few are concerned with speculation about it. Moreover, certain speculative people conceal their work and findings, unwilling to make them public. Yet anyone no matter who it may be must manifest truth in such a subject, to the praise and manifestation of the uncreated truth.[6]

Unlike such 'practical' theorist as named in the treatise (Franco [sc. de Colonia], Johannes de Garlandia, and Lambertus), his 'speculative' treatment of the topic is meant to be the very characteristic which distinguishes his work from those of his contemporaries.

It follows from this that the argument about the general principles of music is supposed to be unique rather than the particular observations about practice of music are, which have earned him a high reputation among music historians today. In adopting the above named method, Johannes again models himself on Aristotle in the *Physics* (Book 1, Chapter 1).[7]

2. The Matter and the Form in Music

Johannes de Grocheio analyzes the principles of music in the Aristotelian scheme of four causes. He makes distinction of two kinds of form in music.

(1) Number as Form

In the definition of *musica* as 'ars vel scientia de sono numerato, harmonice sumpto, ad cantandum facilius deputata,' he designates number or numerical ratio as the form of consonance, while harmonic sounds are its matter.[8]

(2) Composition and Consonance as Form

Later, in a more concrete context, *cantus* or musical composition is qualified as form in contrast with *dictamen* or words *qua* matter.[9] A piece of poetry (matter) provided with an

5) See Mitchell DeWitt, *op. cit.*, pp. 14-22.

6) *Ars Musicae*, p. 112, 4-9.

7) *Ars Musicae*, p. 110, 16-20.

8) Cf. *Ars Musicae*, p. 122, 12-14: 'De sono vero harmonico, quia est materia propria, circa quam operatur. Per numerum etiam eius forma designatur.' Johannes is somewhat inaccurate in the first sentence in which he talks of 'sonus harmonicus' as the 'materia propria' of music. Since a *sonus harmonicus* is coextensive with *sonus numeratus*, the former is a substance already provided with an appropriate form. Simply 'sonus' would be more precise.

9) *Ars Musicae*, p. 134, 21-23: 'Primo enim dictamina loco materiae praeparantur, postea vero cantus unicuique dictamini proportionalis loco formae introducitur.' See also p. 166, 28-30 in a similar vein.

appropriate melody (form) is substantiated into a song. Since these forms (also called *species*) are seized through senses, they are susceptible of classification according to their perceptible features or specific differences. Johannes' much-cited analysis of his contemporary Parisian music practice presupposes such a conceptual framework.

In another context the author identifies consonances as the matter of music.

(Quotation 2)

Ista autem principia sunt et materia, qua utitur omnis musicus, et in ea formam musicam introducit. Licet enim in naturalibus efficiens dicatur principium plus quam materia, in artificiatis tamen materia principium potest dici, eo quod sit ens in actu et forma artis sit ei accidentalis.[10]

These [consonances] are the principles and the matter which every musician uses and in which he brings musical form. For while in natural things the efficient [cause] is said to be the principle, rather than the matter is, in artificial things the matter can be said to be the principle, because it [matter] is a being in actuality and the form of art is accidental to this.

The different predications (form at p. 122, 12-14 and matter here) to the same subject 'consonance' appear *prima facie* strange. But the reciprocal relationship between form and matter is a genuine Aristotelian idea. The reality of the bronze (form) is, the Stagirite explains, potentially a statue (in which the bronze is the matter).[11] What really strikes us from the perspective of Aristotelian metaphysics is the reverse evaluation of form and matter in the case of artificial things. For we know his higher estimation of form over matter as the cause of being.[12] Moreover, as Charlton rightly observes, the Philosopher himself is not consistent as to whether artefacts are realities,[13] nor does he make any clear distinction between natural and artificial things in respect to causality.[14] Is Johannes, then, against or ignorant of Aristotle's fundamental view of causes? Here we find ourselves involved in the history of Aristotle reception or Aristotelianism, as it is traditionally called.

According to Fladt, a passage from the *Physics* (Book I, Chapter 7, 190b3-10) was central, among medieval Aristotle commentators, to the issue of what she names *der artifizielle Prozeß*.[15] Here Aristotle distinguishes ways of coming to be (γίγνεσθαι).

(Quotation 3)

There is always something which underlies, out of which the thing comes to be, as plants and animals come to be out of seed. The things which simply come to be do so some of them by change of shape, like a statue, some by addition, like things which grow, some by subtraction, as a Hermes comes to be out of the stone, some by composition, like a house, some by alteration, like things which change in respect of their matter. All things which come to be like this plainly

10) *Ars Musicae*, p. 114, 1-5. With Fladt I read 'ens in actu' here, instead of Rohloff's 'sine actu,' which deviates from both of the MSS readings.

11) *Pys.* III 1, 201a29-34. On relativity of matter to form, see Sir David Ross, *Aristotle*, London, 1949[5], p. 73.

12) See for example Met. I 3, 1029a5-6.

13) William Charlton, *Aristotle* Physics *Book I and II, Translated with Introduction, Commentary, Note on Recent Works, and Revised Bibliography*, Oxford: Clarendon Press, 1992, p. 76.

14) See e.g. *Phys.* II 2, 194b7-8 (in Charlton's translation): 'In the case, then, of artefacts we make the matter for the work to be done, whilst in the case of natural objects it is there already.' If 'the work to be done (τὸ ἔργον)' is something like the form or the end, the matter of artefacts is determined by the formal or final cause. The same relationship applies to natural things. See also Chapter 4 (1) below.

15) Fladt, *op. cit.*, p. 111. In this chapter I owe to her discussion most of the quotations selected from Averroes and Thomas Aquinas.

come to be out of underlying things.[16]

Charlton points out that this passage presents a difficulty in comparison with *De gen. et cor.* I, 4, 319b21-31, according to which the same processes should be alterations, instead of coming to be.[17] Such a difficulty notwithstanding, medieval commentators seized on this *Physics* passage, with the result that it became 'a paradigm of interpretation for the coming into being of artefacts.'[18]

Averroes, for example, in his commentary to this passage, distinguishes *generari simpliciter* (originating) and *generari hoc* (becoming) as changes in *substantia* and in *accidens* respectively.[19] Based on this distinction, the Commentator formulates, 'formae artificiales, licet sint accidentia in corporibus naturalibus, tamen constituunt res artificiales, secundum quod sunt artificiales, quemadmodum formae naturales constituunt res naturales. (Artificial forms, though they are accidental in natural bodies, constitute artificial things, according as they are artificial, just as natural forms constitute natural things).'[20] His understanding that forms in artefacts are accidental and forms in natural things are substantial became a common property in philosophy of the High Middle Ages, as Fladt convincingly illustrates.[21] The identification of matter (subject) in artefacts as 'ens in actu' (in Quotation 2) is only one step further.[22]

Viewed in this light, Johannes' argument of the principles of consonances is not only well understandable, but shows a striking terminological affinity to his contemporary philosophical writings. In brief, he viewed Aristotle, his principal authority, from the same angle as his fellow philosophers. We should also notice that the idea of 'work of art,' the very concept which underlies the modern view of art, is, though potentially, at issue here.[23] For as long as the form introduced into consonances is a form (even if accidental), it can be a substance in its own right and thus can be distinguished from other forms (compositions). Although we cannot trace any of Johannes' direct influence upon later musicians or music theorists, his is a historiographically noteworthy case in which interpretations of Aristotle's philosophy anticipated the modern notion. This is a point to which we shall return in the concluding chapter. (We have left untouched the designation of the efficient cause as principle of natural things in Quotation 2. This question is taken up in Chapter 4 in relation to the final cause.)

16) *Phys.* I 7, 190b3-10, translation by Charlton, *op. cit.*, pp. 16-17.
17) Charlton, *op. cit.*, pp. 75-76.
18) Fladt, *loc. cit.*
19) Averroes, *Aristotelis de physico auditu libri octo cum Averrois Cordubensis variis in eosdem commentariis*, Venetiis, 1562, p. 37E.
20) *Ibid.*, p. 52L.
21) Fladt, *op. cit.*, pp. 115-116.
22) One representative example may be cited from Thomas Aquinas: 'accidens causatur a subiecto secundum quod est actu' (*Summa theologiae.* I, q. 77,6. This quotation is from Fladt, *op. cit.*, p. 72). '"Ens in actu" (das der Wirklichkeit nach Seiende) gehörte im Hochmittelalter zu den selbstverständlich gewordene Termini, die nicht mehr explizit definiert wurden' (*op. cit.*, p. 70).
23) Both Fladt in *op. cit.* and Mathias Bielitz in 'Materia und forma bei Johannes de Grocheo: Zur Verwendung philosophischer Termini in der mittelalterlichen Musiktheorie,' *Die Musikforschung*, 38 (1985), pp. 257-277 treat this. I owe this point to them.

3. Consonance: Natural or Mathematical?

Johannes de Grocheio returns to the consideration of consonance *qua* cause of music in p. 116, 18-22.

(Quotation 4)

Adhuc autem, si consonantia sit naturalis, ex fine cognosci habet. Naturalis enim potius ex fine demonstrat, ut ait Aristoteles secundo Physicorum. Finis enim primo movet efficientem et ultimo complet opus. Si vero mathematica, eius cognitio sufficiens est per formam.[24]

Moreover, if consonance be natural, it can be recognized by the end [the final cause]. For the student of nature [*naturalis*=φυσικός] rather demonstrates by the end, as Aristotle in Book 2 of his *Physics* says. For the end first moves the agent [the efficient cause] and finally completes the work. If on the other hand [consonance be] mathematical, its recognition is sufficient through the form.

Opposition is here not so much between 'natural' and 'artificial' as between 'natural' and 'mathematical.' But (a) how are they opposed to each other? And (b) what is his intention in talking about 'natural' and 'mathematical'?

In the first place, we must analyze the context in which this seemingly obscure passage occurs. Having acknowledged Aristotle as his model in the *modus procedendi*, Johannes enters into examination of the general or *principia* before the particular or *ex illis orientia* of music (p. 110, 16-20). After he has preliminarily enumerated consonances as principles, he closes the section with the sentence we quoted above as Quotation 2. He then embarks on a proper discussion of consonances.

At the outset, however, he makes a reservation. The task of 'demonstrating the nature and number of principles and the reason for this,' he says, is not for a musician (p. 114, 9-11). True to this remark, he carefully chooses the expression in the next sentence, 'Principia autem musicae *solent* consonantiae et concordantiae appellari (The principles of music are *customarily* called consonances and concordances).' Likewise, if any number is proposed for consonances, it cannot be established in musical terms, and those arguments which insist on a certain number should be refuted. The following part is dedicated to this, with the concluding remark, 'On account of these, therefore, and on account of more such, it seems difficult to account for the number of consonances (p. 116, 23-24).' It is immediately preceding this that Quotation 4 appears.

The phraseology also attracts attention. The repeated use of 'adhuc (moreover)' at the beginning of the paragraphs (p. 114, 40; p. 116,1, 5, 12, 18) indicates that the arguments are accumulated in a similar vein. Viewed sketchily from the context, therefore, our passage as a whole should mean to the effect that no number of consonances is justifiable. But the juxtaposition of two alternatives (consonances as natural vs. as mathematical) has not been

24) *Ars Musicae*, p. 116, 18-22. I agree with Fladt in rejecting all the emendations Rohloff made to these sentences and in following the readings of MS H. To *mathematica / musica* see my discussion below.

elucidated thus far. This urges us toward a closer analysis of the argument.

In the foregoing paragraph in the *Ars musicae*, it has been asked why other animals than human beings do not recognize consonances. While human beings are delighted with three consonances, he says, 'certain animals are delighted with [other] sounds by natural inclination (*inclinatione naturali*).' Now, the goal toward which 'natural inclination' proceeds is the end. Thus, delight is not the end of consonances in the case of animals. Consequently, unless the question why only human beings are delighted with three consonances is settled, the justification of consonances through the end does not stand. Now that such an explanation appears impossible, delight is not the end of consonances. And if the author names delight as the likeliest candidate for the end of consonances, as it seems the case, its failure amounts to insusceptibility of consonances to explanation by means of the end.

Let us now return to Johannes' statement in Quotation 4. The sentence, 'if consonance be natural, it can be recognized by the end,' agrees with this analysis. Since the apodosis has practically been negated in the precedent paragraph, the protasis is not true. Consonance is not natural. Then, (1) if consonance is not mathematical either, and (2) if the enumeration of 'natural' and 'mathematical' for the potential predication of consonance is complete, then consonance is incapable of causal explanations. This looks like what Johannes' argument requires from the paragraph in question.

(1) Mathematical

The two paragraphs preceding the one about what we interpret as the end of consonances (p. 116, 12-17), especially the first paragraph, concern topic (1).

> (Quotation 5)
> Moreover, that is why those who suppose proportion to be first among numbers could not give grounds for consonances and the number of consonances. For if proportion were the cause of consonance, then where such a proportion is, there should be such a consonance.[25]

Johannes continues that a sound of thunder does not make a consonance with another, even if they are in proportion. Now, proportion's being the cause of consonance means that consonance can be explained or recognized by number. Then, since this proposition is disproved with an example of a thunder, it suggests itself that consonance cannot be explained or recognized by form. (Later, in the passage which we have seen as Quotation 1, number will be identified as the form of consonance.)

We can now propose an answer to the question we posed above as question (b): with what intention does Johannes introduce 'natural' and 'mathematical'? For consonance to be 'natural' or 'mathematical,' 'the end' or 'the form' respectively is necessary. That is, in order for consonance to be natural or mathematical, it should be recognized by the end or form (we will see later the reason for this). With unsatisfiedness of these conditions having been implied in

25) P. 114, 40-44. Here, as ever, I follow the readings of the MSS.

the foregoing argument, consonance cannot be 'natural' or 'mathematical,' in conclusion. So, if these two are the only possible predicates for consonance, it will be concluded further that the principles of consonances and their number cannot be determined in causal terms.

(2) Enumeration

The choice between 'natural' and 'mathematical' as the predicate of consonance seems to us at first sight unusual. But once considered within the context of Aristotle's *Physics*, it will prove to be reasonable. Indeed Johannes, exactly in the passage in question, refers to the second book of the same work, though in a different relation. Aristotle writes in Chapter 2 of the *Physics*, Book 2 as follows.

> (Quotation 6)
> The point is clear from those branches of mathematics which come nearest to the study of nature [τὰ φυσικώτερα τῶν μαθημάτων, *literally*, that which is more natural among mathematical sciences], like optics, harmonics, and astronomy. They are in a way the reverse of geometry. Geometry considers natural [*or* physical] lines, but not as natural; optics treats of mathematical lines, but considers them not as mathematical but natural.[26]

Although the author does not bother to give a full description of harmonics, it is evident that *mutatis mutandis* the same applies as optics. It should read, 'arithmetic considers natural consonances [i.e. sounding consonances], but not as natural; harmonics treats of mathematical consonances [i.e. proportions], but considers them not as mathematical but natural.' This completely tallies with Johannes' formulation. Our question (a) above has been answered this way.

A difficulty remains, however. What is his answer to the problem? Is consonance natural, or mathematical, after all? If the enumeration were complete with these, Johannes' argument would add up to a demonstration of consonance's absolute unaccountability. Such a definite conclusion about the principle of music would, in turn, contradict his premise that it is beyond the function of a *musicus* to 'demonstrate the nature and number of principles and the reason for this.' Here again we must have a glance at the background against which the author wrote: Aristotelianism in the thirteenth century.

As Fladt points out, music was assigned an intermediate position between the study of nature and mathematics in the thirteenth-century classification of disciplines.[27] This view is originally based on Aristotle's statement quoted above as Quotation 6. But it does not coincide with the modern interpretation of the same passage, because the original text talks about harmonics, with optics and astronomy, in an either-or scheme: mathematics, or else the study of nature.

A mistranslation of the phrase 'τὰ φυσικώτερα τῶν μαθημάτων' seems relevant. As seen in Charlton's translation, the genitive in τῶν μαθημάτων should be taken as partitive, with τὰ

26) 194a7-12. Translation is by Charlton, *op. cit.*, p. 26.

27) Fladt, *op. cit.*, p. 153. Although she is right in looking at Johannes' statement in the perspective of *scientiae mediae*, she overlooks the context we saw at the beginning of this chapter. Hence her ill founded conclusion that Johannes looked upon *musica* as belonging to these sciences.

μαθήματα signifying mathematical sciences at large or the 'branches of mathematics.' It follows from this understanding that 'astronomy (like optics and harmonics), while usually reckoned as a specially physical branch of mathematics, is really a branch of physics.'[28]

On the other hand, Averroes in Latin translation puts it as 'quod de mathematicis est propinquius scientiae naturali,' in what appears to be the translation of the same passage.[29] Here, *de* designates a point of departure (*from*) or even a point of reference (*in relation to, than*) rather than the whole as against parts (*out of*), because his commentary to the corresponding part reads 'intendebat [sc. Aristoteles] quod consyderatio eius [sc. Aspectiuus] est propinquior consyderationi naturali (Aristotle meant that his inquiry is nearer to the inquiry of the student of nature).'[30] The expression 'nearer' without any qualification (e.g. 'within the branches of mathematics') presupposes an object of comparison (i.e. *than* to mathematics). Then, if the distances of optics from mathematics and from the study of nature are being compared, the inclusion of optics among mathematical sciences is out of question. It is on the basis of such an interpretation that Averroes could think of music as something in-between.

The same is more readily discernible in Thomas Aquinas, when he writes, 'Huiusmodi autem scientiae, licet sint *mediae inter scientiam naturalem et mathematicam*, tamen dicuntur hic a Philosopho esse magis naturales quam mathematicae.'[31] Take note of the clear expression 'they *are said by the Philosopher* to be more natural than they are mathematical.' In fact, the accompanying 'Antiqua translatio,' which Grabmann suggests is William of Moerbeke's revised translation and served as the basis for Thomas' commentary, has 'magis physica quam mathematica.'[32]

Since the interpretation that these sciences are 'more natural than mathematical' latently implies their being *not* mathematical, this might have led to a meaning opposite to ours, according to which they *are* mathematical. Then again, the phrase τὰ φυσικώτερα τῶν μαθημάτων represents a common view of the time, opposite to Aristotle's own,[33] with the result that the medieval translators' misunderstanding is canceled out. Furthermore, Aristotle's language is so clear in the ensuing part that such a mistranslation does not affect the most essential meaning of the passage as a whole.

Now, if Johannes was familiar with the idea of the *scientiae mediae*, his inquiry into the nature of consonance was not necessarily dead-end. In the absence of pertinent clues, however, we must leave this point open. So far, we have endeavored to do justice to Johannes in the question whether consonance is 'natural' or 'mathematical.' Next we shall turn to their consequences: 'the end' and ' the form.'

28) W. D. Ross, *Aristotle's Physics: A Revised Text with Introduction and Commentary*, Oxford: Clarendon Press, 1936, p. 507.

29) Averroes, *op. cit.*, p. 55G-H.

30) *Op. cit.*, 55L.

31) *In octo libros Physicorum Aristotelis expositio*, P. M. Maggiòlo, ed., Torino/Roma: Marietti, 1965, II lect.3, n.164, p. 84. Cf. Averroes, *op. cit.*, p. 55 I-K: Aspectiuus autem consyderat de lineis in dispositione *media inter illas duas* consideratione.

32) Martin Grabmann, *Forschungen über die lateinischen Aristotelesübersetzungen des XIII. Jahrhunderts*, Münster, 1926, pp. 174, 194-196.

33) Notice the antithesis 'while usually reckoned as ..., is really...' in Ross' commentary to this passage (*loc. cit.*).

4. Aristotle, Thomas Aquinas, and Johannes de Grocheio on the End and the Form

Mitchell DeWitt comments on Quotation 4 as follows.

(Quotation 7)

If there were a choice between 'natural' and 'mathematical' for the consonances, to make a valid difference in terms of the final cause Grocheio would have to disagree with Aristotle about the notion that the form in nature is the final cause. Grocheio would have to accept another final cause; this could be the action of God or even God himself.[34]

It is true that Johannes departs from what we commonly accept as Aristotle's opinion in differentiating the form from the end. But can we be absolutely sure of our common view? Is Aristotle so unequivocal about this issue at all? Charlton not only gives two alternative textual interpretations to *Physics* II 8, 199a30-32 (quoted below as Quotation 9), but talks of 'recent disagreement about the interpretation of Aristotle's teleology.'[35] Moreover, Johannes' access to Aristotle's *Physics* was inevitably through the then available Latin translations and commentaries. This chapter is concerned first with Aristotle's thought about the end and the form, and second with its medieval transformation in Thomas Aquinas.

(1) The End and Form in Aristotle's *Physics*

It is beyond the scope of this paper to fully deal with Aristotle's teleology. Our scope may reasonably be restricted to what is relevant to Quotation 4, more specifically, to Aristotle's *Physics*, Book 2, to which Johannes refers.

In Chapter 3 of Book 2 Aristotle enumerates four species of cause: matter, form, agent, and end.[36] But

(Quotation 8)

the last three often coincide. What a thing is [i.e. the form], and what it is for [i.e. the end], are one and the same, and that from which the change originates [i.e. the agent] is the same in form as these.[37]

It is in this context that the form of nature is equated with its end.

(Quotation 9)

And since nature is twofold, nature as matter and nature as form, and the latter is an end, and everything else is for the end, the cause as that for which must be the latter.[38]

With the three grouped into one class, the question arises which is more of the cause of nature, the form-agent-end or the matter?

(Quotation 10)

The student of nature should state both causes [i.e. the end and the matter], but particularly the cause which is what the thing is for [i.e. the end]; for that is responsible for the matter, whilst the matter is not responsible for the end.[39]

34) Mitchell DeWitt, *op. cit.*, p. 48.
35) Charlton, *op. cit.*, pp. 49, 147.
36) 194b23-195a3=Met. Δ. 2, 1013a24-b13.
37) 198a24-26. Translation by Charlton, *op. cit.*, p. 38.
38) 199a30-32. See also Charlton's note, *op. cit.*, p. 49. But the equation of the end and the form is unaffected either way.
39) 200a32-34.

This last quotation also implies a privileged position of the end among the three causes. Such an idea, as well as the expression 'particularly' (μᾶλλον=potius), matches well with Johannes' statement in Quotation 4, 'the student of nature rather demonstrates by the end.'

Turning to consonance as 'mathematical,' what does it mean that 'its recognition is sufficient through the form'? The word 'sufficient' connotes something specific that is comprehended but can be dispensed with. Two possible answers are there. One is 'the matter,' with which the form is usually paired. This theory has the support of Aristotle's statements in *Physics* Book 2.

(Quotation 11)

Both the student of nature and the mathematician deal with these things [sc. planes, solids, lengths, and points]; but the mathematician does not consider them as boundaries of natural bodies. Nor does he consider things which supervene as supervening on such bodies. That is why he separates them [from natural bodies]; for they are separable in thought from change, and it makes no difference; no error results.[40]

With more than sixty lines separated from the last form-matter antithesis (*Ars musica*, p. 114, 1-5.), however, the expression would sound somewhat awkward.

The other possibility is 'the end.' This harmonizes with the preceding sentence, though it presupposes a hierarchy of causes in which the end is more highly ranked than the form. Admittedly, we just talked about a 'privileged position' of the end. But as far as the Aristotelian text goes, its pre-eminence does not seem to be so decisive that it is felt present even in its absence. Once again we are reminded of mediators.

(2) Thomas Aquinas' Re-interpretation of the Aristotelian Doctrine of Causality

Thomas Aquinas in his early work *De principiis naturae* expounds a clear view on the relationship between the causes. He first agrees with Aristotle's *Physics*, Book 1 (Chapter 7, 191a12-14) that there are three 'principles of nature,' namely, matter, form, and privation.[41]

Then he continues,

(Quotation 12)

Sed haec [sc. materia, forma, privatio] non sunt sufficientia ad generationem. Quod enim est in potentia non potest se reducere ad actum; sicut cuprum quod est in potentia idolum, non facit se idolum, sed indiget operante, qui formam idoli extrahat de potentia in actum. Forma autem non potest se extrahere de potentia in actum. ... Oportet igitur praeter materiam et formam esse aliquid principium quod agat, et hoc dicitur esse efficiens, vel movens, vel agens, vel unde est principium motus.

But these are not sufficient for generation. For what is in potency cannot bring itself into a state of actuality. Bronze, for example, which is a statue in potency, does not make itself be a statue. It needs something actively working, which brings out the form of the statue from potency into act. Neither can the form bring itself out of potency into act. ... It is necessary, therefore, that there be in addition to the matter and the form some principle which does something; and this is said to be

40) 193b31-35. Translation by Charlton, *op. cit.*, p. 26. Planes, solids, etc. correspond to the form, and natural bodies to the substance *qua* matter-*cum*-form.

41) Though he does not expressly refer here, he evidently had Aristotle's work in mind, because he names 'Aristoteles in libro Physicorum' in the section after the next.

what makes, or moves, or acts, or that from which the motion begins.[42]

The Angelic Doctor is integrating the Philosopher's dogma, which is unfinished and self-contradictory in some respects, into a coherent system.[43] But for an agent to cause a generation, there must be another cause which originates the motion. Thomas answers this question as follows.

(Quotation 13)

Et quia, ut dicit Aristoteles in II Metaphysicae, omne quod agit non agit nisi intendendo aliquid, oportet esse aliquid quartum, id scilicet quod intenditur ab operante, et hoc dicitur finis.

And because everything which acts, acts only by intending something, as Aristotle says in book two of the *Metaphysics*, there must be some fourth thing, namely that which is intended by that which is doing the work [=the agent]. This is said to be the end.[44]

How, then, is the end related to the form and the agent?

(Quotation 14)

Unde finis est causa causalitatis efficientis, quia facit efficiens esse efficiens; et similiter facit materiam esse materiam, et formam esse formam, cum materia non suscipiat formam nisi propter finem, et forma non perficiat materiam nisi propter finem. Unde dicitur quod finis est causa causarum, quia est causa causalitatis in omnibus causis.

Whence the end is the cause of the causality of the efficient cause, because it makes the efficient cause be an efficient cause. And similarly, the end makes the matter be the matter, and the form be the form, since the matter does not acquire a form except on account of the end, and the form does not perfect the matter except on account of the end. Whence it is said that the end is the cause of causes, because it is the cause of the causality in all the causes.[45]

It is clear from these quotations that the end is the ultimate cause which sets the agent in motion and thereby cause the form to 'perfect the matter.' Put in this conceptual framework, if a certain recognition does not involve the ultimate cause, one can spare the trouble of probing the issue to the bottom. The expression 'sufficient' fits this well.

In conclusion to this chapter, Johannes' thought and expression in Quotation 4 both reflect Aristotelian tenets and resonate with the Thomist re-interpretation of them.[46]

5. Causality and Teleology

Having analytically explicated Quotation 4, we can now go on to review Johannes' discussion about the principles of consonances and thereby determine its direction.

42) Thomas Aquinas, *De principiis naturae*, ch. 3, 2-15, translation by Joseph Bobik in *Aquinas on Matter and Form and the Elements: A Translation and Interpretation of the* De Principiis Naturae *and the* De Mixtione Elementorum *of St. Thomas Aquinas*, Notre Dame, Ind.: University of Notre Dame Press, 1997, pp. 34-35.

43) Etienne Gilson talks of 'l'approfondissement thomiste de l'*esse*' in *Le thomisme: introduction à la philosophie de saint Thomas d'Aquin*, sixième édition, Paris: Librairie philosophique J. Vrin, 1965, p. 230, note 13.

44) Thomas, *op. cit.*, ch. 3, 16-19; p. 37 in Bobik's translation. It is also to be noted that the phrase 'naturalis inclinatio' occurs a few lines below. The same comes up in the *Ars Musicae* (p. 116, 14).

45) Thomas, *op. cit.*, ch. 4, 29-36; p. 60 in Bobik's translation. Elsewhere, God is identified as the final cause (PP. Q. 46. Art. 1 ob. 9). In fact, according to Gilson (*op. cit.*, p. 88), it reaches 'par delà les manières intelligibles d'exister,' 'la raison suprême pour laquelle les choses existent. C'est exactment cette raison que la preuve par la cause finale vise, et c'est celle qu'elle atteint lorsqu'elle conclut à l'existence de Dieu.'

46) Note, however, that we are not talking about any direct relationship between the theologian and the music theorist. We are not sure how far Johannes de Grocheio's denomination as 'magister' and 'regens Parisinus' in the *explicit* of MS D can be relied upon.

After recapitulating the point made (that the number of consonances is hard to account for), Johannes prudently attempts to give his own explanation.

(Quotation 15)

Temptemus *tamen* ***aliquid probabile*** *de hoc dicere. ...* ***Dicamus*** *igitur, quod omnium sublimis creator a principio in sonis trinam harmoniam inseruit perfectam, ut in eis suam bonitatem ostenderet et per illos nomen suum laudaretur ..., et etiam ut nullus possit se excusare a laude divina, sed omnis lingua in sonis nomen gloriae fateatur. Et* ***forte****, sicut est in trinitate gloriosa, ita* ***quodammodo*** *in hac experientia docet: Est enim una prima harmonia quasi mater, quae diapason ab antiquis dicta est, et alia quasi filia, in ista contenta, diapente dicta, et tertia ab eis procedens, quae diatessaron appellatur. Et istae tres simul ordinatae consonantiam perfectissimam reddunt. Et* ***forte*** *hoc senserunt quidam Pythagorici naturali inclinatione ducti, non ausi tamen sub talibus verbis exprimere, sed in numeris sub metaphora loquebantur.* ***Dicamus*** *ergo, quod anima humana immediate a primo creata speciem vel imaginem retinet creatoris. Quae imago a Johanne Damasceno imago trinitatis dicitur, mediante qua naturalis cognitio est ei innata. Et* ***forte*** *ista naturali cognitione in sonis trinam perfectionem apprehendit, quae animae brutorum propter suam imperfectionem non debetur.*

But let us **try** to say **something credible** about this.... We **would say** that the supreme Creator of all things at the beginning implanted triple perfect harmony in sounds, so that He could show His goodness in them and His name could be praised through them ..., and further so that no one could be exempted from the praise of God but everyone's tongue could invoke the name of the glory in sounds. And **perhaps**, just as [it] is with the glorious Trinity, so [it] **in a way** teaches in this practice.[47] For there is a single first harmony as mother, which was called diapason by the ancients, and another as daughter, contained in this and called diapente, and the third originating from these two, called diatessaron. And these three put together make a most perfect consonance. And **perhaps** some of the Pythagoreans, led by a natural inclination, perceived this, though they did not dare to express it in such words but spoke metaphorically in terms of numbers. We **would say** that the human soul, created directly at first hand, retains the Creator's form or likeness. This likeness is called by Johannes Damascenus 'the likeness of the Trinity.' Through this, natural recognition is inherent in the human soul. And **perhaps** by this natural recognition the human soul grasps the triple perfection in sounds, which is not destined for the souls of animals on account of their imperfection.[48]

The first thing that stands out here is the cautious expression (indicated by **boldface** type), carefully avoiding any conclusion. More noteworthy is that his tentative justification of consonances concerns its *end* (cf. 'ut ... ostenderet etc.'). He seemingly contradicts himself, because he just rejected the explanation by means of delight *qua* the end of consonances (See Chapter 3 above). But the status of the 'end' is not the same: delight is an end induced from our experiences, whereas God stands beyond all inductions. This contrast is parallel to that between causal and teleological explanations, and in the final analysis, between philosophy and theology, or between reason and faith. Their reconciliation, the chief concern among the later thirteenth-century Parisian theologians, is something 'which cannot be well dealt with by a

47) While the wording of this sentence is obscure, the gist is clear enough: the structure of the Trinity helps understand music.

48) *Ars Musicae*, p. 116, 25-p. 118, 3. I accept none of Rohloff's emendations but follow either or both of the MSS.

musician (*Ars musicae*, p. 114, 9).'[49]

Conclusion: Between the Middle Ages and the Modern Era

It has been made clear that Johannes is indebted in several ways to Aristotle and the Aristotelians of the thirteenth century. Let us summarize the main points.

(i) Aristotle's empiricism contributed to Johannes' rejection of *musica mundana* and *musica humana.*

(ii) The Aristotelian methodology (classification) prepared Johannes' detailed analysis of the contemporary music practice.

(iii) Introduction of *forma accidentalis*, emphasis on the final cause, and suspended decision about the relationship between causality and teleology reflect trends of late medieval Aristotelianism.

All these characterize Johannes as an Aristotelian who incarnated the Philosopher's spirit in music theory, in accordance with the academic *Zeitgeist* of the late thirteenth century. It must be noted that some of them show indications of modern ideas of art and music: work of art as an original creation (*forma accidentalis*) and music as manipulation of exclusively audible phenomena. In this sense, he may be regarded as a herald of the Renaissance. It cannot, however, be emphasized too strongly that the tradition of Aristotelian philosophy fermented these modern ideas. This holds true of history of thought in general. P. O. Kristeller puts it as follows.

> (Quotation 16)
> The Renaissance is still in many respects an Aristotelian age which in part continued the trends of medieval Aristotelianism and in part gave it a new direction under the influence of classical humanism and other different ideas.[50]

Johannes de Grocheio stood on the threshold of the modern period, right in being a medieval spirit.

49) I disagree with Fladt (*op. cit.*, p. 44) in hastily distinguishing Johannes' position both from Aristotle himself and from the thirteenth-century Aristotelians. Johannes only reserves final judgement as to the ultimate principle of consonances. At least he is not 'criticizing the Aristotelians,' as Fladt asserts.

50) Paul Oscar Kristeller, *Renaissance Thought and Its Sources*, New York: Columbia University Press, 1979, p. 49.