UDC 821.14'02.09 Aristoxenus
1:78(38)

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ARISTOXENUS AND THE SCIENCE OF HARMONICS: SCIENCE, MELODY, AND CATHARSIS**

ABSTRACT: Aristoxenus' *Elements of Harmonics* is a multi-phased project that demonstrates the autonomous and independent science of its activity, by developing, and often dismissing, earlier musical methodologies, and applying Aristotelian scientific methods to the subject. His project synthesizes a plethora of musical speculation over the centuries into the peripatetic tradition. His Pythagorean and peripatetic formation creates the conditions for a brilliant presentation of harmonics that dialectically amasses the otherwise disparate musical traditions into one system, into one science of harmonics as a whole.[1]

KEY WORDS: Aristotle – aristoxenus – Harmonics – Posterior Analytics – Catharsis – Melody – Middle Term – Noetic Intuition.

INTRODUCTION

The advantage of the previous forms of musical expression is that they define the general boundaries and methods of harmonics. Aristoxenus

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** This research project could not have been made possible without the support of a SSHRC (Social Sciences and Humanities Research Council) research grant, which has funded this project for several years. I am grateful to the colleagues and students of these various institutions for very enriching and challenging conversations over the formation of this essay: St Thomas More College (Saskatoon, SK); St. Francis Xavier (Antigonish, NS); the Foro di Studi Avanzati (Frascatti, Italy); the Department of Philosophy at the University of Ottawa; and, finally, to Heather Reid and Susi Kimbell at Fonte Aretusa (Ortezia, Sicily) for organizing the charming conference of *Meter and Music* (May, 2024).

[1] Sophie Gibson, *Aristoxenus of Tarentum and the Birth of Musicology* (Oxford University/The University of California, Los Angeles: Routledge, 2005), p. 4.

relies on the studies of these musicians in order to help him define more precisely the boundaries and methods of harmonics in the peripatetic tradition. Even as he criticizes the errors of the empirical *harmonikoi* and Pythagorean mathematical theorists, he refines his own concept of the science of harmonics in light of Aristotle's division of science.[2] In order to accomplish this end, he was obliged to subject the arithmetically-based theories of the Pythagoreans to a subordinate science in relation to Aristotle's science. This would require that he provide another framework of musical *space* or τόπος other than the one presented by the Pythagoreans and Plato.

THE SCIENTIFIC METHODOLOGY OF ARISTOTLE

The *Elements of Harmonics* adheres to an Aristotelian approach, notably the rule of subject limitation or same domain theory,[3] which is discussed in Aristotle's *Posterior Analytics*: "A science is one if it is concerned with a single genus or class of objects which are composed of the primary elements of that genus and are parts of it or essential modifications of those parts"; μία δ' ἐπιστήμη ἐστὶν ἡ ἑνὸς γένους, ὅσα ἐκ τῶν πρώτων σύγκειται καὶ μέρη ἐστὶν ἢ πάθη τούτων καθ' αὐτά. (*Posterior Analytics*, 87a38–40) This is the limitation of the discussion concerning a particular science to the terms of that science, and is central to Aristoxenus' development of an autonomous study in this field, which explicitly contradicts his teacher's acceptance of harmonics as subordinate to the arithmetic of the Pythagorean music theory.

Aristoxenus adopts two methods of science which appear in the *Posterior Analytics*: that based on perception and that based on mathematics, the first describing something or an event and the other describing the *why* behind it.[4] (*Cf.*, *Posterior Analytics* 79a3–7) The opening of the *Physics* states clearly the need required to articulate the acquired knowledge regarding a science in light of its principles: "When the objects of an inquiry, in any department, have principles, causes, or elements, it is through acquaintance with these that knowledge and understanding is

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[2] *Cf.*, Andrew Barker, "Harmonics," in *A Companion to Ancient Greek and Roman Music*, edited by Tosca A.C. Lynch and Eleonora Rocconi (Hoboken, NJ: Wiley Blackwell, 2020), 262.

[3] Gibson, *Aristoxenus of Tarentum and the Birth of Musicology*, 33.

[4] *Cf.*, Gibson, *Aristoxenus of Tarentum and the Birth of Musicology*, 31: "Although Aristoxenus' conception of harmonic science is essentially based on perceptible phenomena, he exploits elements from both methods; accordingly, his emphasis on the empirical basis of harmonic science and the rejection of mathematics are balanced by the value he claims for demonstration, a process which Aristotle associates with harmonics only in its mathematical form. In this way Aristoxenus attempts to compensate for the lack of explanation in the former by incorporating methodological elements of the latter."

attained." (*Physics* 184a10–12) This insight is captured in Aristoxenus' *Harmonics*, Books I (*Harmonics* 1.19–20) and II. In Book II, he writes: "Since every science which consists of more than one proposition should adopt first principles from which the things dependent on these principles can be demonstrated, we must adopt such principles." (*Harmonics* 44.4–7) The *Posterior Analytics* articulates the limits and boundaries of a particular science this way: "A science is one if it is concerned with a single genus or class of objects which are composed of the primary elements of that genus and are parts of it or essential modifications of those parts." (*Posterior Analytics* 87a38–40) Consequently, the cross referencing and use of another property of another genus is strictly prohibited, if we wish to maintain a strict notion of science: "It is not possible to give a demonstration by shifting from one class of things to another: for instance, one cannot demonstrate something in geometry by means of arithmetic." (*Posterior Analytics* 75a38–40)

The pursuit of a theoretical kind of science as opposed to a phenomenal or practical kind of science does not diminish the importance Aristoxenus accords to the precise perception of *melody*. We see in the *Posterior Analytics* a clear link between the perception of a particular object and the knowledge necessary for a theoretical science: "Sense-perception must be concerned with particulars, whereas knowledge depends upon recognition of the universal... If, however, by observing repeated instances we had succeeded in grasping the universal, we should have our proof; because it is from the repetition of particular experiences that we gain our view of the universal." (*Posterior Analytics* 87b38–88a5) In line with Aristotle's division of science, Aristoxenus maintains the independence of harmonics and articulates the clear demarcations that characterize the same domain by dismissing those who have adopted extraneous methodologies to the science of harmonics.[5] This is in line with the approach of his master in this matter, who specifically accepts harmonics from the subject limitation rule, principally because he accepts the Pythagorean numerical division of musical space and applies mathematical laws to melody.

Aristoxenus provides his original project of harmonics in Book 1. Here, he outlines the nature of harmonics: "For it is the study of first principles, which include whatever is relevant to an understanding of systemata and tonoi." (*Harmonics* 1.19–20) The student of harmonics is understood as a student of melody (περί μελούς): "The man who is proficient in this science should not consider anything beyond these [*systemata* and *tonoi*] as falling within his province." (*Harmonics* 1.22–3) However, in Book II, he revises his account of the science of harmonics:

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[5] *Cf.*, Gibson, *Aristoxenus of Tarentum and the Birth of Musicology*, 33.

"It is to be understood, speaking generally, as the science which deals with *all* melody, and enquires how the voice naturally places intervals as it is tensed and relaxed." (*Harmonics* 32.10–14) Here, Aristoxenus argues that all melody provides the limits of harmonics. It is a significant change, for he isolates melody as the travelling voice that articulates the underlying scalar nature of harmonics. Having established a systematic structure for the division of musical space in order to provide intelligibility to the otherwise disparate oral phenomena, he argues that the observation of perceptual data is intimately linked to the essence of melody via the concept of *dunamis*, which is developed in Book II.[6] The latter is a very important concept that allows us to apprehend melody as an empirically based structure, which frees it from reference to numerical terminology.

In fact, to develop further his insight of *dunamis*, he stresses in Book II that for each note, it is the *function* rather than its precise pitch that carries the philosophical and musical import: "Thus it is clear that the genus can remain constant while the magnitudes change, since up to a certain point the genus does not change when the magnitudes do, but remains the same: and while the genus remains constant it is reasonable to suppose that the functions of the notes do too." (*Harmonics* 49.2–7) While Aristoxenus may be credited for many great contributions to the science of harmonics, rendering it autonomous and an independent science is one of his greatest achievements. Moreover, he has limited his subject of harmonics to the study of melody. He does this without any reference to mathematics nor any other different science. Rather, it is by the concept of *dunamis* and the recognition of the *function* of each note within the scalar structure.

Like Aristotle in the *An. Post*., Aristoxenus relies on the concept of the *universal* to articulate melody in the science of harmonics. As in the *An. Post*., and *Met.* A 1, one's knowledge is due to the apprehension of forms via sense experience and a repetition of sense experience before apprehending the form to generate a concept. So too with Aristoxenus,

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[6] *Cf*., Gibson, *Aristoxenus of Tarentum and the Birth of Musicology*, 34. See also Andrew Barker, "The Journeying Voice: Melody and Metaphysics in Aristoxenian Science," *APEIRON* 38[3], 161-184: 171: "Later, μέλος has a φύσις which is as objectively real as those of the plants and animals studied by botanists and zoologists. It differs, at this level, only to the extent that it exists in a domain accessible to hearing rather than to sight and touch, and this should do nothing to affect its ontological status. The fact that it is to be studied κατά την της αϊσθησεως φαντασίαν, and that people differ in their perceptual acuity, does not make it a 'subjective' phenomenon. Its characteristics can be perceived accurately or inaccurately. Aristoxenus routinely accuses his predecessors of incompetence in this respect, and we have already noted his insistence that students of the subject must train themselves in the accurate perception of the melodies they hear (33.9-27). If we can be right or wrong about the contours of a μέλος when it is considered κατά την της αίσβησεως φαντασίαν, they cannot consist only in the impressions received by any casual listener. They are objectively present in a reality which our faculty of hearing enables us to detect and examine, and it is up to us to discern them correctly."

the listener must be exposed to repeated experience of the repetition of melodic patterns in order for the subject to apprehend enough data to recognize the substance of melody and the conditions that allow the melody to travel.[7] Aristoxenus notes, "Since many forms of melody, of all sorts, come into existence in notes which are themselves the same and unchanging, it is clear that this variety depends on the use to which the notes are put." (*Harmonics* 38.19–23)

The nature of μέλος in our discussion is as real to the science of harmonics as to any other special science. The object of our inquiry is not ambiguous; it is a causal element that requires the intellect to grasp its nature in order to understand the metaphysical foundations of harmonics and its cathartic effect on the human soul. These foundations are based on hearing and the auditory perception, rather than sight or touch: κατά την της αΐσβησεως φαντασίαν, "according to the representation of perception." (*Harmonics* 8.19-9.1) The student of harmonics is asked to pay attention to the accurate perception of melody; it assumes that harmonics and melody are objectively real, though they are perceived by the subject and that the apprehension of the melody would appear as a subjective phenomenon. (*Cf*., *Harmonics* 33.9-27) The contours or boundaries of melody cannot consist only in the impressions received by any casual listener. They are present to us objectively in reality which our faculty of hearing enables us to detect and examine, and to categorize them according to their functions.

THE PSYCHAGOGIC POWER OF HARMONICS

Aristoxenus' influence on musicology was forged in Mantineau, where the power of music played a significantly formative role in influencing a young person's disposition to good character, to an ethos of music, as the Arcadians accentuated the role of 'psychagogic,' (i.e., leading or persuading souls), and a great role to "educational and civic power to music."[8]

It was presupposed in Greek culture that music could significantly affect the human soul. As Eleonora Rocconi reminds us, the musical myths such as bard Orpheus, who was able to woo and move the natural world with his alluring melodies is a case in point. The initial view of musical therapy was to first accentuate the exact association between melody and rhythm. Subsequently, it became, in germ, the *ethos* theory of music,

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[7] "Rather than any particular instance of melody, this essence is a synthesis of all melody," says Gibson, *Aristoxenus of Tarentum and the Birth of Musicology*, 37.

[8] Rocconi, "Aristoxenus and Musical *Ēthos*," 66. Rocconi's excellent article has helpfully provided the formidable Pythagorean background to Aristoxenus and the importance of the cathartic experience of music and harmonics.

for it was attributed with the power to regulate human habits and affections, something reminiscent of early Pythagoreanism. The primary source to confirm this is Iamblichus' *On the Pythagorean Life (3rd-4th cent. CE*), within which several fragments echo Aristoxenus' *Pythagorean Precepts* (a text that is either lost or parts of which are absorbed into Iamblichus' text). Stobaeus tells us that Aristoxenus composed 453 works, and only 2 have come to us in manuscripts on Harmonics: *Rhythmics* and *Elementa Harmonica*.

Ps. Plutarch's *On Music* §2, moreover, confirms the position that the Spartans, the Mantineans and the Pellenians isolated one musical trope and rehearsed it regularly in order to "...be suited to or aligned with the proper formation of character, and practised that sort of music alone." (*De mus*,. 32, 1142e.) Aristoxenus' sojourn through Matineau clearly exposed him to the ethical and character-forming musical practice of the Arcadians.[9] While no list of Aristoxenus' writings survives from Antiquity and that all titles that we do know are handed down to us by others, the *Pythagorean Precepts* is known to be a text that he had written – one whose content is, in part, integrated in Fragments 8 and 9 of Iamblichus' *On the Pythagorean Life.*

Aristoxenus' *Pythagorean Precepts* is replete with references to Plato's *Republic* and Aristotle's Ethics. However, contrary to the "standard view,"[10] Aristoxenus neither denigrated nor stole from Plato or Aristotle. Drawing on Stobaeus (5th-century CE) and Iamblichus (245 – c. 325 CE) for excerpts of the *Pythagorean Precepts*, it is shown that the very views of the Pythagorean life were perceived in a similar way in the 4-5th century BCE. That there was no explicit mention of the standard view amongst the ancients suggests that we hold the ancient view of Aristoxenus as the starting point against which the standard view should be judged. That the standard view identifies similarities between the *Pythagorean Precepts* and Platonic and Aristotelian texts, nobody denies. However, it unsuccessfully attempts to comprehend the true nature of those similarities, for the terminology and general level of ideas are also shared with many other fifth- and fourth-century authors. "Plato and Aristotle clearly shared a number of the general attitudes expressed in the *Pythagorean Precepts*, but none of the ideas for which Plato and Aristotle are famous are anticipated there. They make excellent sense as the Py-

[9] "Aristoxenus' journey to Mantineau, therefore, may have had just the purpose of getting in contact with and delving into the ethical and sociopolitical aspects of the Arcadian musical practice, leading him to write one, or perhaps two works dedicated to the city: (fr. 45, 1 Wehrli)". Rocconi, "Aristoxenus and Musical *Ēthos*," 66.

[10] The standard view suggests that Aristoxenus stole material from Plato and Aristotle, and denigrated Aristotle after Aristotle left his school and library to Theophrastus.

thagoreanism that Plato and Aristotle would have encountered in the fourth century and no sense as documents forged by Aristoxenus to denigrate Plato and Aristotle and exalt the Pythagoreans."[11]

One must read the *Pythagorean Precepts* as reflections on a good way of life that demonstrates the extensive study of fragments which show Aristoxenus to be an original philosopher and one who not only appreciates Plato and Aristotle, but also who shows great respect for the Pythagorean life. Huffman argues that the text in question derives from the *Pythagorean Precepts* and shows to what extent the fragments have been altered in transmission in Iamblichus and Stobaeus.[12]

As mentioned above, Stobaeus tells us that Aristoxenus composed 453 works, and only 2 have come to us in manuscripts on Music: *Rhythmics* and *Elementa Harmonica*. While no list of Aristoxenus' writings survives from Antiquity and that all titles that we do know are handed down to us by others the *Pythagorean Precepts*, Huffman, however, introduces 7 lemmata that are found in Stobaeus' work. Moreover, when we study Iamblichus' *On the Pythagorean Way of Life*, we see virtually identical passages in Stobaeus. Huffman concludes that these excerpts are regarded as parts from Aristoxenus' *Pythagorean Precepts*, as seen in Fragments 8 and 9, and also other passages in Iamblichus that are similar in form and content to the material in Stobaeus (*cf*., Chapter 4) Thus, one can only draw on Stobaeus' use of these excerpts, for this is the only *explicit* evidence from the *Pythagorean Precepts*.[13]

The title and nature of the *Pythagorean Precepts* is centred on the usage of the word *apophaseis.* Although Iamblichus did not refer to Aristoxenus' work by way of the title *Pythagorikai apophaseis*, Iamblichus' chapter 22 of his *On the Pythagorean Way of Life* suggests that an alternative form of education has been transmitted down through the Pythagorean *apophaseis*. Apart from the lemmata to the fragments of Aristoxenus preserved by Stobaeus, in which the term *apophaseis* appears so that it seems extremely likely that what Iamblichus says here is ultimate based on Aristoxenus' *Pythagorean Precepts*, Iamblichus' account of the term *apophaseis* is identical with the use of *apophaseis* in the Pythagorean education. Because it matches perfectly well with what Stobaeus has preserved from Aristoxenus' work, one can reasonably accept what Iamblichus says as a limited guide to the nature of Aristoxenus' work. The

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[11] Carl Huffman, *Aristoxenus of Tarentum: The Pythagorean Precepts (How to Live a Pythagorean Life)* (Cambridge: Cambridge University Press, 2019), 83. See also Mark Nyvlt, "Carl Huffman's *Aristoxenus of Tarentum: The Pythagorean Precepts* (*How to Live a Pythagorean Life*)," *The Classical Review* 72.1: 81–84.

[12] Huffman, *Aristoxenus of Tarentum*, 17 ff.

[13] Huffman, *Aristoxenus of Tarentum*, 82-83.

term "Precept," then, refers to the *moral* content of these judgements rather than mere sayings or maxims.[14]

That humanity is perceived as hubristic in the *Pythagorean Precepts* is a fact and it discloses the ethical agenda of the text. The *Pythagorean Precepts* is but a continuity of the Pythagorean ethical system, as highlighted in the *acusmata,* which are usually transmitted by the oral tradition, dating to the time of Pythagoras himself in the sixth century. The view of the *acusmata* and the retention of this in the *Pythagorean Precepts* suggest that this view was the position of Pythagoras himself. (*Cf*., Iamblichus *VP* 251 "they preserved their original customs and studies.")

Ultimately, the standard view of the *Pythagorean Precepts* is in contrast to the Eudaimonian ethical system of Plato and Aristotle. However, herein lies the problem. In the history of Western ethical thought, the *Pythagorean Precepts* is not referred to, for it is not an Eudaimonian ethical system, as seen above. Thus, "the standard view of the *Pythagorean Precepts*, which argues that Aristoxenus constructed them on the basis of his familiarity with Plato and Aristotle, has masked a crucial fact about the *Pythagorean Precepts*."[15] The salient features of the Eudaimonian ethics of Plato and Aristotle, and, in fact, of the whole Greek tradition, are noticeably absent in the *Pythagorean Precepts*, thereby making it impossible to justly accuse Aristoxenus of bastardizing or stealing the content of Plato and Aristotle.[16]

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[14] Huffman discusses the unique style and format that is shaped by the extracts explicitly identified as from the *Pythagorean Precepts* by Stobaeus. The stylistic aspects of Stobaeus can also help us identify passages in Iamblichus' *On the Pythagorean Way of Life* that derive from the *Pythagorean Precepts* even though Iamblichus does not explicitly identify their source. Huffman further attempts to identify the primary stylistic and formal features of the seven fragments of the *Precepts* (frags. 1-7) preserved under Aristoxenus' name in Stobaeus. Moving beyond Wehrli, Huffman's approach to Iamblichus' *On the Pythagorean Way of Life* confirms the general view that fragments of Aristoxenus' *Pythagorean Precepts* are preserved, sometimes word for word or with minor changes, in Iamblichus' work and that this works mirrors the material that is paralleled by Stobaeus. The material paralleled in Stobaeus is often found integrated into a larger passage that clearly derives from the same sources both in terms of style and content, as is seen in fragments 8, 10, and 11. Thus, it would appear that Iamblichus and Stobaeus are the only two sources in the ancient tradition that preserved fragments from the *Pythagorean Precepts*. We have seen that there are five cases in which excerpts in Stobaeus, identified as coming from the *Pythagorean Precepts*, correspond closely with passages in Iamblichus' *On the Pythagorean Way of Life*, often agreeing word for word. These are frags. 1-2 and VP 175, frag. 6 and VP 183, frag. 2 (end) and VP 203, frag. 3 and VP 205, and frag. 4 and VP 209-11. There are, however, also some significant differences between the texts of the parallel passages in Stobaeus and Iamblichus. Iamblichus attempts to preserve a comprehensive exposition of a given subject rather than an assortment of excerpts. While Iamblichus and Stobaeus use excerpts significantly differently, they both recognize the authoritative text of Aristoxenus' *Pythagorean Precepts*.

[15] Huffman, *Aristoxenus of Tarentum*, 131.

[16] Ultimately, in the history of Western ethical thought, the *Pythagorean Precepts* is not referred to, for it is not a Eudaimonian ethical system. Thus, "the standard view of the *Pythagorean Precepts*, which argues that Aristoxenus constructed them on the basis of his familiarity

Aristoxenus' *Pythagorean Precepts* clearly show us the significant Pythagorean influence on Aristoxenus' thought. Huffman has provided a valuable piece of research for all those interested in the Pythagorean tradition, as captured in Aristoxenus' *Pythagorean Precepts*. Aristoxenus' *Pythagorean Precepts, as identified in* Iamblichus' *On the Pythagorean Life*' chapters 8 and 9 is replete with references to Plato's *Republic* and Aristotle's Ethics. The extensive study of fragments which show Aristoxenus to be an original philosopher and one who not only appreciates Plato and Aristotle, but also one who shows great respect for the Pythagorean life, including the psychogogic powers of music.[17] Huffman clearly demonstrates the importance of the Pythagorean tradition in Aristoxenus' theory of Harmonics. This cannot be underestimated.

Plato's *Republic* (398d-400d) and *The Laws* 655a contain references of the ancient and traditional sources of the psychagogic power of music. Accordingly, the close connection between musical paradigms and temperament are exhibited through the imitation of the kind of music appealed to. While the soul is not isomorphic with *harmonia*, it is, naturally, influenced by music.[18]

Aristotle's reflections on the science of harmonics and especially the role of music differ from the Pythagoreans and Plato. Music has different *functions* other than only education. It can function as "amusement, intellectual enjoyment, and purification."[19] As a result, there is little need

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with Plato and Aristotle, has masked a crucial fact about the *Pythagorean Precepts*." (Huffman, *Aristoxenus of Tarentum*, 131) The salient features of the Eudaimonian ethics of Plato and Aristotle, and, in fact, of the whole Greek tradition, are noticeably absent in the *Pythagorean Precepts*, thereby making it impossible to justly accuse Aristoxenus of bastardizing or stealing the content of Plato and Aristotle. Iamblichus echoes the psychogogic and eudaimonian, as Huffman argues, claims to have knowledge of transition from psyche to physical *pathe* (*psychi* and *phusical pathe*), alluring the soul back to virtue by appropriate music bringing them back to virtue through the most suitable music (VP 64, *cf*., the "correction of human characters and lives through music.") *Cf*., Antonietta Provenza, "Music and Medicine," in *A Companion to Ancient Greek and Roman Music*, 353: "The relationship between music and character is based on the widespread belief that different tunes, modes (harmoniai), rhythms, and instruments could effectively influence both the moral and the physical disposition of players and hearers."

[17] Aristoxenus clearly draws on the Pythagorean sentiment that music heals not only the body, but also the soul. Fragment 26 (Wehrli) from Aristoxenus' Pythagorean Precepts would suggest that Aristoxenus fully accepted the power of music and harmonics to heal soul and the body: "The Pythagoreans... used medicine for the purification of the body, and music for that of the soul." (Antonietta Provenza, "Aristoxenus and Music Therapy: Fr. 26 Wehrli within the Tradition on Music and Catharsis," in *Aristoxenus of Tarentum*, ed. Carl Huffman (New Brunswick (U.S.A) and London (U.K.): Transaction Publishers, 2014), 93)

[18] *Cf*., Rocconi, "Aristoxenus and Musical *Ēthos*," 69. Plato's *Laws* reaffirms the teaching that music and dance should mimic the Good, since this transformation inspires other people in the community, in the polis, to follow and enrich the virtues in one's soul, such as courage and temperance. "For this reason the musical practices in the city should be closely controlled and regulated, and the people in charge of such a task should receive suitable training for being able to judge correctly." (Rocconi, "Aristoxenus and Musical *Ēthos*," 70)

[19] Rocconi, "Aristoxenus and Musical *Ēthos*," 70.

for any censorship or ban on different types of music, since "all the *harmonia* should be used, but not all of them in the same way." (*Pol*. 134a1-2) Moreover, music has the ability to generate a unique "quality of character in the soul more than other art, and it is an extraordinarily effective means of doing so, thanks to the fact that 'there seems to be a close relation of some sort between the soul and *harmoniai* and rhythms, which is why many wise men say either that the soul is a Harmonia, or that it contains one." (*Pol*. 1340b17ff.)

Like the Pythagoreans and Plato, Aristotle and the peripatetics accepted the conviction that music has a transformative effect on the human soul or part of it. Aristotle recognizes the ethical effect of music, but perceives it as character building, for it is a part of the ethical effects of music on the human soul. These are claims made in *Pol* 8.7.[20] Aristoxenus' formidable Pythagorean background enables him to be acquainted with the psychagogic tradition. His claim is that different harmonia for different occasions does *not* corrupt the soul, nor stifle it. Thus, we can say that Aristoxenus, while strict about the kinds of harmonia one can use in public life, is still more flexible than Plato, who rigidly assigned only certain kinds of harmonics to the public realm.[21] We clearly see in Aristoxenus the relationship between himself and "...the previous philosophical tradition concerning the ethical, and, consequently, educational and social role of music in ancient Greek culture."[22]

ARISTOXENUS AND THE SPIRIT OF MUSICAL ETHOS

Ps. Plutarch's *On Music*, Ch. 31-6 (1142b-1144e) informs us of Aristoxenus' views of musical *ethos*, and provides a host of helpful quotes and paraphrases of earlier sources, who had influenced Aristoxenus. There

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[20] G. R. F. Ferrari, "Aristotle on Musical Catharsis and the Pleasure of a Good Story," *Phronesis* 64 (2019) 117-171: 135: "Aristotle begins the chapter by adopting the threefold division of tunes and harmoniai made by certain unnamed musical theorists, into 'ethical' (ἠθικά), 'practical' (πρακτικά) and 'enthusiastic' (ἐνθουσιαστικά) (1341b32-6). The quintessentially ethical harmoniai (ταῖς ἠθικωτάταις, 1342a3), such as the Dorian, are to be used for educating the young (1342a3, 30, b12-17). Given the role Aristotle has assigned music in the education of the young, the ethical harmoniai, then, will be (or will at least include) those that can rise to civic virtue (see 1339a21-5). Thus, a more appropriate understanding of the standard 'ethical', at least in this case, would be 'character-building'. ... Cathartic music is emotionally compelling; it is music to which the active and elating harmoniai are best adapted; it leaves you feeling pleasurably drained, and the pleasure is harmless." *Cf*., Also, Francesco Pelosi "Music and Emotions," in *A Companion to Ancient Greek and Roman Music*, edited by Tosca A.C. Lynch and Eleonora Rocconi (Hoboken, NJ: Wiley Blackwell, 2020), 337 ff., especially on Aristotle at 346 ff. *Cf*., also, Antonietta Provenza**,** "Music and Medicine," in *A Companion to Ancient Greek and Roman Music*, 352 ff.

[21] Rocconi, "Aristoxenus and Musical *Ēthos*," 74.

[22] Rocconi, "Aristoxenus and Musical *Ēthos*," 75.

is a great emphasis on the role of the subject of musical education. Yet, Aristoxenus' technical theory alone is insufficient to produce a proper understanding of psychogogic effects of musical ethos and its influence on building character, says Ps. Plutarch. "Our remarks have thus been sufficient to show that neither Harmonics nor Rhythmics nor any of the other sciences which are treated as dealing with a single element of the subject is capable on its own both of understanding the character and of judging the other elements." (Ps. Plutarch *De mus*. 33 1143d-e) Later philosophers, such as Ps.-Plutarch, have evaluated Aristoxenus' theory of harmonics as insufficient to wholly transform a human soul; for, the soul would, in this new era, always be wanting. This, of course, is not the peripatetic assessment of Aristoxenus, and one can find in Aristotle's reflections another possible way to bring about such a corrective change of character to the listener.

One should keep in mind, though, that, for Aristoxenus, *melopiia* (composition) and ethos are intimately connected. He writes: "These people ... have misunderstood what we said in our public lectures: that we are trying ... to make each of the melopoiiai, and in general that one kind of music damages the characters, while another kind benefits it." (*Harmonics* 31.22-6, 40.1-41.1) This is a sentiment somewhat shared by Ps. Plutarch. The discourse of *Kritike dunamis*,[23] which is a comprehensive judgement of music in all its scope, articulates again the view that technical competence is insufficient to ascend to a *teleos mousikos* and *kritikos*. For, the two salient objects of judgement are musical composition and its performance. The quality of music and melody is attained by the proper mixture of reason (διάνοια) and perception (αἴσθησις).[24] Greek art is infused with the "identification" of aesthetics and ethical goodness. Thus, Ps. Plutarch's *On Music* articulates Aristoxenian insights that the *ethos* of musical composition emerges from a kind of combination of melodic and rhythmic elements that relate or are associated with each other. This product has the power to shape character, despite his assessment that Aristoxenus' view is not powerful enough. From the Peripatetic perspective, however, this conclusion is insufficient and inaccurate. For, I believe that Aristoxenus *does* provide a very good case for musical ethos, in light of Aristotle's works, and is sufficient to form a good character.

Thus, even though paying great attention to the aesthetic value of music (that is to say, to the intrinsic significance of music itself), Aristoxenus may be set within the great philosophical tradition that conceived

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[23] Rocconi, "Aristoxenus and Musical *Ēthos*," 81.

[24] *Cf*., Rocconi, "Aristoxenus and Musical *Ēthos*," 82 and Ps. Plutarch *De mus*. 34 1143f-1144a.

of music as an effective means of developing the capacity for comprehension and judgement of ethical values. The final goal of the philosopher who devotes him or herself to harmonics is the development of the critical faculty, because music is beneficial to the practice of understanding, which is *'the ruling principle and judge of everything',* (*Harmonics* 41.10ff.). As Aristoxenus states further in the *Harmonics* (where he is discussing the fact that practical abilities, like the capacity for writing musical notes, are not the aims of harmonic science): "We shall have missed the truth," he says, "if we make that which judges neither the limit nor the ruling principle, and make into the limit and ruling principle that which is judged." (*Harmonics* 41.20-5).

The emergent form of melody appears to our senses, and is apprehended by both perception and memory. The understanding of harmonics must presuppose an ability to perceive the present melody, but to also remember the previous or past melodic lines that have emerged into being. "For melody consists in coming-to-be, as do the remaining parts of music. Understanding of music comes from these two, perception and memory; for one must perceive what is coming into being, and remember what has come into being. There is no other way of following the contents of music." (*Harmonics* 38.30-39.3) The τόπος or the place or condition is that which allows for the articulation or demonstration of this vocal movement in a unique space. Because it is not a physical space that is the τόπος, melody occurs within a *dimension*, within which we identify a pitch – a sound or note that occupies some position.[25] We would do well to remember that Aristoxenus' emphasis on the voice's movement or kinetic activity within this τόπος is the basis of his science. The nature of the τόπος is disclosed once we can examine the voice's movement and its melodic appearance within our perceptual field.[26]

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[25] *Cf*., Barker, "The Journeying Voice: Melody and Metaphysics in Aristoxenian Science," 166: "Under this conception, in fact, a sound's having a determinate pitch *is* its being located at some point in this quasi-linear space, and its having a different pitch from some other sound *is* its being in a different location. It is tempting to say that the word τόπος is being used metaphorically (though it might be none the worse for that), but we shall find that this way of looking at it is potentially misleading. It is perhaps better conceived as one species of a wider genus, of which the τόπος in which bodies are located and move is another."

[26] Thus, perception and memory allows us to recognize the "flowing and evanescent contours of μέλος," thereby establishing the ground of the scientific understanding of Harmonics. "And from this we are to abstract the determinate and orderly patterns to which its multifarious manifestations conform, and through which its essential φύσις is expressed. ... What the listener actually perceives is not the μέλος as such, but *something* audibly active, in whose activity the μέλος is presented (or represented) to their hearing. Aristoxenus' term for this 'something' is φωνή, or more precisely φωνή μελωδική or μελωδοῦσα." The verb μελωδεῖν signifies "melodising." (Barker, "The Journeying Voice: Melody and Metaphysics in Aristoxenian Science," 165-66)

ARISTOTLE'S *AN. POST.* II.19: NOETIC INTUITION AND THE MIDDLE TERM

In the case of theoretical sciences, the criterion or test by which we have come to know the principles *qua* principles is in our ability to *explain* the phenomena without our purview and through which we acquire scientific understanding of these contingent appearances.[27] In *An. Post*., I.31, 87b28-38 and 88a5-10, Aristotle makes it clear that scientific knowledge cannot base itself upon the act of sense-perception. For, only perceptual knowledge is of particulars, whereas scientific demonstrative knowledge is of universals. Yet, elsewhere in the *Organon*, Aristotle is fully aware of the precondition of sense-perception in the establishment of scientific knowledge.[28] According to Aristotle, sense-perception remains a precondition for the establishment of universal, scientific truths. These truths are obtained by induction from the percept. We acquire knowledge of the *why* from sense-perception, but sense-perception *per se* does not provide us with universal knowledge. Thus, demonstrative knowledge is not acquired by the act of perception.

In *An. Post*. II.19, the progression from sense-perception to theoretical knowledge that culminates in a discussion of νοῦς is described in the following way. The first stage to emerge from sense-perception is memory, "the persistence of such sense-impressions" (*An. Post*., II.19, 100a) once the initial moment of perception has ceased. Repeated memories of the same object produce what Aristotle calls experience, "for a number of memories constitute a single experience," (100a6) out of which emerges the "skill of the craftsman and the knowledge of the man of science, skill in the sphere of coming to be and science in the sphere of being." (100a7-10) Through the method of induction, from the accumulation of sense experience, scientific knowledge alone is unable to realize or produce the universal; the universal is produced by scientific understanding, and that which enables scientific understanding to abstract the universal from the particular is νοῦς.

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[27] *Cf*., L.A. Kosman, "Understanding, Explanation, and Insight in Aristotle's *posterior Analytics*," in *Exegesis and Argument: Studies in Greek Philosophy Presented to Gregory Vlastos*. Ed. E. N. Lee, A. P. D. Mourelatos and R. M. Rorty. (Assen, The Netherlands: Van Gorcum & Comp. B. V., 1973), 386-89: "... being a principle of explanation is a function of place within a larger body of discursive understanding and explanation. First principles are *first* within that larger body; they are capable of the most comprehensive explanatory coverage. Men of science [*cf*., Aristotle, *On Generation and Corruption* I.2, 316a6-12] grow able to formulate theoretical principles which are capable of bringing into consistency and coherence wider ranges of phenomena . . . . Understanding these principles as *principles* is just seeing them in their capacity to effect this consistency and coherence with regard to phenomena, their capacity to make phenomena intelligible. It is, in other words, seeing them in their capacity *to explain*."

[28] *Cf*., *De Caelo,* II.13, 293a25-30; III.7, 306a4-17; and *De Gen. et Corr.* I.2, 316a5-10.

In *An. Post.,* II.19, νοῦς is said to be a ἕξις, the faculty by which first principles are grasped. νοῦς is the capacity that allows for the apprehension of concepts. Concepts are, however, grasped from an ascending series of stages, ranging from the activities of sense-perception to the "skill of the craftsman." (*An. Post*., II.19, 100a8) Only at the scientific stage are concepts formed or apprehended. What remains controversial and ambiguous in *An. Post*., is the very status of νοῦς: Is νοῦς a separate capacity that can apprehend first principles, or is νοῦς a resulting capacity from an inductive method of reasoning? In other words, is the activity of νοῦς dependent upon inductive reasoning, from which stages of knowledge are formed, as concept formation is dependent upon sense-perception, or is it independent of this process and, as a result, enjoys a separate and autonomous status?

It is said in II.19 that we possess νοῦς of first principles as opposed to epistemic knowledge of them. Aristotle highlights the problem of grasping or knowing the ἀρχὴ by way of discussing some preliminary problems, such as whether or not the apprehension of these primary principles, the ἀρχὴ, is similar in kind to the apprehension of conclusions in a syllogism, and weather scientific knowledge is required of both.

> We have already said that scientific knowledge through demonstration is impossible unless a man knows the primary immediate premisses. But there are questions which might be raised in respect of the apprehension of these immediate premisses: one might not only ask whether it is of the same kind as the apprehension of the conclusion, but also whether there is or is not scientific knowledge of both; of scientific knowledge of the latter, and of the former a different kind of knowledge; and, further, whether the developed states of knowledge are not innate but come to be in us, or are innate but at first unnoticed. (*An. Post*., II.19, 99b20-26)

Moreover, Aristotle states that it is strange if we should have innate knowledge of these, for it is not possible (and here Aristotle may have the *Meno* in mind) to possess such elevated knowledge – knowledge of the first principles, i.e., knowledge that surpasses demonstrative knowledge – without recognizing them. Aristotle also rejects the possibility of acquiring knowledge of first principles, since, contrary to the acquisition of demonstrative knowledge of first principles must be possessed from the beginning of our lives – these principles remain the condition for our learning information about the natural world.

> Now it is strange if we possess them from birth; for it means that we possess apprehensions more accurately than demonstration and fail to notice them. If on the other hand we acquire them and do not previously possess them, how could we apprehend and learn without a basis of pre-existence knowledge? For that is impossible as we used to find in the case of demonstration. (*An. Post*., II.19, 99b26-30)

However, Aristotle asserts that νοῦς is the "originative source of science" (100b15); it is the force that allows for demonstrative knowledge to be acquired, but is it itself irreducible to the conceptual confines of epistemic or scientific knowledge?

With respect to the states of knowing, Aristotle asserts the superiority of intuitive knowledge over scientific knowledge – even though scientific knowledge and intuition are both said to be "always true." (100b8) Aristotle then adds that "... no other kind of thought *except intuition* is more accurate than scientific knowledge, whereas primary premisses are more knowable than demonstrations, and all scientific knowledge is discursive." (100b8-19) Given that scientific knowledge is discursive and given discursive knowledge admits of mediation, i.e., requires a middle term, and, finally, given intuitive knowledge is characterized as an immediate apprehension of first principles, then

> it follows that there will be no scientific knowledge of the primary premisses, and since except intuition nothing can be truer than scientific knowledge, it will be intuition that apprehends the primary premisses – a result which also follows from the fact that demonstration cannot be the originative source of demonstration, nor, consequently, scientific knowledge of scientific knowledge. If, therefore, it is the only other kind of true thinking except scientific knowledge. And the originative source of science grasps the original basic premisses, while science as a whole is similarly related as originative source to the whole body of fact." (*An. Post*., II.19, 100b10-17)

νοῦς is not to be included in the echelons of knowledge, which begins with sense-perception and ends with scientific knowledge. Concept formation is strictly within the realm of scientific inquiry. νοῦς, however, is the "originative source" of this capacity to form concepts. νοῦς is the very condition of scientific knowledge. As such, it must be naturally and epistemically prior to the knowledge of scientific knowledge. As the axioms precede the particular rules of a science, so, too, do the first principles precede concepts generated and apprehended by scientific inquiry.[29]

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[29] *Cf*., J. M. Le Blond, *Logique et méthode chez Aristote : Étude sur la recherché des principes dans la physique aristotélicienne*. (Paris : Librairie Philosophique J. Vrin), 1970. Le Blond's starting-point is that the Aristotelian notion of νοῦς includes « une saveur platonicienne » (p. 131), by which Le Blond means that νοῦς is not a product of empirical investigation or inductive reasoning : « Mais le chapitre s'achève ; par l'affirmation du νοῦς supérieur à la science, du νοῦς qui *doit* être à la source de la science : les mots même dont se sert Aristote ont alors une saveur platonicienne qui contraste avec l'empirisme sensualiste . . . . » (pp. 131-32) In what sense can intuition and induction be identified (*cf*., *An. Post*. II.19, 100b5ff) Le Blond, agreeing with O. Hamelin, answers by way of obviating or dismissing the question. « Cette identification paraît s'imposer en effet. » (Le Blond, *Logique et méthode chez Aristote*, 138) Induction is essentially inferior and must « se servir de la sensation comme d'une intuition rationelle. » (O. Hamelin, *Système d'Aristote*. 3ème éd. (Paris : Brin), 1976, 258) This answer, alone, would be

The immanentist activity of noetic intuition in Aristotle's *An. Post*., II.19 may be a peripatetic source for Aristoxenus' development of musical ethos, and of melody and composition, for it is understood as the ruling principle of judgement. Judgement of what? It is a judgement of what sense-perception provides to us. As mentioned, from multiple sense-perceptions, we form memory; from multiple memories, we form an experience; from multiple experiences, we form a heightened consciousness of the particular and the universal as a craftsman; from a habitual mindset of the mixture of particular and universal, we form scientific knowledge, knowledge of the sphere of being. *An. Post*. II.19 highlights the philosophical condition that allows for this ascension of knowledge: νοῦς or noetic intuition. It is not a faculty or stage of consciousness, but it allows for this gradation of knowledge to be recognized at each stage of our intellectual development and our acquisition of the sensible world. We should remind ourselves of Aristoxenus' claim: "We shall have missed the truth," he says, "if we make that which judges neither the limit nor the ruling principle, and make into the limit and ruling principle that which is judged." (*Harmonics* 41.20-5) Aristoxenus draws on noetic intuition as a philosophical reason for the condition of acquiring knowledge of harmonics.

The gradation of conceptual knowledge in ascension with the gradation of reality perceived in *An. Post*. II.19 is similar to *Metaphysics* A 1, where we see the gradation of knowledge seize the gradation of reality in parallel form, a *scala naturae*. Here, we come to realize in *An. Post*. II.19 a clear ascension in speculative knowledge of the world, including the acoustic realm and its τόπος. The grasping activity of the causal structures of our world, which also accounts for the acoustic and auditory intelligibles, makes us realize that we also have an intellectual capacity to grasp all these structures and mimic them in our compositions. This is the activity of νοῦς or *noetic intuition* (which is the principle of this kind of knowledge, but is not the content of its knowledge) – perhaps best to be perceived as a verb-like that provides the conditions for us to grasp

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very dissatisfying, if it were not for Le Blond's qualifying argument: that intuition and induction are related as cause and effect are related. The cause is prior to the effect, just as noetic intuition precedes induction. « En fait, ce qui le conduit à cette affirmation de l'intuition des principes, c'est sa théorie de la science déductive, du syllogisme tout entier suspendu à la vérité de ses prémisses : c'est pour cela qu'il *faut* que ces principes soient connus infailliblement, parce que la cause doit être mieux connue que l'effet. Or, ce principe de l'éminence doit être mieux connue que l'effet, ne s'impose pas absolument, au moins dans l'ordre logique. » (Le Blonde, *Logique et méthode chez Aristote*, 139) Intuitive activity, therefore, is prior to inductive reasoning in that it is the condition for the latter's operation. *Cf*., also J. R. Bagby, "Aristotle and Aristoxenus on Effort," *Conatus* 6, no. 2 (2021): 51-74. *Cf*., also Robert Berchman. *Thinking on Thinking: Studies in Mind, Meaning, and Subjectivity*. (Oregon, USA: Pickwick Publications), 2021, pp. 18-49.

the world using discursive reason.[30] This capacity to grasp the world is the same capacity that enables us to hear a melody and understand the functions of each note within a musical piece, which is essential in the act of melopia, of composition.

Just like the middle term of a syllogism occupies a place in the proposition, be it the subject or predicate,[31] since it is free enough to occupy another position according to the rules of validity, so, too, in music, the melody is like the "middle term" that occupies notes within the Great Scalar System and enables the intelligible chordal structure to be demonstrated, to be articulated, as a gradual unfolding or demonstration of the intelligible harmonic structures behind the melody. *An. Post.* II.19 allows the noetic *intuition* to grasp the world as the world *appears* to us intelligibly. In music, we grasp that intelligible structure by way of the intellect and by way of our auditory capacity – thanks to the information provided to us by sense-perception. We are then able, musically, to grasp auditorily the meaning and *function* of a melody. This alone has a cathartic effect. It is a recognition of the whole and the parts within the whole, since the contact with its object is immediate. The melody displays the theme of the primal chordal structures making it possible to grasp the melody and make sense of it, as content to form, by way of ἀπόδειξις or demonstration.

CONCLUSION

Aristoxenus' idea of melody as a *dunamis* is extremely insightful. One cannot deny the movement of living things, such as what the doctrine of actuality and potentiality tell us, so, too, the melody occupies *functions* within each scale yet is not bound to the content of these structures. The melody is free to use or traverse over any notation in a scale. The structure is the actuality, as a cosmos is actual, and the melody is the *dunamis*, as an individual is in the face of an eternal cosmos. This doctrine opens the doors for the actuality of the *community of listeners*, something that must be developed in light of the *De Anima*, as a kind of actuality capable of hearing an intelligent melody whilst it presupposes a chordal or

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[30] For further discussion on the status and role of νοῦς in II.19, see the following: H. Bonitz, *Index Aristotelicus.* 2nd ed. (Berlin : Akademische Druck- U. Verlagsanstalt Graz, 1955); T. Engberg-Pederson, "More on Aristotelian *epagôgê*," *Phronesis* 24 (1979), 301-19; T. Irwin, *Aristotle's First Principles*, (Oxford: Clarendon Press, 1988), ¶ 169; C. H. Kahn, "The Role of νοῦς in the Cognition of First Principles in *Posterior Analytics* II.19," in *Aristotle on Science: The 'Posterior Analytics*,'" ed. E. Berti. *Proceedings of the eighth Symposium Aristotelicum*, (Padua: Antenore, Sept. 7-15, 1978); Kosman, "Understanding, Explanation, and Insight in Aristotle's *posterior Analytics*," in *Exegesis and Argument*; J. H. Lescher, "The Meaning of νοῦς in the *Posterior Analytics*," *Phronesis* 18 (1973), 44-68; H. Sigwick, "The Establishment of Ethical First Principles," *Mind* 4 (1879), 106-11.

[31] The four positions of the figure of a syllogism are, of course, the following: Sub-Sub, Sub-Prae, Prae-Sub, and Prae-Prae.

genus structure of scale. The community of listeners reminds us of the living community, the polis, that is the τόπος of such demonstration or articulation. In a polis complete with enriched souls, the citizens of such a community can appreciate the cathartic effect of melody and harmonics. We are not solipsistic beings; we are in a community within which dimensions of sounds and harmonics frame much of our experiences. We try to echo these rich dimensions in our melodies to one another, and we respond to this by way of the actuality of our being, not the discursive or theoretical aspect only. This is the basis of catharsis. For, it is also a communal experience shared together. He speaks about the community of listeners who follow and recognize the melody within a matrix of intelligible chordal and harmonic structures. Catharsis is the effect of a common understanding of what already is.

The catharsis one feels when listening or playing music is also an intellectual catharsis. Aristoxenus draws on *An. Post*., regularly to justify his methodology, but he also recognizes that the internal makeup of syllogistic argument provides a framework for the gradual unfolding or demonstration of melody and its intellectual backdrop, as a matrix of intelligibility that allows harmonic elements to be perceived and then understood.

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ARISTOXÈNE ET LA SCIENCE DES HARMONIQUES: SCIENCE, MÉLODIE ET CATHARSIS

Résumé

Les Éléments d’harmoniques d’Aristoxène ont été écrits pendant la période classique de la Grèce antique et ils ont été reconnus comme une « combinaison de tétracordes conjoints et disjoints pour former des arrangements plus vastes, tels que le ‘Grand Système Parfait’, qui est le premier compte rendu complet d’un système scalaire étendu dans l’Antiquité [...]».[32] À la lumière de ses écrits éthiques et politiques, ainsi que de sa référence au lien étroit entre la musique et l’état de l’âme humaine, on peut supposer qu’Aristoxène, comme les pythagoriciens avant lui, attribuait un grand pouvoir à la musique, ou à la science des harmoniques, qui offrait une riche éducation musicale afin d’améliorer le *caractère* de l’âme. Ainsi, dans la culture grecque antique, la théorie de l’*ethos* musical était strictement liée à des thèmes éducatifs et politiques.[33] Ainsi, comme Aristoxène consacre beaucoup d’énergie à faire des harmoniques une science et à exploiter la mélodie comme un phénomène révélateur des structures scalaires musicales plus vastes, antérieures à la réalité, il est également pleinement conscient du pouvoir transformateur des harmoniques et de leur effet cathartique sur l’âme humaine. L’analyse d’Aristote sur l’intuition noétique dans *An. Post*. II.19 pourrait bien être un bon point de départ pour articuler la nécessaire combinaison entre mélodie et catharsis : l’intuition noétique appréhendant la gradation substantielle de la *scala naturae*, de même la mélodie articule la matrice sous-jacente des structures harmoniques intelligibles du monde.

[32] Eleonora Rocconi, “Aristoxenus and Musical *Ēthos*,” in *Aristoxenus of Tarentum*, ed. Carl Huffman (New Brunswick (U.S.A) and London (U.K.): Transaction Publishers, 2014), 65.
[33] Rocconi, “Aristoxenus and Musical *Ēthos*,” 66.