7.0 The Diatonic Genus

7.1 As we have seen, the diatonic or 'Pythagorean' tuning process—the heart of the Mesopotamian musical system—was also known in Greece. If it is right that the Terpandrean seven-stringed lyre is best understood in relation to an Orientalizing, and specifically Assyrianizing, musical movement, it follows that the diatonic component of Greek music must have had a continuous history from the early Archaic period onwards. This chapter presents the evidence for the history of the diatonic in Greece as it can be reconstructed through extant Greek material. I argue that the fundamental importance of diatony in pre-Aristoxenean theory has been largely overlooked due to the relative lateness of our sources. For we have lost nearly two centuries of written θεωρία from the so-called Περὶ μουσικῆς of Lasus in the late sixth century[1] down to the *Elementa Harmonica,* which saw the effacement or transformation of older terms and conventions. All the same, it can be shown that Aristoxenus saw ἁρμονική as an essentially diatonic art, and that the genera which were not strictly diatonic were nevertheless obliged to adhere to certain minimum diatonic principles. Other historical testimonia support the idea that diatony was an important—perhaps the most important—component in the very earliest layers of the Greek evidence. Moreover, it is possible to detect in some of this evidence indications of a circular conception, or details associated with such a conception in later sources. Taken all together, the Classical and Archaic antecedents of the σύστημα τέλειον suggest a point of departure that is entirely compatible with the Symphonic Circle and its seven diatonic phases.

7.2 Other types of tuning were more popular in the late fifth and fourth centuries, namely those classified within the enharmonic and chromatic genera.[2] But according to Aristoxenus, who devised the system as we know it, the diatonic was older than either:

> πρῶτον μὲν οὖν καὶ πρεσβύτατον αὐτῶν θετέον τὸ διάτονον, πρῶτον γὰρ αὐτοῦ ἡ τοῦ ἀνθρώπου φύσις προστυγχάνει, δεύτερον δὲ τὸ χρωματικόν,

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1 Mart. Cap. 9.936; *Suda* s.v. Λάσος; cf. 5.18.

2 Without going into detail, the various genera and their shades (χρόαι) were catalogued by the position of pitches which were 'movable' between the 'bounding' tones of the consonant fourth (οἱ περιέχοντες φθόγγοι): see first Aristox. *Harm.* 21-7.

τρίτον δὲ καὶ ἀνώτατον τὸ ἁρμόνιον, τελευταίῳ γὰρ αὐτῷ καὶ μόλις μετὰ πολλοῦ πόνου συνεθίζεται ἡ αἴσθησις.[3]

Now, the diatonic must be put down as the first and oldest of them [*sc.* the genera], for the natural state [φύσις] of man comes across it first, and afterwards the chromatic, and third and finally the enharmonic, for it is the last to which the perception grows accustomed—and with difficulty at that, after much labor.

7.3 It might be thought that Aristoxenus introduces φύσις here as a way of theorizing about the forgotten origins of the genera, just as Aristotle offers neat but overly simplistic accounts of the origins of tragedy and comedy.[4] Yet the appeal to nature is somewhat more complicated, for elsewhere Aristoxenus seems to have qualified this position. This emerges from a passage of ps.-Plutarch, which almost reads as a continuation of the one just cited:

δεῖ γὰρ δηλονότι κατὰ τὴν τῆς ἀνθρωπίνης φύσεως ἔυρεσιν καὶ χρῆσιν τὸ πρεσβύτερον λέγειν, κατὰ γὰρ αὐτὴν τὴν τῶν γενῶν φύσιν οὐκ ἔστιν ἕτερον ἑτέρου πρεσβύτερον.[5]

For it is clear that we must say 'older' in accord with the discovery and use of by human nature; for according to the nature itself of the genera no one is 'older' than another.

Thus, Aristoxenus did not believe that musical history merely played the design of nature; otherwise he would surely have placed the most 'natural' structure at the pinnacle of the evolution. This is precisely what is done when one sees the diatonic basis of the Perfect System as the ultimate systematization of earlier defective tone structures (cf. 1.12). A persistent tradition does indeed describe the diatonic as more natural than the other genera, and given its systematic dependence on consonant intervals, this is a crucial point.[6] And yet Aristoxenus himself makes the 'natural'

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3 Aristox. *Harm.* 19; the formal sequence is followed, without chronological context, by e.g. *Anth. Pal.* 16.220.5f. (Antipater); Cleonid. 3 (181.12ff.); ps.-Plut. *de Mus*. 1142d; Adrastus ap. Theo Sm. 53.17-56.5; Gaud. 5 (331.8f.); Boeth. *De inst. mus*. 1.15 (200.25f.), 1.21 (212.25). The sequence is reversed by Bacch. 21 (298.6), Vitr. *de Arch*. 5.4.3, as it is (more or less) in Aristoxenus' presentation of the χρόαι (*Harm.* 21-7).

4 Arist. *Po.* 1449a9ff. Cf. Pickard-Cambridge (1962), 89-97, 132ff.

5 Ps.-Plut. *de Mus.* 1137e.

6 This may be inferred from Philolaus' and Plato's preference for the diatonic, but is made explicit by Vitr. *de Arch.* 5.4.3: *diatoni vero, quod naturalis est, facilior est intervallorum*

diatonic the *oldest* of the genera, at the same time denying that the later types were any less natural than it. This will be important for understanding the diatonic basis of the other genera (7.26-39). Thus, the development of music was not dictated by nature, but resulted from the control of nature through human invention. The question was concisely posed and answered centuries later by Bacchius, who summarized Aristoxenean material:

> Πῶς ὑπάρχει [*sc.* τὰ κατὰ τὰς μελῳδίας συμβαίνοντα]; — Ἃ μὲν φύσει, ἃ δὲ τῇ ἡμετέρᾳ χρήσει.[7]
>
> How do [*sc.* the phenomena of melody] come about? — Some arise from nature, others from our own use.

7.4 In his ranking of the genera, then, it seems that Aristoxenus has in mind a clear picture of historical priority. There is good reason to believe that ὁ μουσικός should be taken at his word. Obviously we cannot expect Aristoxenus to have a perfectly accurate picture of the state of Greek music from three centuries earlier. Nevertheless, if the diatonic was in fact of great antiquity, one may at least credit the musicians of the fourth century with a general awareness of the fact.

7.5 A number of arguments confirm this view. First, while the diatonic may have shared the Classical stage with the chromatic and enharmonic genera, it must have constituted the foundation of the new σύστημα τέλειον. The τόνοι or 'pitch keys'—by which Aristoxenus organized and interrelated the various octave species (σχήματα) of each

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distantia ("indeed, because it is natural, the distance of intervals of the diatonic is easier"); Nicom. *Ench.* 7 (249.1ff.): τὴν δὲ πρόβασιν ἀνάγκῃ τινὶ φυσικῇ . . . κατὰ τοῦτο τὸ διατονικὸν γένος κ.τ.λ. ("the progression by some physical necessity . . . in the diatonic", etc.); Aristid. Quint. 1.9 (16.10ff.): τούτων δὲ φυσικώτερον μέν ἐστι τὸ διάτονον κ.τ.λ. ("Of these, the diatonic is more natural" etc.); Boeth. *De inst. mus*. 1.21 (212.26): *diatonum quidem aliquanto durius et naturalius.* Plato *Lg*. 657a-b calls for music which follows the laws of nature (μέλη τὰ τὴν ὀρθότητα φύσει παρεχόμενα), and this can be loosely connected with the diatonic given his preference for it in the *Republic* and *Timaeus*; cf. Adrastus ap. Theo Sm. 56.3-5: τὸ δὲ διάτονον γένος ἁπλοῦν τι καὶ γενναῖον μᾶλλον κατὰ φύσιν· διὸ μᾶλλον τοῦτο παραλαμβάνει Πλάτων ("The diatonic genus is somewhat simple and more noble by nature; for this reason Plato embraced it the more"): cf. Macr. *Somn. Scip*. 2.4.13 *diatonum mundanae musicae doctrina Platonis adscribitur*.

7 Bacch. 2 (292.7f.).

genus and the smaller fragments (συστήματα) thereof for the purposes of modulation and interconnection (μεταβολή)—were essentially diatonic in nature. This follows from the fact that the term τόνος in this usage seems to derive from its more basic meaning, "the difference between a perfect fourth and a perfect fifth" (cf. 2.21). As we saw in the Mesopotamian system, it is through the continuous alternation of these two intervals that the diatonic scale is generated, and consequently a series of τόνοι in the earlier sense of the word. Since these pitches were the same τόνοι "upon which systems are placed and sung",[8] we may exclude a direct etymology from τόνος as τάσις ("pitch"). Ptolemy considered this a likely explanation of the ancients' coinage, though the exact derivation of this layer of meaning had been forgotten by his time.[9] There were in fact thirteen τόνοι (and later fifteen), rather than seven or eight, in the σύστημα τέλειον.[10] But this came about merely as an extension of the diatonic process through two cycles of alternating fifths and fourths, rather than one, so that all possible modulations could be accommodated by an underlying grid of semitones. Hence the τόνος in this sense derives from the wholetone's function as a useful unit of sonic measurement.[11]

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8 Cf. Aristox. *Harm.* 37: πέμπτον δ' ἐστὶ τῶν μερῶν τὸ περὶ τοὺς τόνους ἐφ' οἷς τιθέμενα τὰ συστήματα μελῳδεῖται ("The fifth subtopic [of ἁρμονική] is that which concerns the τόνοι, upon which the systems which are sung are placed").

9 Ptol. *Harm.* 2.10 (62.21f.): τόνῳ διαφέροντας ἀλλήλων ὑποθέμενοι, καὶ διὰ τοῦτο ἴσως τόνους αὐτοὺς ὀνομάσαντες ("assuming these to differ from each other by a τόνος, and perhaps for this reason naming them τόνοι").

10 Aristoxenus' theory of the τόνοι is alluded to by Cleonid. 12 (203.4-204.15); Aristid. Quint. 1.10 (20.5ff.); cf. ps.-Censor. *de Mus.* 6.609.17ff.; Isid. *Etym.* 3.20.7-8; see also the criticisms of Ptol. *Harm.* 2.9-11.

11 Aristox. *Rhythm.* 2.21 γνώριμον κατὰ μέγεθος, ἤτοι ὡς τά τε σύμφωνα καὶ ὁ τόνος ἢ ὡς τὰ τούτοις σύμμετρα (". . . intelligible in magnitude, either like the consonant intervals and the τόνος, or like those intervals commensurate with these"). Adrastus ap. Theo Sm. 53.3ff.: καθάπερ ὁ πῆχυς τοῦ κυρίως τοπικοῦ διαστήματος . . . ἔστι δὲ γνωριμώτατον τὸ τονιαῖον διάστημα, ἐπειδὴ τῶν πρώτων καὶ γνωριμωτάτων συμφωνιῶν ἐστι διαφορά ("just like the cubit for literally spatial intervals . . . the τόνος is the most intelligible interval, because it is the difference between the first and most intelligible consonances"); cf. 66.19-67.3: οἱ δὲ παλαιοὶ πρῶτον διάστημα τῆς φωνῆς ἔλαβον τὸν τόνον… ὅτι μέχρι τούτου καταβαίνουσα ἡ φωνὴ τοῦ διαστήματος ἁπλανῆ τὴν ἀκοὴν φυλάσσει. τὸ δὲ μετὰ τοῦτο οὐκέτι οἷά τε ἡ ἀκοὴ πρὸς ἀκρίβειαν λαβεῖν τὸ διάστημα ("and the ancients took the tone as the first interval of the voice . . . because, as the voice proceeds, it

7.6 That the σύστημα τέλειον had a theoretical precursor in the diatonic has been further obscured by a passage of the *Elementa Harmonica* in which Aristoxenus, in criticizing the diagrams of his predecessors, says that they concerned themselves only with octachords in the enharmonic genus.[12] This allusive and punning account was already confusing in antiquity. As Proclus commented, "Aristoxenus is saying something incredible here, that the ancients did not know the diatonic diagram",[13] reporting also the older gibe of Adrastus, elicited by this same problem, that Aristoxenus was generally "concerned to seem to say something brand new" (ὅπως ἂν δόξῃ τι καινὸν λέγειν πεφροντικώς).[14] For the diatonic had been the subject of close scrutiny by Philolaus, Plato, and—in his wish to make it conform more closely to the resonant ratios—Archytas.[15] Indeed the statement, according to the usual interpretion, would scarcely accord with Aristoxenus' own chronology of the genera.

7.7 The solution to the riddle must be that Aristoxenus, in focusing on the new system he is forging, neglects an older, established θεωρία as not needing any redress, and saves his criticism for the architects of its change. Aristoxenus brought to completion what had long been sought, a new system which could accommodate the innovations of the late fifth and fourth centuries. What he has taken for granted, then, is the phase of music and its theory preceding these trends, which, relative to the New Musicians, will have been classical forms. Thus, when he complains that

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safeguards the hearing as far as this interval, but after this [i.e. with smaller intervals] the hearing is no longer able to take the interval with precision").

12 Aristox. *Harm.* 2-3: τοὺς μὲν οὖν ἔμπροσθεν ἡμμένους τῆς ἁρμονικῆς πραγματείας συμβέβηκεν ὡς ἀληθῶς, *restituit Marquard ex Procl. in Ti.*› ἁρμονικοὺς εἶναι βούλεσθαι μόνου, αὐτῆς γὰρ τῆς ἁρμονίας ἥπτοντο μόνου, τῶν δ' ἄλλων γενῶν οὐδεμίαν πώποτ' ἔννοιαν εἶχον ("Now it happens that those who previously set themselves to the endeavour of ἁρμονική truly wanted to be only 'ἁρμονικοί', for they grasped only the enharmonic [ἁρμονία] itself, but never yet had any thought for the other genera"); cf. the summary, with some additions, in ps.-Plut. *de Mus.* 1143e-f.

13 Procl. *in Ti.* 3.192a (2.169.21-29 Diehl): ἐν οἷς καὶ λέγει τι θαυμαστὸν ὁ Ἀριστόξενος, ὅτι τὸ διατονικὸν διάγραμμα οὐκ ἤδεσαν οἱ παλαιοί . . . πῶς οὖν ταῦτα λέγει καίτοι καὶ τοῦ Πλάτωνος κατὰ τὸ διατονικὸν γένος ἐκθεμένου τὸ διάγραμμα καὶ τῶν ἀμφὶ τὸν Τίμαιον, θαυμάσαι ἄξιον.

14 Aristox. fr. 8 = Adrastus ap. Procl. *in Ti.* 3.192a (2.169.29ff. Diehl).

15 Philol. fr. 44B6a D-K (see 8.5); Archyt. fr. 47A16; Pl. *Ti.* 35b-36b. Cf. Burkert (1972), ch. 5 sec. 2; Barker (1978), 3; (1982-9), 2.59f.; West (1992), 165.

> Ἐρατοκλῆς ἐπεχείρησε καθ' ἓν γένος ἐξαριθμῆσαι τὰ σχήματα τοῦ διὰ πασῶν ἀναποδείκτως τῇ περιφορᾷ τῶν διαστημάτων δεικνύς.[16]
>
> Eratocles attempted to enumerate the octave-schemes of one genus [*sc.* the enharmonic], showing it, without formal demonstration [ἀναποδείκτως], by the rotation of the intervals.

we should not conclude that the enharmonic genus was the first melodic style ever to be subject to theoretical scrutiny. It was rather the first to be analysed with an eye towards comprehending in a single system the innovative practices that were then (in the second half of the fifth century[17]) being developed, what would eventually culminate in the new σύστημα τέλειον. Eratocles is criticized for not having done this well or completely enough, and for doing it ἀναποδείκτως ("without formal demonstration"), that is, without "the logical derivation of propositions from appropriate principles".[18]

7.8 The phrase τῇ περιφορᾷ τῶν διαστημάτων is crucial. This "interval rotation" has always been seen as Eratocles' great achievement, a breakthrough in the cyclical synthesis of disparate tunings. But given the opprobrious tone, it makes more sense to understand the phrase as belonging to the complaint of ἀναποδείκτως. Since Aristoxenus' criticism of his predecessors was tied to their failure to produce sufficient diagrams, ἡ περιφορά should be a means of demonstrating species without recourse to diagrams, and so presumably could be executed on the instrument itself, with one tuning succeeding another in a visibly and audibly coherent sequence (δεικνύς, "showing"). It was a processual cycle which 'brought one back around' to the starting point, exactly as περιφορά suggests. It was thus a familiar technique that could be used without the more rigorous methods required by Aristoxenus—not needing, for example, the linear interval map of the σύστημα τέλειον. The underlying principle of scales linked in a cyclical system would have been the same, but the two forms of presentation are quite distinct. To take full account of the complex musical

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16 Aristox. *Harm.* 6.

17 Eratocles' dates are unknown, but the resonance between his theory of road-junctions and Ion of Chios fr. 32 (West)—for which see below and cf. West (1992), 226—as well as his use of octachords (see 8.0) lets him be dated approximately to the second half of the fifth century.

18 Barker (1982-9), 2.130 n. 25.

developments of the late fifth century, a more graph-like approach was needed to assist the ears. This was the function of the musical diagram, as Bacchius explains:

> Διάγραμμα δὲ τί ἐστι; — Συστήματος ὑπόδειγμα . . . διαγράμματι δὲ χρώμεθα, ἵνα τὰ τῇ ἀκοῇ δύσληπτα πρὸ ὀφθαλμῶν τοῖς μανθάνουσι φαίνηται.[19]
>
> And what is a diagram? A representation of a [*sc.* musical] system. And we use a diagram so that, for students of the subject, matters which are hard to grasp with the hearing may appear before their eyes.

7.9 Thus Eratocles did not produce a sufficient account by Aristoxenus' latter-day standards, but *merely* used a rotational process which did little to transform a no-longer-adequate method of musical analysis. Given that the σύστημα τέλειον reveals a diatonic substructure in the τόνοι, and that Aristoxenus accepted the diatonic as the oldest of the genera, the easiest solution is to suppose that ἡ περιφορὰ τῶν διαστημάτων reveals a thorough familiarity with the cyclical properties of the diatonic method as the basis of pre-Aristoxenean θεωρία—a long-familiar, not novel, approach. It is important, then, that Bacchius defines a diagram as "a flat chart on which *all* the genera could be sung" (σχῆμα ἐπίπεδον, εἰς ὃ πᾶν γένος μελῳδεῖται).[20]

7.10 Plato, who was only interested in the diatonic, serves to unite this tuning method with the cyclical in his elaborate Myth of Er, where the eight tones (τόνοι) all partake in a cyclical cosmos.[21] The old usage of τόνος as "tuning" (cf. 2.25) clarifies the word's later meaning of "octave species": that is, these τόνοι were "the tunings"—i.e. the standard tunings—and they were created by cyclical transformation; compare the synonymous term τρόποι, which may thus be rendered as "turnings" of the musical

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19 Bacch. 62 (305.16-20).

20 Bacch. 62 (305.16-20). A diagram with all the genera is found at e.g. Nicom. *Ench.* 12 (264.6ff.).

21 Pl. *Resp.* 10.616b-617d.

circle.[22] The link between these cyclical τόνοι and the diatonic method is established by the intermediate application of τόνος, "tuning", to mean "diatonic tuning" specifically—an ancient and somewhat untechnical usage, documented from the Classical period (cf. 2.26). Eratocles therefore showed how the enharmonic could be schematized according to a classical, diatonic, and fundamentally circular approach.

7.11 In the light of the foregoing, one can see, in a criticism of his predecessors where Aristoxenus' new, unaddressed harmonic concerns dwarf those of an earlier period, the strata of the evolutionary process which led to the σύστημα τέλειον :

> τέταρτον δ' ἂν εἴη μέρος τὰ συστήματα θεωρῆσαι πόσα τ' ἐστὶ καὶ ποῖ' ἄττα καὶ πῶς ἔκ τε τῶν διαστημάτων καὶ φθόγγων συνεστηκότα. οὐδέτερου γὰρ τῶν τρόπων τεθεώρηται τὸ μέρος τοῦτο ὑπὸ τῶν ἔμπροσθεν· οὔτε γὰρ εἰ πάντα τρόπον ἐκ τῶν διαστημάτων συντίθεται τὰ συστήματα καὶ μηδεμία τῶν συνθέσεων παρὰ φύσιν ἐστὶν ἐπισκέψεως τετύχηκεν, οὔθ' αἱ διαφοραὶ πᾶσαι τῶν συστημάτων ὑπ' οὐδενὸς ἐξηρίθμηνται. περὶ μὲν γὰρ ἐμμελοῦς ἢ ἐκμελοῦς ἁπλῶς οὐδένα λόγον πεποίηνται οἱ πρὸ ἡμῶν, τῶν δὲ συστημάτων τὰς διαφορὰς οἱ μὲν ὅλως οὐκ ἐπεχείρουν ἐξαριθμεῖν—ἀλλὰ περὶ αὐτῶν μόνον τῶν ἑπταχόρδων ἃ ἐκάλουν ἁρμονίας τὴν ἐπίσκεψιν ἐποιοῦντο—οἱ δὲ ἐπιχειρήσαντες οὐδένα τρόπον ἐξηριθμοῦντο, καθάπερ οἱ περὶ Πυθαγόραν τὸν Ζακύνθιον καὶ Ἀγήνορα τὸν Μυτιληναῖον.[23]
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> The fourth topic would be to observe the systems: how many they are, what type, and how they are composed from intervals and musical tones. For in neither of these ways has this topic been observed by the earlier harmonists: for the question of whether systems are composed from intervals in every manner, and whether none of these composites run counter to nature, has not met an examination; nor have all the differences of the systems been enumerated by anyone. For concerning what is properly melic and what is not [περὶ μὲν γὰρ ἐμμελοῦς ἢ ἐκμελοῦς], our predecessors have simply made no account. Some made no attempt at all to enumerate the differences between systems, but made examination

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22 For τρόπος as τόνος, see e.g. Plut. *An seni* 793a: τόνων καὶ τρόπων . . . οὓς ἁρμονίας οἱ μουσικοὶ καλοῦσι; *De E Delph.* 389e: εἴτε τόνους ἢ τρόπους εἴθ' ἁρμονίας χρὴ καλεῖν: cf. West (1992), 188 n.103; ps.-Plut. *de Mus.* 18.1137b: πολυτρόπῳ; Bacch. 46-7 (303.3ff.), etc.; Gaud. 20 (347.22): τρόπον ἢ τόνου; Aristid. Quint. 1.6 (8.20), 1.10 (20.1-4): τόνον . . . τρόπου συστηματικόν, οἷον λύδιου ἢ φρύγιου, etc.; Alyp. 3 (367.20): τρόπους τε καὶ τόνους.

23 Aristox. *Harm.* 36-37.

only of the heptachords themselves, which they used to call ἁρμονίαι. Those who did try were in no way exhaustive, i.e. Pythagoras of Zacynthus and his school, and Agenor of Mytilene and his.

7.12 The key phrase here is ἀλλὰ περὶ αὐτῶν μόνον τῶν ἑπταχόρδων ἃ ἐκάλουν ἁρμονίας τὴν ἐπίσκεψιν ἐποιοῦντο. The MSS reading ἑπταχόρδων must be retained against Marquard's proposed emendation of ἑπτὰ ὀκταχόρδων, which has been adopted by all editors since 1868. In M, ἑπτὰ χορδῶν had been corrected to ἑπταχόρδων; wishing to account for this, Marquard saw a parallel in Aristoxenus' criticism, mentioned above, of his predecessors who "only spoke about enharmonic octachord systems" (περὶ συστημάτων ὀκταχόρδων ἐναρμονίων μόνον ἔλεγον).[24] It is generally accepted that the *Elementa Harmonica* is, as we have it, a later compilation of two independent drafts; there are a number of parallel topics that are repeated between books 1 and 2.[25] Deeming then that the two passages in question were essentially identical critiques, Marquard suggested that ὀκτα- had been omitted in a sort of numerical haplography, whereupon the editor of M closed the gap between ἑπτὰ and χορδῶν in a false emendation.

7.13 But this cannot be right. First, ἑπτὰ χορδῶν is more economically explained as an erroneous division of ΕΠΤΑΧΟΡΔΩΝ at the time when word breaks were first introduced to a text without accents, a very natural error for which there is an exact (but inverted) parallel in Nicomachus.[26] Second, with ἃ ἐκάλουν ἁρμονίας ("which they used to call ἁρμονίαι"), Aristoxenus is evidently drawing a distinction between an older use of the term ἁρμονία and that of his own day. Now, with the exception of this passage, Aristoxenus always uses ἁρμονία to mean a scale in the enharmonic genus; the enharmonic, so popular in the late fifth and early fourth centuries, had become the "tuning" *par excellence*.[27] Thus the predecessors here criticized cannot

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24 Aristox. *Harm.* 2.

25 Cf. Barker (1982-9), 2.120; West (1992), 4; contrast Bélis (1986).

26 Nicom. *Exc.* 1 (266.7).

27 Adrastus ap. Theo Sm. 55.15-56.1: καλεῖσθαι δέ φησιν Ἀριστόξενος τοῦτο τὸ προειρημένον γένος ἁρμονίαν διὰ τὸ εἶναι ἄριστον, ἀπαναγκάμενον τοῦ παντὸς ἡρμοσμένου τὴν προσηγορίαν ("And Aristoxenus says that this, the aforementioned genus, is called ἁρμονία because it is best, taking this title away from τὸ ἡρμοσμένον as a whole"); ps.-Plut. *de Mus.* 1143e-f. See also Henderson (1957), 388f.; West (1992), 164f.

28 Cf. Laloy (1904), 101.

have been talking about the enharmonic. Consequently the first passage cannot be adduced as a parallel, and the supposed haplography vanishes—a lesson not to underestimate the disjunction between the first two books of the *Elementa Harmonica* when attempting to draw "internal" analogies.

7.14 This passage gives us a glimpse of the earlier practical and theoretical norm of the seven-stringed lyre which had been current in the Archaic period and well into the Classical.[28] It is clear from the phraseology that Aristoxenus saw these heptachords as a fixed, finite set, as shown both by the definite article and still more so by the intensive pronoun (περὶ αὐτῶν μόνον τῶν ἑπταχόρδων, "only about the heptachords themselves"). This would naturally precede the work of Eratocles and others, whose octachord diagrams were the first steps towards the σύστημα τέλειον. Moreover, these ancient ἁρμονίαι must have been more orderly than the odd tunings, seemingly from the high enharmonic period, preserved by Aristides Quintilianus, which show sometimes more, sometimes fewer than seven pitches.[29] For they did in fact have seven pitches—exactly as we should expect from early literary evidence and the consistent representation of seven-stringed lyres throughout the Archaic period.[30]

7.15 This ancient heptachordy began to undergo a permanent change at the professional level in the first half of the fifth century (probably in c. 480-460),[31] with a decisive turning point being Phrynis' victory at the Panathenaea in 446/5 with his modern

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29 Aristid. Quint. 1.9. On these scales generally, see Winnington-Ingram (1936), 55ff.; West (1992), 174f. and n. 47 with literature cited there.

30 Terp. fr. 4.2 (Gostoli); *h. Merc.* 51; Pi. *N.* 5.22: φόρμιγγ' . . . ἑπτάγλωσσαν; *P.* 2.70f.; Ion of Chios fr. 32 (West), quoted below. For the ceramic evidence, Maas/Snyder (1989).

31 This crucial issue has not been adequately addressed; see first West (1992), 63f. A thorough study of the ceramic evidence is needed; initial indications of my own ongoing survey are that eight-stringed instruments become the most common configuration in professional contexts between 480-460; but note that an accurate typology, could it be established, would itself prove an important dating criterion for the vases. Corroborative literary evidence is Pliny *N.H.* 7.204, who credits Simonides (traditionally *c.* 556-468: see West [1971]) with the eighth string—or τὸν τρίτον φθόγγον as the *Suda* puts it (*s.v.* Σιμωνίδης): see further 8.78—while ps.-Plutarch reports (*de Mus.* 1136c-d) that Lamprocles added a disjunctive tone at the top of the conjunct heptachord (see further 8.32-33). Nicomachus' attribution of the eighth string to Pythagoras in *Ench.* 5 (244.14ff.) was in his time already an old tradition, which may be dismissed as having ulterior motivations (cf. 8.8). The tradition of Terpander's eighth string is equally false: see 8.49-69.

πολυχορδία.[32] Yet the heptachordal norm must have persisted at the popular level and in the music lesson, for non-professional lyres are still commonly so depicted throughout the period of the New Music and beyond, and the seven strings of the ancients are still clearly recalled in much later sources.[33] Aristotle treats it as a matter of fact that there were seven strings in the old ἁρμονίαι, while the Aristotelian *Problems*, compiled well into the octachord period, nevertheless report heptachords as standard in an earlier θεωρία.[34] Nicomachus clings stubbornly to the memory, loyally but wrongly attributing the eighth string to Pythagoras (see 8.8-29). We are thus justified in regarding Aristoxenus' τῶν ἑπταχόρδων as comprising a coherent collection of some sort associated with this ancient phase of Greek music, just as the Aristotelian problems cited refer in the plural to heptachordal ἁρμονίαι. For Aristoxenus the term ἁρμονία was closely associated with the tunings of this heptachordal "system", not used as "attunement" in some more generic sense which might include a variety of other tunings with more or fewer than seven strings, such as those in Aristides Quintilianus. For Aristoxenus this set of heptachordal tunings comprised *the* ἁρμονίαι.

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32 Ister *FGrH* 334F56 = schol. a *ad* Ar. *Nub.* 971: ὁ Φρῦνις κιθαρῳδός . . . δοκεῖ πρῶτος κιθαρίσαι παρ' Ἀθηναίοις καὶ νικῆσαι Παναθήναια ἐπὶ Καλλιμάχου ἄρχοντος. For Phrynis, see further 2.38-40, 8.63.

33 E. *Alc.* 446f.: ἑπτάτονόν τ' ὀρείαν / χέλυν; *Ion* 881; Call. *Del.* 253ff.: ἔνθεν ὁ παῖς τοσσάδσε λύρῃ ἐνεδήσατο χορδάς / ὕστερον, ὁσσάκι κύκνοι ἐπ' ὠδίνεσσιν ἄεισαν· ὄγδοον οὐκέτ' ἄεισαν ("Hence the child [*sc.* Apollo] later bound that number [*sc.* seven] of strings to the lyre, as often as the swans sang upon his birth; an eight time they did not yet sing"); forged Laconian decree, Boeth. *De inst. mus.* 1.1 (182.7ff.); Verg. *Aen.* 6.646; Thrasyllus wrote a work called Περὶ τοῦ ἑπταχόρδου probably in the early first century A.D. (Porph. *in Harm.* 5 [91.14]; for dates see Barker [1982-9], 2.209f.) and cf. 8.68; *Anth. Pal.* 9.250 (Onestes); Nicom. *Ench.* 3 (242.5): ἔν γε τῇ ἑπταχόρδῳ κατὰ τὸ παλαιὸν, cf. 5 (245.4), 7 (249.15), 9 (253.4), 11 (256.5f.): τῇ τοίνυν ἀρχαιοτρόπῳ λύρᾳ, τουτέστι τῇ ἑπταχόρδῳ; *Exc.* 1 (266.3), 6 (277.9-10); Paus. 3.12.10: χορδαῖς ἑπτὰ ταῖς ἀρχαίαις; Lucian *Astr.* 10; ps.-Plut. *de Mus.* 1141c: ἑπταφθόγγου τῆς λύρας ὑπαρχούσης ἕως εἰς Τέρπανδρον; *Exc. Neap.* 23 (418.10ff.); Procl. *Chr.* ap. Phot. *Bibl.* 320a33-b11; Alex. Aphr. *In Metaph.* 1093a13; Clem. Al. *Strom.* 6.16.144; Isid. *Etym.* 3.22.4; *Suda* s.v. Τέρπανδρος; etc.

34 Arist. *Metaph.* 1093a14: ἑπτὰ δὲ χορδαὶ ἡ ἁρμονία; ps.-Arist. *Pr.* 19.7: οἱ ἀρχαῖοι ἑπταχόρδους ποιοῦντες ἁρμονίας ("the ancients, making their heptachordal ἁρμονίαι"); 19.47; 19.25: ἑπτάχορδοι ἦσαν αἱ ἁρμονίαι τὸ παλαιόν; 19.32: ἑπτὰ ἦσαν αἱ χορδαὶ τὸ ἀρχαῖον; cf. 19.44.

7.16 Thus two broad groups of ἁρμονικοί may be detected in Aristoxenus' critique. Like Eratocles, the schools of Pythagoras of Zacynthus and Agenor of Mytilene, while aware of the subjects which needed discussion, addressed them inadequately. But the unnamed adherents of seven-stringed classical music never even attempted an investigation. It was not the concern of the earlier codified heptachordy, widely taught in the παιδεία, to incorporate new features which would catalyze a breakdown of rules and conventions which had been handed down from the Archaic period.

7.17 This conservative force, and the coexistence in the later fifth century of an old heptachordal discipline with its modification by avant-garde musicians, is well illustrated by Right Logic's resentful account of the contemporary music lesson in *Clouds*—a passage rife with musical puns.[35] Scandalously, young students are introducing fashionable modulations—καμπαί or "bends",[36] a term which derives its

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35 The general image of the melodic road (see below), raised by κάμψειέν τινα καμπὴν, οἵας οἱ νῦν, τὰς κατὰ Φρῦνιν ταύτας τὰς δυσκολοκάμπτους, is elaborated throughout. The phrase εἶτα [ἔδει] βαδίζειν ἐν ταῖσιν ὁδοῖς εὐτάκτως refers to the orderly, i.e. traditional, pursuit of melodic pathways—note that τάξις is the technical word for the pitch of a string (cf. 9.31). There may be a similar joke in the βαδιζούσῃ of Pherec. fr. 155.24 K-A (cited below). Even ἐπετρίβετο may have a double meaning, punning on τρίβος ("path"), which would ameliorate the repetitiousness of ἐπετρίβετο τυπτόμενος: if a boy turned aside from the melody, he trod his devious path with a beating from the teacher. τὼ μηρὼ μὴ ξυνέχοντας must have some relevance to the cardinal rule of συνέχεια (discussed below), though it is unclear to me how the joke works.

36 Cf. Ar. *Nub.* 333: ᾄσματοκάμπτας ("song-benders"); fr. 753 K-A: φωνάριον ᾠδικὸν καὶ καμπτικόν; Tim. fr. 26.3 (*PMG* 802) of Phrynis: ἰωνοκάμπταν; Pherec. fr. 155.15 K-A = ps.-Plut. *de Mus.* 1141d-1142a of Phrynis: κάμπτων με καὶ στρέφων ὅλην διέφθορεν ("he destroyed me [*sc.* Music] utterly with his bending and twisting"); cf. 1142a, a fragment attributed to Aristophanes (953 K-A) but possibly a continuation of the Pherecrates fragment (cf. Barker [1982-9], 1.237 n. 204): ἐξαρμονίους ὑπερβολαίους τε ἀνοσίους / καὶ νιγλάρους, ὥσπερ τε τὰς ῥαφάνους ὅλην / καμπῶν (v.l. κάμπτων) με κατεμέστωσε ("out-of-the-ἁρμονία, high-pitch, unwholesome / and whistling; and he [*sc.* Philoxenus or Timotheus] stuffed me full of bends like a cabbage"); Eup. fr. 366 K-A: ἡ μουσικὴ πρᾶγμ' ἐστὶ βαθὺ καὶ καμπύλον ("Music is a deep and devious business"); Poll. *Onom.* 4.66: Φρῦνιν . . . μέλεσι πολυκαμπέσι . . . κεχρῆσθαι λέγουσιν.

meaning from the ancient image of the melodic "road"[37]—into the older style on offer from the κιθαριστής:

> εἶτα βαδίζειν ἐν ταῖσιν ὁδοῖς εὐτάκτως εἰς κιθαριστοῦ . . .
> εἶτ' αὖ προμαθεῖν ᾄσμ' ἐδίδασκεν τὼ μηρὼ μὴ ξυνέχοντας . . .
> ἐντεινάμενους τὴν ἁρμονίαν ἣν οἱ πατέρες παρέδωκαν.
> εἰ δέ τις αὐτῶν βωμολοχεύσαιτ' ἢ κάμψειέν τινα καμπὴν
> οἵας οἱ νῦν, τὰς κατὰ Φρῦνιν ταύτας τὰς δυσκολοκάμπτους,
> ἐπετρίβετο τυπτόμενος πολλὰς ὡς τὰς Μούσας ἀφανίζων.[38]
>
> And then [*sc.* they had] to walk in good order in the streets to the citharist's . . .
> And then in turn he taught them to learn a song by heart, not holding their thighs together . . .
> Tuning the ἁρμονία which our fathers handed down.
> But if one of them played the fool or effected some modulation—
> Like musicians nowadays do, those difficultly-bent modulations à la Phrynis—
> He got a good long thrashing for doing away with the Muses.

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37 Cf. Hom. *Od.* 8.73f.; 8.481; 22.347; *h. Merc.* 451: οἶμος ἀοιδῆς; Pi. *O.* 1.110: ὁδὸν λόγων; Pi. *O.* 9.47: ἐπέων . . . οἶμον λιγύν; cf. Pi. *N.* 6.45, 54: ὁδὸν ἁμαξιτὸν εὗρον; Pi. *P.* 4.247f.; 9.45; Pi. *I.* 4.1: κέλευθος; cf. B. 5.31; Pi. *N.* 7.51; fr. 6.118 (S-M); Ion of Chios fr. 32 (West), cited below; Ar. *Av.* 1374, cited below; Aristox. *Harm.* 5 and 67 (see below); cf. 69 *et passim*; Call. *Jov.* 78: Φοίβου δὲ λύρης εὖ εἰδότας οἴμους; cf. *Del.* 9; A. R. 4.150; *Anacreont.* 34.14 (West); Adrastus ap. Theo Sm. 54.12-15; Nicom. *Ench.* 6 (245.21), 12 (261.20); Gaud. 6 (333.28) *et passim*; Anon. Bell. 3.78 (25.8). The increasingly complex rules for choosing one's route accounts for the curious descriptions of modern melodies as "devious ant-paths": Ar. *Thesm.* 99f. of Agathon: (Euripides speaking) Σίγα· μελῳδεῖν γὰρ παρασκευάζεται. / (Mnesilochus responds) μύρμηκος ἁτραπούς, ἢ τί διαμινυρίζεται; Pherec. fr. 155.22-5 K-A = ps.-Plut. *De. mus.* 1141d-1142a of Timotheus: ἅπαντας οὓς λέγω / παρελήλυθεν, ἄγων ἑκτραπέλους μυρμηκιάς. / κἂν ἐντύχῃ πού μοι βαδίζούσῃ μόνῃ, / ἀπέδυσε κἀνέλυσε χορδαῖς δώδεκα; cf. Psell. *De trag.* 5: ἀνάτρητος ("bored through and through") of the new music, with Winnington-Ingram's comments ap. Browning (1963), 77. The road image survives into modern Greek, where δρόμος designates "mode" (Beaton [1980], 9). It is also found in ancient Indian music theory, where *antaramarga* is "the path between the notes": see e.g. Widdess (1995), 264-7.

38 Ar. *Nub.* 964-972.

7.18 Note first that here in the music lesson, where we must assume a seven-stringed lyre, the term for the tuning is again ἁρμονία, as in the Aristoxenus passage. The conservative musical taste underlying this passage—perhaps not entirely shared by Aristophanes, who indulged in New Music himself (if ironically)—is found again in *Frogs*. When Dionysus brings Aeschylus back to earth as the greatest tragedian, it is the return of an old celebrity who learned his craft in the classical seven-stringed phase of music. As another Aristophanic character complained elsewhere, "they sang everything all alike—on seven strings" (ᾖδον ἑπτάχορδα πάνθ' ὁμοῖα).[39] Thus, in *Frogs*, Euripides charges Aeschylus with "always composing the same things" (ποιοῦντα ταὔτ' ἀεί),[40] while Psellus attributes to Euripides the introduction of πολυχορδία to tragedy.[41] The well-known vase-painting by Duris, showing the music lesson in its classical form with boys studying the lyre and epic poetry at the house of the κιθαριστής—and no fewer than four carefully rendered seven-stringed instruments—is from this same Aeschylean period.[42] One boy is shown with a tablet on which he has written down a hexameter invoking the Muse; it belongs to the traditional prelude style attributed to Terpander—the Aeolic form Μοῖσα is not accidental.[43]

7.19 This "ἁρμονία which our fathers handed down" does not suggest the usual picture of chaotic evolution used to explain the apparently aberrant evidence of Philolaus fr. 6a, the Libation Style of Olympus, and the ἁρμονίαι of Aristides Quintilianus (cf. 1.4, 1.12, 1.25). On the contrary, since ἁρμονία and ἑπτάχορδα in the Aristophanic passages clearly do not refer to one tuning only, it indicates a well-defined convention of tuning which had been stable for generations.[44] This is confirmed by another music lesson scene where Aristophanes recounts how the boorish Cleon made little progress in his music lessons because he would only learn the Dorian ἁρμονία;[45] the implication is that mastery of the Dorian led on to a more involved knowledge of tuning. Hence these passages, taken together, refer to a tradition of tuning which was

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39 Ar. fr. 467 K-A.

40 Ar. *Ran.* 1250.

41 Psell. *De trag.* 5: συστήμασι δὲ οἱ μὲν παλαιοὶ μικροῖς ἐχρῶντο, Εὐριπίδης πρῶτος πολυχορδίᾳ ἐχρήσατο.

42 Berlin F 2285. See West (1992), plate 11.

43 See West (1971), 308.

44 Cf. Hp. *Vict.* 1.18: ἁρμονίης συντάξιες ("the arrangements of ἁρμονία").

45 Ar. *Eq.* 985-96.

formal, ancient, had several stages of which the Dorian had had some primacy for generations before Aristophanes, *and was properly heptachordal.*

7.20 What role did diatony play in this period of the classical—i.e. Archaic—heptachord? Was the diatonic, as in the later fifth century, largely overshadowed by what would become known as the enharmonic and chromatic genera, or by some other tunings of which we have no notice, like those of Aristides (though these themselves are predominantly enharmonic in character)? Or was the Terpandrean heptachord proper to a classical form of diatonic music which endured throughout the Archaic period? A scholiast, commenting on the "ἁρμονία which our fathers handed down", asserts that "the ancient tuning was σύντονος" [46]—the very term used by Aristoxenus to describe the diatonic in its normal form.[47] In the music lesson, the diatonic was surely the first tuning method to be learned, since, as Aristoxenus says, it was oldest and first found by human nature. It was, besides, the easiest to learn, since the ear could readily trust the consonant intervals, and the diatonic was tuned by a very regular progression of these πρῶται συμφωνίαι.[48] The enharmonic, by contrast, cannot be established solely through ἡ λῆψις διὰ συμφωνίας.[49] Requiring years of practice, it belonged to the art of

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46 Schol. *ad* Ar. *Eq.* 968, glossing ἀντειναμένους τὴν ἁρμονίαν: ὡς συντόνου οὔσης τῆς παλαιᾶς ἁρμονίας.

47 Cf. Psell. *De trag.* 12 προσηύλουν αὐταῖς οἱ κράτιστοι αὐληταί, ὁ μὲν τὴν χρωματικὴν περίοδον, ὁ δὲ τὴν ἐναρμόνιον, ὁ δὲ τὴν σύντονον: Winnington-Ingram, ap. Browning (1963), 71, wished to supplement this as σύντονον ‹διάτονον›, but the text should stand because σύντονον would have been more likely to drop out than διάτονον.

48 Cf. Aristox. *Harm.* 55: πολὺ μᾶλλον τοῖς τῶν συμφώνων μεγέθεσι πιστεύει ἡ αἴσθησις ἢ τοῖς τῶν διαφώνων· ἀκριβεστάτη δ' ἂν εἴη διαφώνου διαστήματος λῆψις ἡ διὰ συμφωνίας ("our perception is much more trusting of the consonant interval sizes than the non-consonant, and the tuning of a nonconsonant interval would be most precise when it is arrived at through consonance"). Cf. Vitr. *de Arch.* 5.4.3, cited above; Adrastus (ap. Theo Sm. 53.3ff), cited above.

49 Ps.-Plut. *de Mus.* 1145b-c, esp. τὸ μὴ δύνασθαι ληφθῆναι διὰ συμφωνίας τὸ μέγεθος, καθάπερ τό τε ἡμιτόνιου καὶ τὸν τόνον καὶ τὰ λοιπὰ δὲ τῶν τοιούτων διαστημάτων ("the magnitude [*sc.* of a quarter-tone] cannot be taken through consonance, like the semitone and tone and the other such intervals").

the professional citharode.[50] It is unlikely, then, that the citizen-choruses of tragedy would have been called upon to make quarter-tone discriminations. As Aristides Quintilianus wrote:

> φυσικώτερον μέν ἐστι τὸ διάτονον (πᾶσι γὰρ καὶ τοῖς ἀπαιδεύτοις παντάπασι μελῳδητόν ἐστι) . . . ἀκριβέστερον δὲ τὸ ἁρμόνιον· παρὰ γὰρ τοῖς ἐπιφανεστάτοις ἐν μουσικῇ τετύχηκε παραδοχῆς, τοῖς δὲ πολλοῖς ἐστιν ἀδύνατον.[51]
>
> The diatonic is more natural, for it can be sung by everyone, even those who are altogether uneducated . . . But the enharmonic is more exacting; for it has won acceptance from the most illustrious men in music, and is impossible for most people.

7.21 It is true that the enharmonic was considered proper to tragedy in the Classical period.[52] Its original defining feature, however, was not the difficult quarter-tone πυκνόν, but the consonance-derived ditone, which the choruses would in fact have been able to sing. As Aristoxenus believed, this basic form of the enharmonic had been drawn by Olympus centuries earlier—in the Orientalizing period in fact—*from the diatonic*.[53] There is no problem, then, in allowing the enharmonic its attested place in tragedy, while at the same time conceding that the further refinement of the quarter-tone discriminations was less essential to its popular character than the underlying—and readily singable—diatonic substrate. In fact, this three-pitched

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50 Aristox. *Harm.* 19: τρίτον δὲ καὶ ἀνώτατον τὸ ἁρμόνιον, τελευταίῳ γὰρ αὐτῷ καὶ μόλις μετὰ πολλοῦ πόνου συνεθίζεται ἡ αἴσθησις ("Third and last comes the enharmonic, for the perception becomes accustomed to it last and with difficulty after much labor"); cf. Adrastus ap. Theo Sm. 56.1ff.: ἔστι δὲ δυσμελῳδητότατον καὶ, ὡς ἐκεῖνός φησι, φιλότεχνον καὶ πολλῆς δεόμενον συνηθείας, ὅθεν οὐδ' εἰς χρῆσιν ῥᾳδίως ἔρχεται ("it is very difficult to sing and, as he [*sc.* Aristoxenus] says, artistic and requiring much habituation, whence it does not come easily into use"). Consider Plato's portrait of musicologists straining to distinguish between such closely-packed intervals (*Resp.* 7.531a-c); as Barker (1978), 8, points out, πυκνώματ' ἄττα ὀνομάζοντες provides a verbal link to the κατατύκνωσις mentioned by Aristoxenus (*Harm.* 7, 28, 38, 53), which relied on quarter-tone discriminations and seems to have acted as musical graph paper for measuring very fine intonational shades.

51 Aristid. Quint. 1.9 (16.11-15); cf. Vitr. *de Arch.* 5.4.3.

52 *PHib.* 13.20f., cited below; cf. West (1992), 164.

53 Aristox. fr. 83 = ps.-Plut. *de Mus.* 1134f-1135b: ἀναστρεφόμενον τὸν Ὄλυμπον ἐν τῷ διατόνῳ κ.τ.λ. ("Olympus was roaming about in the diatonic," etc.).

version of the enharmonic is attested in the *Paean* of Athenaeus, one of the Delphic hymn inscriptions of the Hellenistic period,[54] which shows the enduring and popular appeal of this style over the centuries since its invention. Thrasyllus too treats this as the essential form of the enharmonic.[55]

7.22 It is no accident, then, that Aristoxenus lists the diatonic before the enharmonic and chromatic genera. It formed the core of an earlier system, before the modulating and chromatic New Music, before the challenging enharmonic in its heyday. This must be what lies behind his distinction of two ancient phases in Greek musical history:

> ὅτι δ' ἔστι τις μελοποιΐα διτόνου λιχανοῦ δεομένη καὶ οὐχ ἡ φαυλοτάτη γε ἀλλὰ σχεδὸν ἡ καλλίστη, τοῖς μὲν πολλοῖς τῶν νῦν ἁπτομένων μουσικῆς οὐ πάνυ εὐδηλόν ἐστι, γένοιτο μεντἂν ἐπαχθεῖσιν αὐτοῖς· τοῖς δὲ συνειθισμένοις τῶν ἀρχαικῶν τρόπων τοῖς τε πρώτοις καὶ τοῖς δευτέροις ἱκανῶς δῆλόν ἐστι τὸ λεγόμενον . . . μάλιστα μὲν γὰρ καὶ πλεῖστον χρόνον ἐν τῷ χρώματι διατρίβουσιν, ὅταν δ' ἀφίκωνταί ποτε εἰς τὴν ἁρμονίαν, ἐγγὺς τοῦ χρώματος προσάγουσι συνεπισπωμένου τοῦ μέλους.[56]
>
> But, that there is a certain style of melic composition [μελοποιΐα] which needs a ditonic λιχανός, and that it is not the worst μελοποιΐα but quite the best, is entirely unclear to the many who undertake music these days, but would be if they applied themselves. But what I am saying is clear to those who are accustomed to the first and second ancient styles . . . For they [*sc.* musicians today] spend most of their time in the chromatic, and if at some point they end up in the enharmonic, they lead it near to the chromatic, the melody being drawn along.

7.23 Of the two archaic styles, one is associated with the enharmonic genus, thought to be the most lofty and beautiful by those who were familiar with both and with contemporary practice. What distinguished the other ancient style? Certainly not chromaticism *merely*,[57] since this was practiced by those who were unfamiliar with and intolerant of the older styles—effeminate louts who would vomit bile when they

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54 For this hymn, see now Hagel (2000), 38-89; cf. West (1992), 288ff.

55 Thrasyllus ap. Theo Sm. 92.27-93.2.

56 Aristox. *Harm.* 23.

57 That is, chromaticism as currently practiced. For evidence of early chromaticism, see below.

heard enharmonic music, as Aristoxenus memorably put it.[58] Although he does equate one of the earlier styles with the enharmonic, it might seem facile for us to associate a different genus to each phase of music. It is logical to assume, however, that the diatonic played some role since it is not otherwise assigned by Aristoxenus. In fact, it is said that the chromatic was first introduced into tragedy by progressive musicians of the later fifth century like Euripides and Agathon, earlier composers using either the enharmonic on its own—*or combining it with the diatonic*.[59]

7.24 It appears then that the diatonic occurred in one or both of the two earlier styles, and this is hardly surprising given Aristoxenus' assertion of the diatonic's historical priority. It is only to be expected that a more difficult and refined style like the quarter-tone enharmonic should be a secondary development. Quite possibly the first style also saw the enharmonic in its more archaic form without the quarter-tone divisions, as established centuries earlier.[60] Yet this, too, leads us back to the diatonic, which Aristoxenus believed to be older still, and the point of departure for the enharmonic. So either the first ancient style was largely diatonic; or, if it was mixed with the enharmonic—for Aristoxenus recognizes music of mixed genera[61]—we may suppose an anterior phase of diatonic music, according to the Aristoxenean view of musical development.

7.25 How then were diatonic tunings approached, practically and theoretically, in this earlier period? Were "the heptachords which they used to call the ἁρμονίαι" in fact the species of an integrated diatonic cycle as in Mesopotamia? It is certainly tempting to infer this from the cyclical interval procession known to Eratocles. Indeed, with a

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58 Aristox. fr. 85 = Plut. *Quaest. conviv.* 711c: οἱ δ' ἄνανδροι καὶ διατεθρυμμένοι τὰ ὦτα δι' ἀμουσίαν καὶ ἀπειροκαλίαν, οὓς φησιν Ἀριστόξενος χολὴν ἐμεῖν ὅταν ἐναρμονίου ἀκούσωσιν.

59 Plut. *Quaest. conviv.* 645e: Ἀγάθωνος, ὃν πρῶτον εἰς τραγῳδίαν φασὶν ἐμβαλεῖν καὶ ὑπομῖξαι τὸ χρωματικόν; Psell. *De trag.* 5: ἡ δὲ παλαιὰ τραγικὴ μελοποιία γένει μὲν τῷ ἐναρμονίῳ ἐχρήσατο ἀμιγεῖ καὶ μικτῷ γένει τῆς ἁρμονίας καὶ διατόνων, χρώματι δὲ οὐδεὶς φαίνεται κεχρημένος τῶν τραγικῶν ἄχρις Εὐριπίδου; cf. West (1992), 351.

60 As Professor West suggests (correspondence); cf. West (1992), 351f.

61 Aristox. *Harm.* 7: μιγνυμένων πάλιν τῶν γενῶν; 44: πᾶν μέλος ἔσται ἤτοι διάτονον, ἢ χρωματικὸν ἢ ἐναρμόνιον ἢ μικτὸν ἐκ τούτων ἢ κοινὸν τούτων ("every μέλος will either be diatonic or chromatic or enharmonic or mixed from these or the common-ground of these").

modification of Marquard's theory of numerical haplography, one could suppose that περὶ αὐτῶν μόνον τῶν ἑπταχόρδων once read περὶ αὐτῶν μόνον τῶν ‹ἑπτὰ› ἑπταχόρδων. Yet, although this is as plausible as Marquard's conjecture, it is hardly necessary, since the complete περιφορά of a heptachord *must* yield seven permutations, no more and no less.[62] This makes it especially important that a sevenfold division of the 'citharodic νόμος' was attributed to Terpander himself (see further 10.38). Ptolemy's insistence on seven τόνοι (cf. 10.37) thus shows him a more faithful heir to the ancient heptachordal music than modernists like Phrynis and Timotheus, or their successors who used the pitch-keys of Aristoxenus.

7.26 In fact, it can be shown that, for all their microtonal variation, the Greek genera were required to conform to a basically diatonic structure. This emerges most clearly from two points in combination. First are the names of the principle consonances—the resonant fourth and fifth—called respectively ἡ [συμφωνία] διὰ τεττάρων, "the [consonance] through four [*sc.* strings]", and ἡ [συμφωνία] διὰ πέντε, "the [consonance] through five [*sc.* strings]". Clearly these intervals—which derive from the heptachordal period (cf. 8.45-47)—were so named because they typically occurred across four or five strings respectively. Second is Aristoxenus' cardinal rule of συνέχεια—generally translated as "continuity"—which dictated the minimum conditions for the proper construction of all the genera. This entailed the 'consonant responsion', to its counterpart a perfect fourth or fifth away, of every note, *regardless of its microtonal shading*. Only when this condition was met could a scale or tuning (μέλος) be considered "joined/tuned" (ἡρμοσμένον). The precept is clearly presented in two passages of the *Elementa Harmonica*:

> ὑποκείσθω δὲ καὶ τῶν ἑξῆς κειμένων φθόγγων κατὰ μέλος ἐν ἑκάστῳ γένει

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62 Cf. the *v.l.* at Arist. *Metaph.* 1093a14 (ἑπτὰ δὲ χορδαὶ ἢ ἁρμονίαι rather than ἑπτὰ δὲ χορδαὶ ἡ ἁρμονία), with the comment of Alex. Aphr. *In Metaph.* 1093a13: ἑπτὰ δὲ φθόγγοι τῆς διὰ πασῶν καὶ ἁρμονίαι τοσαῦται ("Seven are the pitches of the octave, and the *harmoniai* are the same in number"), which shows that, if the variant is not in fact the correct reading, the mistake was made already in antiquity, and was besides readily intelligible in its own right. Similarly, in one manuscript of Porph. *in Harm.* 5 (96.16), the title of Thrasyllus' work is given as Περὶ ἑπταχόρδων, as against Περὶ ἑπταχόρδου at 91.14—which itself rests upon an emendation: see further Düring's apparatus *ad* 91.13.

ἤτοι τοὺς τετάρτους διὰ τεττάρων συμφωνεῖν ἢ τοῦς πέμπτους διὰ πάντε ἢ ἀμφοτέρως.[63]

And let it also be laid down that, for notes which are "continuous" along the μέλος in each genus, either every fourth note is consonant at a fourth, or every fifth note is consonant at a fifth, or both.

οὐ δεῖ δ' ἀγνοεῖν, ὅτι οὐκ ἔστιν αὐτάρκες τὸ εἰρημένον πρὸς τὸ ἐμμελῶς συγκεῖσθαι τὰ συστήματα ἐκ τῶν διαστημάτων· οὐδὲν γὰρ κωλύει συμφωνούντων τῶν φθόγγων κατὰ τοὺς εἰρημένους ἀριθμοὺς ἐκμελῶς τὰ συστήματα συνιστάναι, ἀλλὰ τούτου μὴ ὑπαρχόντος οὐδὲν ἔτι γίγνεται τῶν λοιπῶν ὄφελος. θετέον οὖν τοῦτο πρῶτον εἰς ἀρχῆς τάξιν οὗ μὴ ὑπαρχόντος ἀναιρεῖται τὸ ἡρμοσμένον.[64]

It is essential to realise that the aforementioned [principle] does not guarantee that systems will be properly assembled from intervals. For nothing stops a tuning from being put together improperly even when the notes are consonant according to the aforementioned numbers [i.e. every note being consonant by a fourth or fifth (or both) with every fourth or fifth note from itself]; but if this condition is not fulfilled, there is no use bothering about the rest: and so this must be made the first principle (θετέον οὖν τοῦτο πρῶτον εἰς ἀρχῆς τάξιν), without the fulfillment of which, attunement (τὸ ἡρμοσμένον) is destroyed.

7.27 With these conditions met, the names of the consonances are fairly accurate. Either every four strings will comprise a consonant fourth, or every five a fifth, but not necessarily both. This either/or approach to is able to account for the various enharmonic and chromatic scales, which, while the "movable" strings of each tetrachord can be any number of pitches, depending upon genus and shade, still fulfill συνέχεια by virtue of the fact that the tetrachord as a whole responds to another tetrachord either by conjunction *or* disjunction, but not necessarily both.

7.28 Only with the diatonic genus do the interval names make consistent sense. With one exception (see below), every fourth and every fifth is consonant and the tetrachords both conjunct and disjunct simultaneously. This results immutably from the consistent alternation of fifths and fourths. The harmonious semantic agreement of

63 Aristox. *Harm.* 29.

64 Aristox. *Harm.* 54.

the Greek interval names and the diatonic method shows that this genus was the standard by which the others were judged. These genera, which did not match all the structural characteristics of the diatonic, were nevertheless *required* to match some of them. That συνέχεια was an essentially diatonic precept finds confirmation in Ptolemy's qualification of the structure as διατονικοῦ συνεχοῦς, "continuous diatonic"; this is shortly followed by an example of modulation between a structure consonant at the fifth to one which is consonant at the fourth—a sort of bifurcation of the "continuous diatonic" into its two less continuous offspring.[65] More obliquely, Plutarch describes the Sirens of Plato's diatonic scale as "holding together (συνέχουσι) and safeguarding the harmony".[66]

7.29 Finally, to the usual division of intervals into σύμφωνος and διάφωνος, Thrasyllus introduces a distinction which is nowhere else attested. Intervals like the διέσεις, those microtonal divisions of the chromatic and enharmonic genera which cannot be established through ἡ λῆψις διὰ συμφωνίας, could still be considered "consonant in accord with συνέχεια" (σύμφωνα δὲ κατὰ συνέχειαν).[67] In other words, the rule which governed the properly heptatonic μέλος ἡρμοσμένου was concerned that all φθόγγοι should occur within a minimum consonant framework—with the framework of the diatonic the most completely consonant. On the other hand, Thrasyllus' pairing of δίεσις with τόνος encourages us to read the former as "semitonal interval", the Pythagorean usage of Philolaus fr. 6a (cf. 8.5, 8.36). This is perhaps the easiest way to interpret his description of these intervals as "the first principle of consonance, but not actually consonance" (ἀρχὴ μὲν συμφωνίας, οὔπω δὲ συμφωνία). If this is right,

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65 Ptol. *Harm.* 2.6 (55.12-15): οἷον ὅταν ἀπὸ διατονικοῦ συνεχοῦς ἀποκλίνῃ που τὸ γένος ἐπὶ χρωματικόν, ἢ ὅταν ἀπὸ μέλους ἐπὶ τοὺς διὰ πάντε συμφώνους εἰωθότος ποιεῖσθαι τὰς μεταβάσεις ἐπὶ τοὺς διὰ τεσσάρων γάνηταί τις ἐκτροπή ("As for instance when [*sc.* the μέλος] turns aside the genus a bit from continuous diatonic to the chromatic, or when there is some diversion from a μέλος accustomed to make the steps of its course upon [*sc.* notes] which are consonant at a fifth to those [*sc.* which are consonant] at a fourth").

66 Plut. *Quaest. Conv*. 746a: αἱ μὲν οὖν ὀκτὼ περιόδοις ἑφεστῶσαι τὴν τῶν πλανωμένων ἄστρων πρὸς τὰ ἀπλανῆ καὶ πρὸς ἄλληλα συνέχουσι καὶ διασῴζουσιν ἁρμονίαν ("the eight [*sc.* sirens], standing over the rotations 'hold together' and preserve the ἁρμονία of the movable towards the immovable stars ones and towards each other").

67 Thrasyllus ap. Theo Sm. 48.16-49.5, esp. 48.20f.: σύμφωνα δὲ κατὰ συνέχειαν οἷον τόνος, δίεσις ("consonant by συνέχεια, like the tone and quarter tone").

then Thrasyllus has only the diatonic in mind here, not the other genera, and this too would reveal its close connection to συνέχεια.

7.30 For his part, as we have seen, Aristoxenus made συνέχεια the "first principle" (ἀρχή) of ἁρμονική.[68] Thus τὸ ἡρμοσμένου, which is generally translated merely as "attunement", may be more exactly defined as "attunement according to συνέχεια", while συνέχεια is better translated as "cohesion"—i.e. "diatonic cohesion". Since this principle of attunement is said to be "of an elemental character" (στοιχειωδεστάτην),[69] it is allied with the title of Aristoxenus' work itself—ΑΡΜΟΝΙΚΑ ΣΤΟΙΧΕΙΑ. That Aristoxenus understood ἁρμονική as a whole to be an art stemming from and based upon τὸ ἡρμοσμένου, as he conceived it, is in fact

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68 Cf. Aristox. *Harm.* 19: πολλὰς ἔχοντος διαφορὰς τοῦ ἡρμοσμένου κατὰ τὴν τῶν διαστημάτων σύνθεσιν, ἔστι τι τοιοῦτον ὃ κατὰ παντὸς ἡρμοσμένου ῥηθήσεται ἕν τε καὶ ταὐτόν, τοιαύτην ἔχον δύναμιν οἵαν αὐτὴν ἀναιρουμένην ἀναιρεῖν τὸ ἡρμοσμένου ("although attunement [τὸ ἡρμοσμένου] has many differences with respect to the composition of intervals, for attunement as a whole there is a certain something which will be stated, a single unitary principle having such a force that if it is removed, attunement is also removed"); ps.-Plut. de Mus. 1144b: πρῶτον οὖν περὶ συνεχείας γνωστέον· ἀναγκαῖον γάρ ἐστιν ὑπάρχειν τῇ κριτικῇ δυνάμει συνέχειαν ("So first one must know about συνέχεια; for it is necessary for our critical faculty that συνέχεια be present").

69 Cf. Alyp. 1 (367.1-4): τῆς μουσικῆς ἐκ τριῶν . . . ἁρμονικῆς ῥυθμικῆς μετρικῆς, πρώτην τε τάξει καὶ στοιχειωδεστάτην νοητέον τὴν περὶ τὸ ἡρμοσμένου πραγματείαν ("Music [*sc.* being comprised] of three subjects, harmonics, rhythmics and metrics, one must consider the activity which concerns τὸ ἡρμοσμένου to be first in order, and of an elemental nature"); Anon. Bell. 3.29 (9.10f.): πρώτην τε τῇ τάξει καὶ στοιχειωδεστάτην νοητέον τὴν περὶ τὸ ἡρμοσμένου πραγματείαν. αὕτη δὲ ἁρμονικὴ καλεῖται ("One must consider the practice which concerns τὸ ἡρμοσμένου to be first in position and of an elemental character. And this practice is called ἁρμονική"). Compare to these the close linguistic parallels at Aristox. *Harm.* 1: τὴν ἁρμονικὴν καλουμένην . . . πραγματείαν, τῇ τε τάξει πρώτην οὖσαν ἔχουσάν τε δύναμιν στοιχειώδη ("The practice called ἁρμονική, being both first in order and having an elemental significance").

stated explicitly by later sources which depend upon the Aristoxenean tradition.[70] For all the complexity that could be created through the mixing of genera and modulation between τόνοι, nevertheless heptatonic structures, with their prescribed use of consonance, provided the raw material—the harmonic elements—from which the modern tunings of the late fifth and fourth centuries were built, and into which they should, according to Aristoxenus, be dissolvable.

7.31 When combined with the Aristoxenan chronology, συνέχεια opens the possibility that the enharmonic and chromatic were not merely analyzed against a diatonic norm, but represent its historical *modification*. Easy and reliable to tune, the 'clear' consonant intervals of the diatonic could serve as a point of departure for the quarter-tone dissections and whole-tone omissions of the enharmonic, and for the 'coloring' of the chromatic—much like the 'blue' notes of the African-American syncretism, or the octatonic structures of diatonicized Slavonic folk music.

7.32 In fact, a persistent tradition treats both the enharmonic and chromatic as derived from the diatonic, in contrast to the Aristoxenean classification into three independent genera. This orientation surfaces in one of the anonymous musical treatises unearthed by Bellerman, which contain, besides a bulk of conventional material, a few real treasures to survive the onslaught of Aristoxenus' followers:

> χρῶμα δὲ ἤτοι παρὰ τὸ τετράφθαι πως ἐκ τοῦ διατονικοῦ ἢ παρὰ τὸ χρώζειν μὲν αὐτὸ τὰ ἄλλα συστήματα.[71]
>
> And the chromatic [*sc.* is so-called] either through having been converted somehow from the diatonic, or from its coloring of other systems.

7.33 In this and other details, the anonymous treatise closely echoes the curious passage which has been interpolated into Aristides Quintilianus' *De musica*, and which defines both chromatic and enharmonic in terms of the diatonic:

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70 Schol. *ad* Ptol. *Harm.* 1.1 (3.1): ἁρμονική ἐστιν ἐπιστήμη θεωρητικὴ τῆς τοῦ ἡρμοσμένου φύσεως ἢ ἕξις θεωρητικὴ τοῦ διαστηματικοῦ μέλους καὶ τῶν τούτῳ συμβαινόντων ("ἁρμονική is the science which regards the nature of τὸ ἡρμοσμένου, or the domain which regards the intervallic μέλος and those things which go along with it."); the first part of this is repeated verbatim at *Exc. Neap.* 7 (413.4f.); cf. Alyp. 1 (1-4), cited above; Anon. Bell. 3.29 (9.10f.), cited above.

71 Anon. Bell. 2.26 (7.17f.).

τὸ χρωματικὸν γένος διατονικοῦ ἐστιν ηὐξημένου καὶ πεπυκνωμένου ἡμιτονίοις· τὸ δ' ἁρμόνιον διατονικοῦ ἐστι τόνῳ μὲν διπλασιασθέν, τῷ δ' ἡμιτονίῳ δίχα διῃρημένου . . . χρωματικὸν δὲ καλεῖται παρὰ τὸ χρώζειν αὐτὸ τὰ λοιπὰ διαστήματα, μὴ δεῖσθαι δέ τινος ἐκείνων.[72]

The chromatic genus is the diatonic augmented and packed and condensed with semitones; and the enharmonic is the diatonic doubled at the tone, and divided in two at the semitone . . . And the chromatic is so-called from its coloring of the other intervals, when it does not actually need some one of them.

Note how both passages contain a double explanation of the chromatic, one described as a structural shift from the diatonic, the other as a milder sort of variation—as though two distinct musical practices were described by the same or similar terminology, or in crisis as to whether the chromatic deserves to be given separate classification. One thinks of Lysander of Sicyon's use, in the late Archaic or early Classical period, of χρώματα εὔχροα ("colourful shadings"), a mysterious phrase which might also suggest some dichotomy within the chromatic.[73]

7.34 The passage from Aristides Quintilianus also introduces ethical descriptions of each of the genera, the diatonic being "masculine and quite severe" (ἀρρενωπὸν δ' ἐστὶ καὶ αὐστηρότερον), the chromatic "sweetest and plaintive" (ἡδιστόν τε καὶ γοερόν), the enharmonic "rousing" (διεγερτικὸν). The same conjunction of ideas is found again in Theon of Smyrna, where the source seems to be Adrastus. Here the diatonic is defined as "somewhat majestic, powerful . . . a bit simple, and noble" (σεμνόν τι καὶ ἐρρωμένον . . . ἁπλοῦν τι καὶ γενναῖον),[74] while the chromatic is then presented in relation to it:

καλεῖται δὲ πάλιν τὸ γένος τῆς τοιαύτης μελῳδίας χρωματικὸν διὰ τὸ παρατετράφθαι καὶ ἐξηλλάχθαι τοῦ πρόσθεν γοερώτερόν τε καὶ παθητικώτερον ἦθος ἐμφαίνειν.[75]

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72 [Aristid. Quint.] 2.19 (92.19-25); for the interpolation of this passage, see 2.21.

73 Philoch. *FGrH* 328F23 = Ath. 14.637f-638a. For the dates of Lysander, see West (1992), 69; Barker (1982-9), 1.300 n. 205. On Lysander's contributions to music, see Barker (1982a).

74 Adrastus ap. Theo Sm. 54.14, 56.4.

75 Adrastus ap. Theo Sm. 55.4-7.

> The genus of this sort of melody is in its turn called chromatic through having been altered [παρατετράφθαι] and transformed and from showing a more plangent and plaintive character than the previous genus [*sc.* the diatonic].

7.35 Note the verbal reminiscence here between παρατετράφθαι and παρὰ τὸ τετράφθαι in the Bellerman's Anonymous quotation. With both of these compare παρέτρεψεν in Nicomachus' roughly-contemporary explanation that the chromatic "diverges a little, only one semitone, from the diatonic" (μικρὸν γὰρ παρέτρεψεν, ἓν μόνον ἡμιτόνιον, ἀπὸ τοῦ διατονικοῦ).[76] This, or something similar in his lost work, is clearly the model for Boethius, who, after describing the diatonic as "harder and more natural" (*durius et naturalius*), derives the chromatic from it as "breaking from that natural tuning, as it were, and slipping into the more slack" (*quasi ab illa naturali intentione discedens et in mollius decidens*).[77] Elsewhere, he too gives a dual explanation of the chromatic.[78]

7.36 The same conception of the genera—their derivation from the diatonic combined with ethical properties appropriate to each—can be deduced from the *Hibeh Papyrus*:

> λέγουσι δὲ ὡς τῶν μελῶν τ[ὰ] μὲν ἐγκρατεῖς, τὰ δὲ φρονίμους, τὰ δὲ δικαίους, τὰ δὲ ἀνδρείους, τὰ δὲ δειλοὺς ποιεῖ, κακῶς εἰδότες ὅτι οὔτε χρῶμα δειλοὺς οὔτε ἁρμονία ἂν ἀνδρείους ποιήσειαν τοὺς αὐτῇ χρωμένους. τίς γὰρ οὐκ οἶδεν [Αιτ]ωλοὺς καὶ Δόλοπας καὶ πάντας τοὺς θώ[ντας Θερμοπύλ]ησι διατόνῳ μὲν τῇ μουσικῇ χρω[μένους, πολὺ] δὲ τῶν τραγῳδῶν ὄντας ἀνδρειο[τέρους τῶν διὰ παλ]ιτὸς εἰωθότων ἐφ' ἁρμονίας ᾄδειν; [ὥστε δῆλον ὅτι οὔτε] χρῶμα δειλοὺς οὔτε ἁρμονία ἂν [ἀνδρείους ποιήσειαν.][79]

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76 Nicom. *Ench.* 12 (263.9f.).

77 Boeth. *De inst. mus*. 1.21 (212.26-213.1).

78 Boeth. *De inst. mus*. 1.21 (213.8-10): *chroma autem, quod dicitur color, quasi iam ab huiusmodi intentione prima mutatio, cantatur per semitonium, semitonium et tria semitonia* ("But the chromatic, which is to say 'colour', now a sort of alteration from the first method of tuning [i.e. the diatonic], is sung by semitone, semitone, and three semitones"). He continues (213.12-14): *tractum est autem hoc vocabulum, ut diceretur chroma, a superficiebus, quae cum permutantur, in alium transeunt colorem* ("but this term is drawn from surfaces which, when they are altered, go over to another color, so that it is called *chroma*").

79 *PHib*. 13.13-22: text West (1992a), 16f.; for κακῶς εἰδότες, see the parallels cited by West *ad loc.*

> And they say how some μέλη make for self-controlled people, some thoughtful, some just, some courageous, and others craven, little knowing that the chromatic does not make those who use it craven, nor the enharmonic courageous. For who does not know that the Aetolians and Dolopes and all who sacrifice at Thermopylae make use of music which is diatonic—and they are much more courageous than the tragedians, who are accustomed to sing in the enharmonic every time? So it is clear that neither the chromatic would make people craven, nor the enharmonic brave.

This curious passage has aroused considerable surprise for its seemingly interchangeable treatment of the diatonic and chromatic as against the enharmonic.[80] A coherent reading is possible without this. That is, by showing that courageous peoples have resulted from diatonic rather than the enharmonic music espoused by the ἁρμονικοί who are under attack, their position as a whole is undermined, the alleged ethical properties of both enharmonic and chromatic collapsing together.[81] But given the context, χρω[μάνους at ii.19—the restoration is certainly correct given χρωμάνους at i.17—is punning on χρῶμα. The sense would then be: "Who does not know that the Aetolians and Dolopes use/colour the diatonic (χρωμάνους)? And *they* are courageous. So, clearly, the chromatic does not make one cowardly". The speaker himself may have adduced this argument ironically, merely to make his point. But if the interpretation is correct—or simply if one accepts the *communis opinio* that the diatonic and chromatic are treated interchangeably—we may infer a contemporary conception quite close to that which underlies the other passages: the association of diatonic music with the manly, and the chromatic as a modification of the diatonic.

7.37 These passages share enough common detail, conceptual and verbal, that they must derive from a single theoretical position; this comprised at least the two subjects which the sources show to be inseparable: a definition of the genera as derived from the diatonic—including a double explanation of the chromatic—and an ethical property associated with each. At the same time these exemplars are rather diffuse, not being explicitly ascribed to any single theorist, and not showing the same well-drawn lines that we see in the repetition of Aristoxenean ideas. This suggests that they are fragmentary survivals of an early musical taxonomy which was partially obliterated by the success of Aristoxenus' revisions. The ethical material, at any rate, derives from a fifth century trend, of which Damon is the notable representative; by association, this

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80 See the comments of Anderson (1966), 151; Barker (1982-9) 1.184 n.8; West (1981), 117; (1992), 247 n.84; (1992b), 20 *ad* 21-22.

81 For an alternate interpretation, see West (1992a), 20 *ad loc.*

approach to generic analysis may be equally old. If one accepts an early fourth century date for the text of the *Hibeh Papyrus*, a solid historical foundation emerges for this strand of pre-Aristoxenean θεωρία.[82]

7.38 At the same time, the explanation of the genera as diatonic modifications is consonant with Aristoxenean συνέχεια, with its imposition of minimum diatonic standards upon all heptatonic scales. The two positions are not opposed, then, but approach the same musical facts from different directions. The structural priority of the diatonic is also loosely recalled elsewhere by Nicomachus, who attributes to Pythagoras the analysis of the enharmonic and chromatic in light of what was known about the diatonic[83]—the type of activity which, with better historical justification, may be attributed to Eratocles with his enharmonic octachord analysis on the basis of a diatonic cycle. Likewise, when Euclid presents only the basic procedure for establishing the diatonic tuning in the *Sectio Canonis*, one can assume that this provided only a rough preliminary framework for the other genera. And again, Ptolemy tells us precisely that "this is how the citharodes tune" (οὕτω γὰρ ἁρμόζονται οἱ κιθαρῳδοί).[84]

7.39 Thus, within Aristoxenus' definition of ἁρμονική, the diatonic, being structurally fundamental, is justly described as the oldest of the genera, despite the fact that we must suppose the existence of non-diatonic lyre tunings as characteristic of the Homeric period—tunings which may themselves have dictated later syncretic forms. This may shed light on a curious statement in ps.-Plutarch, which seems to derive from Aristoxenus:

> κιθάρα δὲ πολλαῖς γενεαῖς πρεσβυτέρα τραγῳδίας οὖσα ἐξ ἀρχῆς ἐχρήσατο [*sc.* τῷ χρωματικῷ γένει]. τὸ δὲ χρῶμα ὅτι πρεσβύτερόν ἐστι τῆς ἁρμονίας, σαφές.[85]

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82 For Damon and the dating of the text, see 2.37.

83 Nicom. *Ench.* 7 (249.4ff.): τὸ γὰρ χρωματικὸν καὶ ἐναρμόνιον γένος αὖθίς ποτε ἐκ τούτου διετράνωσεν ("for from this [*sc.* the diatonic] he [*sc.* Pythagoras] clarified the chromatic and enharmonic at some later time").

84 Ptol. *Harm.* 2.1 (44.1ff.); cf. 1.16 (39.17f.): δύο γὰρ ποιοῦσι τοὺς ἡγουμένους τόνους καὶ τὸ λοιπόν, ὡς μὲν αὐτοὶ νομίζουσιν, ἡμιτόνιον ("for they make the leading intervals two tones and the remainder, as *they* consider it, a semitone").

85 Ps.-Plut. *de Mus.* 1137e.

> And the *cithara*, being many generations older than tragedy, used the chromatic genus from the beginning. And that the chromatic is older than the enharmonic is evident.

This agrees with Aristoxenus' statement elsewhere that, prior to Olympus' invention of the enharmonic in the early Archaic period, all music had been either diatonic or chromatic.[86] It seems to conflict, however, with the Aristoxenean chronology cited above, which made the diatonic older than the chromatic. But this might merely mean that, while the diatonic was original from a structural point of view, and 'natural' in its exclusive use of the primary resonant intervals, heptatonic shadings were part of the τέχνη from the start—whether from the influence of native Greek practice, or because this was part and parcel of Asiatic music, or both.

7.40 To return to the πρῶται συμφωνίαι, there is another point which is sympathetic to the Mesopotamian tradition. It was stated above that ἡ [συμφωνία] διὰ πέντε and ἡ [συμφωνία] διὰ τεττάρων make consistent sense only in the diatonic genus. To be precise, however, the names *almost* make sense. For, as in the Mesopotamian system, one fourth or fifth in a diatonic tuning must always be the non-consonant, 'unclear' tritone. It is for this one interval that, besides the need for legitimizing the conjunction and disjunction of the microtonal tetrachords found in the enharmonic and chromatic genera, Aristoxenus must allow that "consonant responsion" be by fifth and/*or* fourth. Of course, this one exception would not prevent the creation of the terms ἡ [συμφωνία] διὰ πέντε and ἡ [συμφωνία] διὰ τεττάρων, since the one non-consonant fourth or fifth is greatly outnumbered by the remaining consonant intervals. Nevertheless, it was necessary to recognize that an interval of four or five strings might not actually be a 'fourth' or 'fifth' in the usual sense, and for this Aristoxenus used the expression τὸ [*sc.* διάστημα] διὰ πέντε.[87]

7.41 Thus the very names assume that intervals of five and four strings will be consonant. The one non-consonant fifth which must arise is excluded from this classificatory norm and put into a sort of onomastic isolation. This is in fact the precise dichotomy we find in the Mesopotamian labels 'clear' and 'unclear'. Although the terminology

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86 Aristox. fr. 83.

87 Aristox. *Harm.* 48; cf. 21-2: δεῖ δὲ νοῆσαι τῶν συμφώνων διαστημάτων ‹τὸ› ἐλάχιστον τὸ κατεχόμενον τά τε πλεῖστα ὑπὸ τεττάρων φθόγγων, ὅθεν δὴ καὶ τὴν προσηγορίαν ὑπὸ τῶν παλαιῶν ἔσχε ("And it is necessary to consider the smallest of the consonant intervals, that which is comprised *for the most part* by four notes, which is in fact why it had this name from the ancients").

is different, it as though we were glimpsing the Mesopotamian conception through a palimpsest. For the Greek names of the consonances exclude any original relationship with what we consider to be the characteristically Greek tunings. The generalizing nature of the terms implies that it would be normal to find consonant fifths or fourths in any and every position of a proper μέλος ἡρμοσμένον. As a consequence, the non-consonant interval which must arise in diatony may also appear in any position. This is oblique confirmation that the diatonic phases were in fact known in the heptachordal period.

7.42 This conclusion cannot be dismissed simply on the grounds that such a binary perspective is in the nature of the diatonic tuning method. It is true that the process universally yields the same general type of pitch relationships—that is, scales of tones and semitones with consonant parallelism and a single unparallel tritone. But it does not follow that two musical traditions should develop identical musical and terminological perspectives, since this would depend on the musical use to which these scales are put. Other viable perspectives which are excluded here are, for example, an Archytean 'tempering' of heptatony towards the finer resonant intervals. Once tempered, intervals might be classified by relative resonance, with an eye towards heterophony, as Crocker (1978) argued for *UET* VII/74 col. i. As in CBS 10996, each interval might be given a separate name so that in a written description of a tone-structure, such as the Retuning Text, the exact position of the tritone might be specified—such an innovation would not be necessary for the aurally-inclined practicing musician, for whom 'interval rotation' was demonstrable without any diagram. Or one might expect to find a nomenclature which could acknowledge a relationship between the very particular diatonic pitch-structure and other tunings that were in use; and yet the genera themselves exhibit essential diatonic charcteristics. But perhaps the most important point: to dismiss such terminological and conceptual parallels by appeal to the 'universal' properties of diatony is to ignore the fact that this tuning method is not itself universal. It is not, as Aristoxenus would agree, predetermined by nature but culture-specific and idiosyncratic; its very exstence in more than one culture being evidence of historical relationship.

7.43 To return now to the process of interval rotation known to Eratocles and his contemporaries, there is another important fact that reveals the foundational importance of the cyclical conception both for and before Aristoxenus. This is the term συνέχεια itself, which came to Aristoxenus via Aristotle, for whom 'the continuous' was a key critical concept:

λέγω δ' εἶναι συνεχὲς ὅταν ταὐτὸ γάηται καὶ ἓν τὸ ἑκατέρου πέρας οἷς ἅπτονται καὶ ὥσπερ σημαίνει τοὔνομα, συνέχηται· τοῦτο δ' οὐχ οἷόν τε δυοῖν ὄντοιν εἶναι τοῖν ἐσχάτοιν. τούτου δὲ διωρισμένου φανερὸν ὅτι ἐν τούτοις ἐστὶ τὸ συνεχές, ἐξ ὧν ἕν τι πέφυκε γίγνεσθαι κατὰ τὴν σύναψιν. καὶ ὡς ποτε γίγνεται τὸ συνέχον ἕν, οὕτω καὶ τὸ ὅλον ἔσται ἕν.[88]

I mean to say that 'continuous' is when, for things which are touching each other, the boundary of each is one and the same, and, as the name suggests, is 'held together' [συν-εχ- = together-hold]. And this is not possible when the extremes are two distinct things. When so defined, it is clear that the continuous exists only in those things from which one thing can naturally arise through being in contact. And however the continuous becomes a single thing, that is how the whole too will be a single thing.

7.44 Scholars have explained musical συνέχεια as describing the component pitches of a tuning, that is, τὸ ἡρμοσμένον is 'continuous' because no other pitches can be inserted between those which compose it: each interval shares a single string with the two adjacent intervals.[89] This is certainly true, and derives from the literal adjacency of strings on a heptatonic lyre (cf. 9.32). But I believe this is merely a corollary of what is intended. For συνέχεια cannot be created *without* "consonant responsion", and yet fulfillment of this rule does not alone guarantee συνέχεια: imagine a μέλος which has consonant responsion, but for which the interior "movable" pitches (φθόγγοι κινούμενοι) do not constitute a recognised genus. Yet such a tuning would still exhibit 'continuity' according to the usual interpretation of συνέχεια.

7.45 I suggest, therefore, that συνέχεια governs not merely the continuity of pitches within a scale, but the continuity of the scale as a whole in reference to something larger than itself. The key evidence here comes from a corollary of συνέχεια:

ᾧ δ' ἂν τῶν φθόγγων μηδὲν ᾖ τούτων συμβεβηκός, ἐκμελὴ τοῦτον εἶναι πρὸς ⟨τούτους⟩ οἷς ἀσύμφωνός ἐστιν.[90]

And for whichever of the pitches none of these conditions apply, this pitch is ἐκμελὴ towards those pitches with which it is not consonant.

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88 Arist. *Ph.* 5.3.227a11-16.

89 Cf. Barker (1982-9), 2.101.

90 Aristox. *Harm.* 29; for τούτους vs. τοὺς, see Da Rios' apparatus.

ἐμμελής and ἐκμελής normally refer to the individual pitches of a tuning which conforms to συνέχεια; they are either "in" or "out" of the μέλος ἡρμοσμένον. Thus the terms appear frequently in Book 3, where Aristoxenus gives pitch-by-pitch accounts of the genera. While this meaning obtains in the present passage, there is a further dimension. The immediate focus is on a single μέλος ἡρμοσμένον: properly 'continuous', each of its pitches must enjoy consonant responsion to some other pitch and so be ἐμμελής in the primary sense. But the qualification is introduced that a pitch may be ἐκμελής towards any of its companions if there is no consonant responsion between them. Clearly, this corollary looks to the interrelationship of more than one μέλος. The two pitches which are ἐμμελῆ in the context of their own μέλος are ἐκμελή in the context of another μέλος, by not exhibiting the consonant responsion which would define it.

7.46 Hence, συνέχεια governs not merely the cohesion of pitches within a μέλος, but that of a μέλος within a system of μέλη—as made possible by rules of consonance ultimately dependent upon diatony. It is, moreover, in complete accord with the process of interval rotation; for, according to Aristotle's definition, only circular motion can be truly 'continuous'.[91] But cyclical συνέχεια has its roots in pre-Socratic thought, as an essential aspect of Parmenides' sphere, for example:

> οὐδὲ διαιρετόν ἐστιν, ἐπεὶ πᾶν ἐστιν ὁμοῖον·
> οὐδέ τι τῇ μᾶλλον, τό κεν εἴργοι μιν συνέχεσθαι,
> οὐδέ τι χειρότερον, πᾶν δ' ἔμπλεόν ἐστιν ἐόντος.
> τῷ συνεχὲς πᾶν ἐστιν· ἐὸν γὰρ ἐόντι πελάζει.[92]
>
> And it is not divisible, since it is all the same;
> And it is not somewhat more in this place, which would prevent it from being continuous,

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91 Arist. *Ph.* 8.8.265a8f.: κατ' οὐδεμίαν κίνησιν ἐνδέχεται κινεῖσθαι συνεχῶς ἔξω τῆς κύκλῳ; 8.8.264b9 ἡ δ' ἐπὶ τῆς περιφεροῦς ἔσται μία καὶ συνεχής; cf. Heraclit. fr. 22B103 D-K: ξυνὸν γὰρ ἀρχὴ καὶ πέρας ἐπὶ κύκλου περιφερείας ("in the circumference of a circle the beginning and end are common"); ps.-Arist. *Mech.* 848a6ff.: ἐξ οὗ γὰρ ἄρχεται τόπου τὸ πέρας αὐτῆς [*sc.* τῆς γραμμῆς], εἰς τὸν αὐτὸν τοῦτον τόπον ἔρχεται πάλιν· συνεχῶς γὰρ κινουμένης αὐτῆς τὸ ἔσχατον πάλιν ἀπῆλθε πρῶτον ("For from whatever place the boundary (of a drawn circle) begins, it goes back again to the very same place: for when it moves continuously [συνεχῶς], the final point arrives back at the first point").

92 Parm. fr. 28B8.22-25 D-K.

And it is not somewhat less in that, but the whole is filled with being.
In this way it is all continuous: for that which is moves towards that which is.

7.47 While Aristoxenean συνέχεια thus represents the late development of an ancient concept, we may find a hint of the musical reality which συνέχεια describes as early as the Homeric *Hymn to Hermes*:

καὶ πήχεις ἀνέθηκ', ἐπὶ δὲ ζυγὸν ἤραρεν ἀμφοῖν
ἑπτὰ δὲ συμφώνους ὀΐων ἐτανύσσατο χορδάς . . .
πλήκτρῳ ἐπειρήτιζε κατὰ μέλος.[93]

And he put in the arms, and joined (ἤραρεν) a yoke upon them both,
And stretched seven consonant strings of sheepgut . . .
He tested it with the plectrum κατὰ μέλος.

The MSS have κατὰ μέρος here, but the same phrase recurs at 419 and 501 where the reading is in both cases κατὰ μέλος. Allen/Halliday/Sikes (1936) thus gave κατὰ μέλος "the balance of evidence".[94] As Càssola (1975) pointed out, this is counteracted by the fact that μέλος, in a musical sense, is not Homeric.[95] Nevertheless, the parallels at 419 and 501 are persuasive since an error of μέρος for μέλος would be easy to make. The real question, then, is whether μέλος makes better sense in the context.

7.48 Since the testing is done specifically with the plectrum, the reference must be, whatever the reading, to the tuning of the strings, to see whether they are εὖ καὶ ἐπισταμένως. This was precisely what Odysseus did to test his bow, when the string sang like a sparrow in the returning spring (cf. 5.16). Accordingly Càssola, who reads κατὰ μέρος, takes it to mean that Hermes checks the tuning string by string.[96] But here the reading μέλος is greatly preferable since it, rather than μέρος, can denote a musical tuning—in fact it seems to have been the word of choice at this period, in preference to ἁρμονία.[97] Now, if it is right to allow συμφώνους its usual technical sense (cf. 2.24), it follows that Hermes is testing that each string is "well and knowledgeably tuned" in

93 *H. Merc.* 50-53.

94 Allen/Halliday/Sikes (1936), *ad loc.*

95 Càssola (1975), *ad loc.*

96 Càssola (1975), *ad loc.*

97 See West (1992), 177 and n. 57.

some consonant relationship. We can take Lucian effectively glosses the *Hymn* when he replaces ἑπτὰ δὲ συμφώνους οἷων ἐτανύσσατο χορδάς with ἀντεινάμενος ἑπτὰ χορδὰς μελῳδεῖ . . . ἁρμόνιον ("stretching seven strings thereon, he sang . . . precisely in tune").[98] That is, each consonant string (σύμφωνος χορδή) is just as it should be (ἁρμόνιος).

7.49 What is the purposeful manner of tuning implied here? The phrase κατὰ μέλος is the key. In Classical times a technical expression in its own right, occurring four times in Aristoxenus (thrice in the *Elementa Harmonica*, once in the *Elementa Rhythmica*[99]), where it is closely allied with the rule of συνέχεια. Significantly, all three examples in the Elementa Harmonica come from the same discussion. The first of these was quoted above; the remaining two I give here:

> οὐ δὴ προσεκτέον εἰ τὸ συνεχὲς ὅτε μὲν ἐξ ἴσων ὅτε δ' ἐξ ἀνίσων γίγνεται, ἀλλὰ πρὸς τὴν τῆς μελῳδίας φύσιν πειρατέον βλέπειν κατανοεῖν τε προθυμούμενον τί μετὰ τί πέφυκεν ἡ φωνὴ διάστημα τιθέναι κατὰ μέλος.[100]
>
> Do not be alarmed if "the continuous" arises sometimes from equal [intervals] and sometimes from unequal: one must try to look to the nature of melody and be ready to understand which interval naturally comes after which when the voice puts them together κατὰ μέλος.
>
> ὑποκείσθω δὲ καὶ τοὺς τοῖς ἑξῆς φθόγγοις συμφωνοῦντας διὰ τῆς αὐτῆς συμφωνίας ἑξῆς αὐτοῖς εἶναι. ἀσύνθετον δὲ ὑποκείσθω ἐν ἑκάστῳ γένει εἶναι διάστημα κατὰ μέλος ὃ ἡ φωνὴ μελῳδοῦσα μὴ δύναται διαιρεῖν εἰς διαστήματα.[101]
>
> And let it also be that those tones which are consonant with "continuous" tones, each through the same consonance, are continuous with each other. And in each genus an interval will be "incomposite" κατὰ μέλος when the voice in singing cannot break it apart into [smaller] intervals.

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98 Lucian *DDeor.* 11.4.

99 Aristox. *Rhythm*. 2.21; the examples from *Harm.* are given below.

100 Aristox. *Harm.* 28.

101 Aristox. *Harm.* 29.

7.50 The diatonic essence of συνέχεια is further corroborated here by Aristoxenus' appeal to "the nature of melody" (τὴν τῆς μελῳδίας φύσιν), recalling his description of the diatonic as open to discovery by human nature (ἡ τοῦ ἀνθρώπου φύσις). Elsewhere he states that there is "a certain nature of the cohesive/continuous in melody" (τις φύσις . . . τοῦ συνεχοῦς ἐν τῇ μελῳδίᾳ).[102] Likewise, he criticized his predecessors for not showing which sequences would be "contrary to nature" (παρὰ φύσιν), in other words, for not formulating the rule of συνέχεια. This explains his statement that none of the genera is any more natural than another, for all rest upon the same natural foundation—the diatonic. Nicomachus too described the diatonic progression as dictated by "a certain natural necessity" (ἀνάγκῃ τινὶ φυσικῇ).[103] Intervals of a μέλος ἡρμοσμένου conforming to συνέχεια occur in certain sequences "along the tuning", or which are "in the μέλος", where κατὰ μέλος may be contrasted with the phrase παρὰ μέλος, "missing the μέλος".[104] The exact sequence will vary with the genus, but in each case 'symphonic responsion' is observed κατὰ μέλος. It is this structure which Aristoxenus described as "a certain marvelous arrangement of the nature of the μέλος ἡρμοσμένου" (τάξιν . . . τινα . . . τῆς φύσεως τοῦ ἡρμοσμένου θαυμαστὴν).[105] Thus μέλος ἡρμοσμένου and μέλος itself emerge as technical terms expressly allied to diatony, and being continuous/cohesive κατὰ μέλος assumes these diatonic structures as an underlying norm, generic variations notwithstanding.

7.51 Can one read a similar technical meaning into κατὰ μέλος in the *Hymn to Hermes*? Not that there is any awareness of Aristoxenean συνέχεια *per se*. But the reverse is conceivable: the Aristoxenean rule made the μέλος ἡρμοσμένου conform to a certain standard of construction which was of fundamental importance in practical music, one which *could* be implied in the *Hymn*. For "testing it along the μέλος" (ἐπειρήτιζε κατὰ μέλος) clearly shows that some definite tuning is intended, i.e. that which is implied by ἑπτὰ δὲ συμφώνους ὅίων ἐτανύσσατο χορδάς. Compare [μέλος]

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102 Aristox. *Harm.* 27.

103 Nicom. *Ench.* 7 (249.1-3): τὴν δὲ πρόβασιν ἀνάγκῃ τινὶ φυσικῇ . . . κατὰ τοῦτο τὸ διατονικὸν γένος ("the progression by some physical necessity . . . along this diatonic genus").

104 Variations of the phrase appear in similar contexts: Nicom. *Ench.* 7 (249.1ff.), quoted above; ps.-Plut. *de Mus*. 1140f.: Δώριον νήτην προσετίθεσαν, οὐ χρησαμένων αὐτῇ τῶν ἔμπροσθεν κατὰ τὸ μέλος ("[*sc.* Terpander] added Dorian νήτη, his predecessors not using it in the μέλος"); Pl. *Lg*. 801c uses κατὰ μέλος differently, to describe composition "in music".

105 Aristox. *Harm.* 42.

ξύμφωνον in Sophocles' adaptation of the tale, which—if Wilamowitz' conjecture is correct—serves to bridge the two phrases.[106] σύμφωνον μέλος is perhaps unspecific enough that it could equally describe the other μέλη ἡρμοσμένα allowed by Aristoxenus, enharmonic and chromatic. But, as I have argued (2.25), ἑπτὰ συμφώνους χορδάς has a collective implication which suggests that the seven strings are linked throughout by mutual consonant relations, as opposed to the isolated consonant responsion that characterizes the non-diatonic genera. The diatonic proper—oldest and most natural—may be safely inferred here as being the μέλος ἡρμοσμένον *par excellence*, the prime exemplar of συνέχεια κατὰ μέλος.

7.52 Far from being untechnical (cf. 2.24), the invention scene in the *Hymn to Hermes* attests the harmonic construction of the lyre (cf. 4.15-18), the association of συμφωνία and ἁρμονία (cf. 4.17), and an implicit understanding of how consonance is to be set up and tested, and what sort of tuning should properly result—all this before Lasus committed his θεωρία to writing. With these details and its fragments of epic technical language (cf. 5.14-19), the *Hymn* bridges the gap between the seven-stringed lyre of the Orientalizing period and the codification of συνέχεια by Aristoxenus. The period between Terpander and the *Hymn* itself—whatever its exact date—is spanned by the Lesbian school, whose dynasty reigned supreme into the sixth century, preserving the first principles of the Orientalizing musical movement in its classical form, as symbolized by Terpander. Against this background we can understand better the terse detail of the *Hymn*. The poet is not uninterested in or unknowledgable of technical musical material. Rather, the full reality of contemporary practice would be readily evoked in the mind of the musically knowledgable by a few sure strokes. And who would better know such things than the lyre-playing ἀοιδός himself?

7.53 The testimonia which concern μεταβολή provide further evidence that the σύστημα τέλειον was founded upon an earlier diatony, the 'continuity' of whose scales had already allowed them to be fully interrelated. According to an earlier precept which Aristoxenus attributed to Eratocles, acceptable modulation (μεταβολή) could only take place at consonant "intersections":

> ἀπὸ τοῦ διὰ τεσσάρων ἐφ' ἑκάτερα δίχα σχίζεται τὸ μέλος
>
> From the fourth the *melos* splits in two in either direction.[107]

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106 S. *Ichn.* 319 (Lloyd-Jones); contrast 327 (Maltese).

107 Aristox. *Harm.* 5.

ἀπὸ πυκνοῦ δ' ἐναντίως ἐπὶ μὲν τὸ βαρὺ δύο ὁδοί, ἐπὶ δὲ τὸ ὀξὺ μία

After the *pyknon* [*sc.* when descending] there are, in opposite directions, two roads continuing the descent and another one that goes back up.[108]

7.54 An important fragment of Ion of Chios confirms that this approach to modulation was standard practice not later than 422 B.C., when Ion died, and probably by his *floruit* mid-century:

ἑνδεκάχορδε λύρα, δεκαβάμονα τάξιν ἔχουσα
τὰς συμφωνούσας ἁρμονίας τριόδους·
πρὶν μέν σ' ἑπτάτονον ψάλλον δῖς τέσσαρα πάντες
Ἕλληνες σπανίαν μοῦσαν ἀειράμενοι.[109]

eleven-stringed lyre with a ten-stepped arrangement—
the three-way, consonant crossroads of ἁρμονία.
Hitherto all the Greeks played you heptatonic—two tetrachords—
summoning up a sparse Muse.

This is the earliest testimony for the tetrachordal perspective, fundamental to the later theorists. It corresponds very closely, moreover, to the Eratoclean conception of μεταβολή as a melodic road which splits at consonant intersections, with three choices (besides the one just travelled). Once again, of course, there is the conjunction of ἁρμονία and συμφωνία. A careful analysis of Aristotle *Physics* 8.8, which addresses

108 Aristox. *Harm.* 67. I have expanded the translation to make the laconic wording clearer.

109 Ion of Chios fr. 32 (West) = Cleonid. 12 (202.14-17); see the discussion of West (1992a), 25f., adducing the Aristoxenus passages quoted above. I prefer δῖς to διὰ because δῖς τέσσαρα more clearly glosses ἑπτάτονον. A number of sources describe the old heptachord as consisting of two tetrachords sharing μέση as a common tone (i.e. **H**-PH-L-**M**-PM-PN-**N**); in the oldest of these sources it is not necessarily the later conjunctive paradigm—where the strings are consonant διὰ τεσσάρων—which is intended: see further 8.36-38. Cf. ps.-Arist. *Pr.* 19.47: διὸ καὶ μέσην αὐτὴν προσηγόρευσαν, ὅτι ἦν τοῦ μὲν ἄνω τετραχόρδου τελευτή, τοῦ δὲ κάτω ἀρχή ("which in fact is why they called it μέση, because it was the last string of the upper tetrachord and the beginning of the lower"); Boeth. *De inst. mus*. 1.20 (207.29ff.): *mesen nervum secundo numeramus. Atque ideo duo tetrachorda per mesen coniunguntur.* Arist. *Ph.* 8.8 also discusses in non-musical terms the use of a mid-point as both a beginning and an end.

linear and rotational motion, 'continuity', issues of 'middle-point' and "deflected" (ἀνακάμπτου) movement, would doubtless help to elucidate further Aristoxenus' conception of musical συνέχεια, as well as the crucial issues which concern the ancient θεωρία—in particular, musical 'middle-point' and the bending of the melodic path (καμπή), by which the basic form of modulation was effected.

7.55 According to the rule of melodic 'junctures', modulation in the enharmonic and chromatic genera can only take place at the consonant "bounding" notes of each tetrachord (οἱ περιέχοντες φθόγγοι), not from the variable, "moving" inner notes (οἱ κινούμενοι) whose intonation was so often microtonal. In the διάτονον γένος, however, each φθόγγος is by definition such an intersection, and so can serve as a departure point for μεταβολή. Created by the strictest application of συνέχεια—Ptolemy's διατονικοῦ συνεχοῦς—the diatonic served as the skeleton of the σύστημα τέλειον, regulating, indeed enabling, modulation between the various συστήματα of the enharmonic and chromatic in all their shades. Thus the fragment implies knowledge of the complete diatonic connectability of all the species, at approximately the same time that Eratocles was rotating the enharmonic octachords. Once again his researches are seen against a diatonic background.

7.56 Given that Aristoxenus was musically conservative, railing against the practices of his day and prepared to sacrifice popularity for purity of technique,[110] it follows that his contemporaries, for whom the New Music was now becoming mainstream,[111] were pursuing modulations and joining pitch systems that transgressed the rule he lays down. If this is right, his allowance for modulation represents an older, classical practice known to Ion and Eratocles. What is surprising about this is that scholars generally assume that the New Music was objectionable because it involved modulation. It now appears that modulation was a regular part of music prior to this movement, and that the New Music was controversial because it used too much modulation, or/and modulations which were improperly constituted.

7.57 In fact, as early as the early sixth century (!), according to Heraclides of Pontus, the aulete Sacadas of Argos—a renowned musician from a musical city, with three consecutive Pythian victories under his belt—was modulating with each strophe of his

110 Cf. Aristox. frr. 70, 76, 85.

111 West (1992), 371f.

τριμελὴς νόμος ("Etude in Three Tunings").[112] Lasserre (1998) made much of this, noting that, despite the fact that the ethnic names Dorian, Lydian and Phrygian suggest *prima facie* independent geographical origins for these tunings, they must nevertheless have been somehow mutually compatible, implying a unified musical system which could accomodate diverse tunings.[113] We cannot say certainly what "Dorian, Lydian and Phrygian" mean in this context.[114] Nor do we have any precise information regarding the "multiplicity of αὐλός notes" (τῇ τῶν αὐλῶν πολυφωνίᾳ) used in the late sixth century by his countryman Lasus of Hermione.[115] Yet both testimonia are clear evidence that the particular acoustic properties of the αὐλός profoundly affected the course of ἁρμονική (cf. 1.24). A lyre used for such

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112 Ps.-Plut. *de Mus.* 1134b. According to ps.-Plut. *de Mus.* 1131f-1132c, Heraclides, for his Συναγωγὴ τῶν ἐν μουσικῇ ("Compilation of Musical Matters"), drew upon a document preserved at Sicyon which contained a list of poets and musicians from Argos (fr. 157 Wehrli). Sacadas' victories began in the third year of the forty-eighth Olympiad (thus 586, 582 and 578): Paus. 10.7.4-5 (cf. 2.22.8-9); ps.-Plut. *de Mus.* 1134a; cf. West (1992), 212. Argos, which was home to Aristonicus, a contemporary of Archilochus who pioneered the art of solo-*cithara* playing (Menaechmus *FGrH* 131F6 = Ath. 14.637f), seems to have enjoyed a musical efflorescence in the sixth century. Herodotus (3.131-2) reports that, in the time of Polycrates, "the Argives were held to be first among the Greeks in music" (Ἀργεῖοι ἤκουον μουσικὴν εἶναι Ἑλλήνων πρῶτοι). Sacadas and others established at Argos the festival called τὰ ἐνθυμάτια (ps.-Plut. *de Mus.* 1134b-c). It may have been at this time that the Greek musical notation first took form, since a number of its peculiarities are best traced to the archaic Argive script: see West (1992), 261ff.; cf. 5.18. Lasus of Hermione, who emerges as an important and innovative musician at the end of the century, was also from the Argolid, as was Telesilla.

113 Lasserre (1988), 82: "[il *trimeles nomos*] presuppone, accanto ad una tecnica relativamente facile da mettere a punto sull'aulo, una teoria della scala musicale che identificava già perfettamente la funzione degli intervalli nella trasposizione. Questa teoria presuppone a sua volta una struttura comune ai tre modi armonizzati da Sacada, in altri termini un'origine comune".

114 It is not clear whether these three names were preserved with the original tradition, or have been introduced anachronistically. Ps.-Plut. (*de Mus.* 1134a) claims that these were the only three tunings known at the time, a belief attested in other late sources, e.g. Ptol. *Harm.* 2.6 (56.4ff.), 2.10 (62.19f.). Thus these specific tunings may be mere inference from the name τριμελὴς νόμος. Curiously enough, Heraclides of Pontus, who seems to be the source here, insisted elsewhere that the three true ἁρμονίαι should correspond to the three Hellenic races, Dorian, Ionian and Aeolian: see Ath. 14.624c.

115 Ps.-Plut. *de Mus.* 1141c.

'polyphonic' pieces, if it were to avoid retuning between strophes or elaborate mechanisms like the "tripod" of Pythagoras of Zacynthus,[116] would require more strings than the traditional seven—nine in the case of the τριμελὴς νόμος. In fact, such an instrument is already attested in the mid-sixth century.[117] At any rate, we have here good evidence for modulation well back into the Archaic—indeed, at approximately the same time that σύμφωνοι χορδαί and κατὰ μέλος surface in the *Hymn to Hermes*.

7.58 It would seem then that Pindar—who also celebrated the παμφωνία or πολυφωνία of the αὐλός[118] and musical ποικιλία (a word glossed by ps.-Plutarch as πολυχορδία[119]), and was said to have been a student of Lasus[120]—was no stranger to μεταβολή. Even the austere, heptachordal Aeschylus may well have used modulation. This would have been under certain well-defined conditions at first—between strophes for instance, following the example of Sacadas. In a well-known fragment of Pherecrates, Music complains of the progressive indecencies she has suffered during the course of the fifth century from the likes of Melanippides, Cinesias, and Phrynis—with her ultimate violation at the hands of Timotheus who, with Philoxenus, was the quintessential New Musician. These crimes are recounted in language rife with sexual and musicological puns. Of Cinesias, the effeminate dithyrambist of the later fifth century, she says:

> Κινησίας δέ γ' ὁ κατάρατος Ἀττικός,
> ἔξαρμονίους καμπὰς ποιῶν ἐν ταῖς στροφαῖς,
> ἀπολώλεχ' οὕτως, ὥστε τῆς ποιήσεως
> τῶν διθυράμβων, καθάπερ ἐν ταῖς ἀσπίσιν,
> ἀριστέρ' αὐτοῦ φαίνεται τὰ δεξιά.[121]
>
> And Cinesias, that damned Athenian,
> Making exharmonic bends in his strophes,
> So destroyed me that in the composition
> Of his dithyrambs—as with [the reflection of] shields—
> The left appears in the same spot as the right.

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116 Ath. 14.637c-f.

117 Paris E643; cf. Maas and Snyder (1989), 38, 51 fig. 15a; West (1992), 62.

118 Pi. *I.* 5.27, *O.* 7.12, *P.* 12.19: αὐλῶν . . . πάμφωνον μέλος; cf. *Adesp.* 29b (*PMG* 947): πολύχορδος αὐλός; Pl. *Resp.* 3.399c-d.

119 Ps.-Plut. *de Mus.* 1137a.

120 See West (1992), 344 n.68.

121 Pherec. fr. 155.8-12 K-A.

7.59 It is universally acknowledged that ἐξαρμονίους καμπάς are modulations; as 'exharmonic' suggests, these are pitches which do not occur within a given ἁρμονία; a ἁρμονία which, on the basis of the Aristophanic material discussed above (7.18), we may presume to be heptachordal. If interstrophic modulation was accepted practice since the time of Sacadas, the criticism ἐν ταῖς στροφαῖς becomes intelligible as a violation of convention.[122] Moreover, the images of invertibility and reflection fit well with a circular conception of μεταβολή and συνέχεια. In *Birds*, Aristophanes brings together the image of road and circle in his travesty of Cinesias and the modern dithyrambic style.

KIN.:	πέτομαι δ' ὁδὸν ἄλλοτ' ἐπ' ἄλλαν μελέων . . .
PEIS.:	ἀσπαζόμεσθα φιλύρινον Κινησίαν.
	τί δεῦρο πόδα σὺ κυλλὸν ἀνὰ κύκλον κυκλεῖς;[123]

CIN.:	I fly on first one and then another road of μέλη . . .
PEIS.:	We welcome thee, lime-wood Cinesias.
	Why do you come here circling your lame foot round the circle?

The language is complex. Though the primary reference of τί δεῦρο πόδα σὺ κυλλὸν ἀνὰ κύκλον κυκλεῖς—with the punning language of κυλλὸν ("lame") and κύκλον ("circle")—seems to be the halting, modernist dance of a circular dithyrambic chorus,[124] it combines with ὁδὸν μελέων (the melodic path) to form a gloss on the modulatory nature of the music (πέτομαι δ' ὁδὸν ἄλλοτ' ἐπ' ἄλλαν). This serves to confirm the interpretation of Pherecrates' καθάπερ ἐν ταῖς ἀσπίσιν, / ἀριστέρ' αὐτοῦ

122 Cf. D. H. *Comp.* 19 (194.5-196.7 Roberts): τοῖς δὲ τὰ μέλη γράφουσιν τὸ μὲν τῶν στροφῶν τε καὶ ἀντιστρόφων οὐχ οἷόν τε ἀλλάξαι μέλος, ἀλλ' ἐάν τ' ἐναρμονίους ἐάν τε χρωματικὰς ἐάν τε διατόνους ὑποθῶνται μελῳδίας, ἐν πάσαις δεῖ ταῖς στροφαῖς τε καὶ ἀντιστρόφοις τὰς αὐτὰς ἀγωγὰς φυλάττειν . . . οἱ δέ γε διθυραμβοποιοὶ καὶ τοὺς τρόπους μετέβαλλον, Δωρίους τε καὶ Φρυγίους καὶ Λυδίους ἐν τῷ αὐτῷ ᾄσματι ποιοῦντες, καὶ τὰς μελῳδίας ἐξήλαττον, τοτὲ μὲν ἐναρμονίους ποιοῦντες, τοτὲ δὲ χρωματικάς, τοτὲ δὲ διατόνους . . . οἵ γε δὴ κατὰ Φιλόξενον καὶ Τιμόθεον καὶ Τελεστήν, ἐπεὶ παρά γε τοῖς ἀρχαίοις τεταγμένος ἦν καὶ ὁ διθύραμβος.

123 Ar. *Av.* 1374-9; cf. Anacr. fr. 33 (*PMG* 378).

124 See Dunbar (1995), *ad* 1379.

φαίνεται τὰ δεξιά and the familiarity of cyclic modulation prior to Aristoxenus, as emphasized by the pleonastic and frequentative ἀνὰ κύκλου κυκλεῖς.

7.60 Thus what distinguished the interstrophic modulation of Sacadas from the μεταβολή of the later fifth century was not the basic principle of an interrelationship between two tunings, but the reckless abandon with which the New Musicians crossed from one to the next, breaking down all distinctions in the ἁρμονίαι. Sacadas moved from one ἁρμονία to another; the New Music was 'exharmonic', not belonging to an identifiable heptachordal ἁρμονία. We learn from ps.-Plutarch that

> τὸ δ' ὅλου ἡ μὲν κατὰ Τέρπανδρου κιθαρῳδία καὶ μέχρι τῆς Φρύνιδος ἡλικίας παντελῶς ἁπλῆ τις οὖσα διετέλει· οὐ γὰρ ἐξῆν τὸ παλαιὸν οὕτως ποεῖσθαι τὰς κιθαρῳδίας ὡς νῦν οὐδὲ μεταφέρειν τὰς ἁρμονίας καὶ τοὺς ῥυθμούς· ἐν γὰρ τοῖς νόμοις ἑκάστῳ διετήρουν τὴν οἰκείαν τάσιν.[125]
>
> In general, the style of citharody practiced by Terpander persisted even unto the time of Phrynis as one which was altogether simple. For in the old days it was not allowed to make citharodic compositions like today, nor to transfer the ἁρμονιαι and the rhythms [*sc.* beyond their proper boundaries]. For in the *nomoi* they guarded the proper tuning for each.

7.61 As we recall, the practice of adhering to one diatonic tuning for each piece is attested in the Assyrian song catalogue VAT 10101 (1.18, 5.21, 6.17); the same was probably true of the Hurrian hymns, to judge from the cult song to Nikkal, which was in the *nīd qabli* tuning (cf. 2.9, 5.22). But though the Archaic composers' were reluctant to "transfer the ἁρμονίαι", it does not follow that they were unaware of how the tunings were structurally interconnected—just as the compilers of VAT 10101 knew of seven distinct tunings, whose connectivity was celebrated in the Retuning Text (cf. 1.20). Again the reference is to αἱ ἁρμονίαι, *the* tunings. (Note too that ps.-Plutarch's source did not use the normal Aristoxenean term for modulation, μεταβάλλειν.) Thus we read later in the same treatise:

> καὶ οἱ παλαιοὶ δὲ πάντες, οὐκ ἀπείρως ἔχοντες πασῶν τῶν ἁρμονιῶν, ἐνίαις ἐχρήσαντο. οὐ γὰρ ἡ ἄγνοια τῆς τοιαύτης στενοχωρίας καὶ ὀλιγοχορδίας αὐτοῖς αἰτία γεγένηται, οὐδὲ δι' ἄγνοιαν οἱ περὶ Ὄλυμπου καὶ Τέρπανδρου

125 Ps.-Plut. *de Mus.* 1133b-c; for τάσιν read perhaps τάξιν, which can apply to rhythmic as well as tonal arrangement.

καὶ οἱ ἀκολουθήσαντες τῇ τούτων προαιρέσει περιείλον τὴν πολυχορδίαν τε καὶ ποικιλίαν.[126]

> And all the ancient poets, though not without experience of all the ἁρμονίαι, only used some of them. For it was not ignorance that was responsible for such narrow melodic range and the moderate number of strings they used, nor was it through ignorance that the circles of Olympus and Terpander, and those who followed the preference of these men, rejected a large number of strings and complexity.

7.62 Interestingly enough, ps.-Plutarch goes on to illustrate the ancient ὀλιγοχορδία by reference to the "three-noted" (τρίχορδα) music of Olympus' Libation Style (cf. 3.5). In the context of these musicians knowing πᾶσαι αἱ ἁρμονίαι, such 'gapped' or 'defective' tunings emerge against a diatonic backdrop, exactly as seen in the Balkans (cf. 3.49). Likewise, the scales of Aristides Quintilianus might represent the enharmonic and polychordal development of diatony in the later fifth century and the mixing of the two genera which Aristoxenus attests. With their frequent quarter-tones they are in fact largely enharmonic in character. Yet they show sometimes more, sometimes fewer than the seven pitches which were standard throughout the Archaic period. Like the Libation Style, these pitch structures may merely have been selective against a diatonic background. Indeed, it is hard to see how they could have been preserved in written form without knowledge of diatony, since the notation system itself presupposes this method.[127]

7.63 Without going further into the development of the σύστημα τέλειον and the nature of its antecedents, we get some idea of the important role of diatony in the fifth century, and even a distant memory of it in the Archaic period. The diatonic, an essential theoretical precursor to any more elaborate developments, appears in the earliest fragment of music theory, Philolaus fr. 6a, and was still presupposed in most of the relevant Aristotelian problems with their fundamental musical study and test questions (see further 8.0). The process of interval rotation, mentioned in connection with Eratocles, would in fact be easiest to effect with the diatonic for, as we saw in the Mesopotamian system, this method of tuning both derives from and gives rise to cyclical properties which are latent in the phenomena of resonance. Moreover, if it is correct that this process predates Eratocles, the 'road map' conception should represent an early stage of the cycle's conversion to the graphic two-dimensionality of

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126 Ps.-Plut. *de Mus.* 1137a-b.

127 See West (1992), 262.

the σύστημα τέλειον. By contrast, ἡ περιφορά was demonstrable solely with the lyre, with each species or σχῆμα transformable into another in some progressive fashion.

7.64 Thus the evidence suggests the early existence of an integrated system of diatonic tunings, what Aristoxenus remembered as "the heptachords which they used to call the ἁρμονίαι", and Aristophanes as "the method of tuning (ἁρμονία) handed down by our forefathers". The modulatory relationships between these ἁρμονίαι were seen in circular terms by the later fifth century at the latest on the traditional interpretation of Eratocles' περιφορά; but more probably Eratocles provides the *terminus ante quem* for the conception. That Sacadas modulated between three tunings, and so knew in the Archaic period some larger structural conception that could link these together, tends to confirm the suggestion that Aristoxenus' fundamental rule of diatonic "cohesion" (συνέχεια) is foreshadowed by details of language in the *Hymn to Hermes*. This does not necessarily exclude other approaches to practical and theoretical lyre music in the early Classical and Archaic periods; it may have been only one tributary to a complex music-stream (cf. 1.12, 1.22, 2.11, 2.15). Nevertheless, the diatonic component at least emerges as a self-sufficient and definite τέχνη, with the σύστημα τέλειον encrusted thereupon as being a robust and indispensable substructure. Since these were themselves required to follow diatonic structural principles, the achievement of the Aristoxenean system was to allow an intrinsically diatonic interconnection of the various microtonal genera. Thus he succeeded in protecting the heptachordal, 'Arcadian' integrity of ἁρμονική.