

## 10.0 The Symphonic Circle in Greece

- 10.1 The argument used to dissociate the epicentric arrangements of Greece and Mesopotamia has been that such a scheme is simply a natural and convenient way to identify one out of a large number of strings;<sup>1</sup> hence such a perspective could arise independently in two places. Where this was the only evidence adduced to connect Greek and Mesopotamian practice, this was a useful and sufficient rejoinder. Yet several lines of reasoning have now converged to connect Terpander's heptachordal lyre with an Orientalizing, diatonicizing musical movement. Given this framework, kinship rather than independent development emerges as the more economical scenario.
- 10.2 And yet there are a number arguments against the mere convenience of the arrangement. Instruments with many more than the seven strings of the Greek lyre or the nine of the Babylonian *sammû* were widely used in Mesopotamia from very early times: the great harps from the reliefs of Assurbanipal's palace at Nineveh (cf. 1.25), the eleven-stringed 'silver lyre' of Ur,<sup>2</sup> and the thirty-stringed instruments attested in Sumerian sources.<sup>3</sup> For these, an inward numbering would be progressively more impractical. How convenient would it be to call the seventeenth of thirty strings the "thirteenth from the end", if the nine-stringed epicentry is supposed to spare the player the difficulty of counting to seven?
- 10.3 Moreover, since we see from the Nineveh reliefs and elsewhere that instruments of different configurations were played together, imagine the confusion if the second string from the front of one instrument were the fourth, sixth, or some other number on another. The arrangement is only helpful when the count is made from one or other end of the instrument; finding the central string in a large array first and reckoning thence becomes unnecessarily complicated. But this would put the idea of centralization out of focus, since the method might be applied to both an even and odd

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<sup>1</sup> West (1993/4), 162: "The inward numbering is not unnatural. For the player it was easier to identify strings in this way than by counting from one end only. The seventh out of an array of nine, for example, was more readily identified as 'third from the end' than as 'number seven'".

<sup>2</sup> U. 123554 = BM 121199, early third millennium.

<sup>3</sup> *MSL* VI 126, line 132; Shulgi B, *UET* VI, No. 81 rev. 8 (<sup>gis</sup>.SA.XXX); see Kilmer (1965), 263.

number of strings; an inward arrangement on a thirty-stringed instrument, while providing the desired convenience, would yield no central string, or two central strings.

- 10.4 Nor should one suppose that for instruments other than the *sammû* there would have been some alternative nomenclature more convenient to the particular needs of each. While many chordophones and their parts are presented in the remaining columns of tablet U.3011, the nine epicentric strings are the only such system given. This, as well as its position in the first column, suggests that the scheme was more generally relevant—exactly as Greek ἄρμονική, presented by the theorists in terms of strings, provided the harmonic material for ‘music’ as a whole. In fact, the Mesopotamian string names, as well as the interval and tuning vocabulary drawn from them, are used consistently throughout the tablets and in other non-specialist contexts dealing with vocal music, wind-instruments, and strings of every description. The epicentric strings were thus a universal, standardizing construction, applicable to instruments of seven, nine, eleven, or thirty strings—and to the wind instruments that play together with them in the Nineveh reliefs.
- 10.5 From other examples of imported Asian cultural artifacts, one sees a tendency for the unnecessary to be filtered out in the process of adaptation, for the necessary to be translated. Where something concrete and previously unknown in Greece was adopted, its name was also taken over as a loan-word, filling a void in the Greek language; this is seen with a commodity like sesame (σησάμη < Sem. *sâsam-*), or a tool like the writing tablet (δέλτα < W. Sem. *dalt* or *delt*). Other cases which were more conceptual might still entail the borrowing of a linguistic form, like the monetary unit of the μνᾶ. With the alphabet, adopted directly from Phoenician, the Greeks did not lack equivalents for the literal meaning of *aleph*, *bet*, etc., but since these words also identified the letters, which were new technical artifacts, they were Hellenized and retained. Similar cases are the Hurrian adaptation of Akkadian musical vocabulary (cf. 2.9), and the Greek and Etruscan use of Akkadian terms in the art of hepatoscopy or liver divination.<sup>4</sup> Sometimes a Greek word might serve as a calque for a foreign term, describing the idea just as well; this happened, for example, with the names of the constellations. As I have argued, the same was true of Akkadian *pitnu* and Greek ἄρμονία, both drawn from the language of joinery and applied metaphorically of the tuning process (6.5-7). As the borrowing becomes increasingly abstract, a more general calquing process occurs, as with systems of time, divination, astronomy, and other such institutions, where these were merely ‘retold’ in the Greek language. The

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<sup>4</sup> Burkert (1992), 46-51; West (1997), 48.

logical extreme of this ‘translation’ process is found in the poetic and mythological material—a literal retelling in Greek of foreign ideas.<sup>5</sup>

- 10.6 We may distill from these parallels the general principle that vital signs of a foreign conception persisted in transmuted but recognizable form. Consider the relationship between the Greek and Mesopotamian strings in this light. While both evince the epicentric arrangement, there is no exact correspondence between the individual names, though one-to-one equivalents could have been found; that the Greek nomenclature includes names drawn from a heterogeneous finger system shows further disregard (cf. 9.24). Moreover, the one arrangement is comprised of seven, the other of nine strings. This suggests that a centralized organization itself, and not the number or names of strings, was the essential feature. The common aesthetic stance of ἀντιφωνία, the redundant octave, attested in both the Greek and Mesopotamian sources (cf. 6.13, 8.42-48, 8.56), guarantees that heptatonic structures could be exhibited in paradigmatic form on seven strings, whereas their expression in nine, equally possible, would add no further tonal information.
- 10.7 CBS 10996 seems to provide an historical link of some sort between the nine strings of the Retuning text and a more streamlined heptachordal expression of the diatonic cycle. The tablet belongs to “a category of Akkadian mathematical texts that consists of lists of constant numbers, or coefficients which are entered together with the objects or operations to which they apply”.<sup>6</sup> Column 2.1-10, for instance, lists how much a cargo boat could hold of various commodities, where the vessel is a mathematical constant by which the other amounts are measured; lines 11ff. list the capacity of other measures or containers.<sup>7</sup> In other words, these texts are meant to establish equivalencies between different standards.
- 10.8 Excitement about the musical content of column 1, which provided the information needed for deciphering the Retuning Text, has caused the tablet’s generic context to pass without further comment since its first publication by Kilmer (1960). And yet, clearly, the musical text, and our reading of it, should be in harmony with this goal of coordination. In fact, two distinct systems of musical measurement are at work. The epicentric strings of U.3011, which derive from the Sumerian period, occur in pairs where their names inherently suggest the ancient nine-stringed enumeration 123454321.

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<sup>5</sup> On these and other adaptations, see Burkert (1992), 28ff.; West (1997), 1-60.

<sup>6</sup> Kilmer (1960), 273.

<sup>7</sup> Kilmer (1960), 274f.

But because “second-behind” and “behind” do not occur where expected and are replaced instead with “fore” and “next”, a seven-stringed perspective has been superimposed.

- 10.9 The tablet’s context make us expect these two measures to be reconciled, and this may come from the labeling of the intervals. In the Retuning Text, the diatonic cycle is analyzed and presented using these terms to follow the changing location of the unclear tritone. Thus, while the Symphonic Circle is expressed in nine strings, a basic heptatonic perception is operative already in the Old Babylonian period. CBS 10996 might therefore serve the function of conversion. Yet this is not a sufficient explanation of the text’s purpose; its coordination with the Retuning Text is not absolute, for the latter makes no use of the thirds and sixths recorded in the former. Yet the first column 1 of UET 7/74 does contain all the interval types, as do the Hurrian hymns with their clearly practical context. Taken together, these facts attest that, despite the canonical nine-stringed presentation of the Symphonic Circle, the underlying heptatonic tonal reality was clearly apprehended throughout the larger Mesopotamian musical culture from at least the Old Babylonian period. For the eighth and seventh centuries, the period of interest for the Greek Orientalizing movement, the perspective is guaranteed by the Middle Assyrian VAT 10101 and the Neo-Babylonian U.3011, both of which imply the terminology of CBS 10996.
- 10.10 Note that in the transcription of CBS 10996, because of the antiphonal repetition, the strings have been conventionally represented by the ordinal series 1-2-3-4-5-6-7. This implies a left-right perspective which is not present in the text itself. According to the actual string designations of U.3011, the ‘numbers’ involved are 1234543. Yet the economical omission of “second-behind” and “behind” need entail no replacement of the epicentric approach. A different central string now comes to prominence—the fourth of seven, as in Greece, whose Akkadian designation as Ea-creator has always marked it apart from the Sumerian nomenclature. It might be that CBS 10996 attests, albeit obliquely, the Babylonian adaptation or reanalysis of an older Sumerian system; but clearly there is not enough evidence to elucidate any simple historical relationship. The existence of two standards means that no equation can be definitely drawn between specific Greek and Mesopotamian tunings (Dorian and *n̄d qablim*, for instance<sup>8</sup>). That is, in the seven-stringed expression of the Symphonic Circle, would the same progression of tonal relationships now be organized around the fourth string, with the first and ninth strings being cut away, so to speak? Or would the eighth and

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<sup>8</sup> Cf. Gurney/West (1998), 224.

ninth strings be omitted, as in CBS 10096, changing the identity of all the tunings? At any rate, all of the seven tunings could be reached from any other through the process of ‘interval rotation’, so that the diatonic cycle could be begun from any position, regardless of what was considered normative in the Retuning Text.

- 10.11 Thus, in an adaptation where individual string names were entirely discarded, the conflict of the nine- and seven-stringed perspectives—which at any rate might have been awkward only for the Babylonian theorists—could easily have vanished. The very divergence between the particular *details* of the Greek and Mesopotamian string schemes, far from being an obstacle, is a valuable musical clue that the essential feature was the identification of a center. In other words, the epicentric structure is, *as a whole*, a kind of calque. Provided that they emphasize this, the exact designation of the other strings was unimportant; specific Oriental terminology could fall away in the process of adaptation, while the older finger names could be made to uphold the centralized perspective. *madhyama*, the only one of the seven Sanskrit strings that supports a centralized approach, might also be understood in this light (cf. 1.1); there are, besides, philological arguments in favor of seeing *madhyama* as a relic, “applicable to an earlier state of the scale”.<sup>9</sup>
- 10.12 Nor is there any trace in the Greek evidence of a system of interval naming like that of CBS 10996, suggesting that this too was less than vital to the musical art itself. It is true that the interval names occur in the practical context of the Hurrian hymns, where they serve as a kind of notation. But we have no idea of how this system represented the actual music. Since none of the interpretations that have been advanced (cf. 2.9) have been able to coordinate the song lyrics completely with the intervals, it is probable that the ‘notation’ compressed the music according to some kind of tonal shorthand, where the elaboration of the individual musician may have played an important role. In other words, there is no evidence to suggest that the interval names reflect any crucial musical reality. The Symphonic Circle, in its most practical, exportable form, could be learned simply through demonstration on an instrument (cf. 7.8), while as many foreign words and unnecessary refinements as possible would be ignored. Nor are the Greeks of Terpander’s generation likely to have needed a system of notation, since for centuries their musical culture had been transmitted orally.

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<sup>9</sup> Fox-Strangways (1914), 142.

- 10.13 These arguments lead to the conclusion that the practice of Mesopotamian diatonic music was closely allied to the epicentric arrangement, since this is the one formal feature which may be detected in the Greek evidence, and that this was not incidental or merely convenient but served some definite purpose. There is, in fact, considerable evidence in the Greek sources to relate the centralized heptachord—which is to say μέση—to musical function.
- 10.14 Consider again the passage from Aristotle’s *Metaphysics*, discussed in the last chapter, which treats μέση as an ἀρχή with respect to priority of position. The parallel of the chorus leader proved that the Archaic Greek heptachord was focused on the central string, rather than those at either end. But the chorus leader also had a dominant *function* within his group, and this opens the possibility that Aristotle’s comparison is coherent on yet another level. For though the examples are adduced in illustration merely of arrangement, the τάξις of the chorus was itself based on the function of the κορυφαῖος. As the best singer, the chorus leader served to set the tone, so to speak, uniting the less certain voices into a coherent group. Thus, according to Demosthenes, “if someone takes away the leader, the rest of the chorus is gone” (τὸν ἡγεμόν’ ἂν ἀφέλη τις, οἴχεται ὁ λοιπὸς χορὸς).<sup>10</sup>
- 10.15 This functional dichotomy between leader and chorus finds a striking parallel in one of the Aristotelian *Problems*, which goes on to give some tantalizing details of how μέση served this central function:

Διὰ τί, ἐὰν μὲν ἡ μέση κινηθῆ, καὶ αἱ ἄλλαι χορδαὶ ἤχοῦσι φθειρόμεναι, ἐὰν δὲ αὐτὴ μὲν μένη τῶν δ’ ἄλλων τις κινηθῆ, ἢ κινηθεῖσα μόνη φθείρεται — ἢ ὅτι τὸ ἡρμόσθαι ἐστὶν ἀπάσαις τὸ ἔχειν πῶς πρὸς τὴν μέσην [ἀπάσαις *secl.* Winnington-Ingram], καὶ ἡ τάξις ἢ ἐκάστης ἤδη δι’ ἐκείνην.<sup>11</sup> ἀρθάντος οὖν τοῦ αἰτίου τοῦ ἡρμόσθαι καὶ τοῦ συνέχοντος οὐκέτι ὁμοίως φαίνεται ὑπάρχειν.

<sup>10</sup> D. 21.60.

<sup>11</sup> Jan’s supplements in this sentence (ἢ ὅτι τὸ ἡρμόσθαι <πρὸς τὴν μέσην> ἐστὶν ἀπάσαις, τό <τε> ἔχειν πῶς πρὸς τὴν μέσην ἀπάσαις, καὶ ἡ τάξις ἢ ἐκάστης ἤδη δι’ ἐκείνην) are unnecessary. Deleting the second ἀπάσαις would be better, although the tautology does not obscure the sense. I found that I was anticipated in this emendation by Winnington-Ingram in a marginal note to his edition, kept, like the rest of his library, in the Institute of Classical Studies in London.

μῆς δὲ ἀναρμόστου οὐσίας, τῆς δὲ μέσης μαυούσης εὐλόγως τὸ κατ' αὐτῆν ἔκλειπει μόνον, ταῖς δὲ ἄλλαις ὑπάρχει τὸ ἡρμόσθαι.<sup>12</sup>

Why is it that, if [*sc.* the pitch of] μέση is changed, the other strings also sound spoiled, whereas if μέση remains while one of the other strings is changed, only the changed string is spoiled? Is it because for all the strings being in tune consists of having some relation towards μέση—and the pitch of each is already [*sc.* established] through that string. Thus, when you take away the cause of their being-in-tune [τοῦ ἡρμόσθαι] and that which holds them together [τοῦ συνέχοντος], it no longer appears to be the same. But if one of the strings is out of tune while μέση maintains its pitch, it makes sense for that string alone to be left out of the tuning, since the being-in-tune persists for the others.

- 10.16 The implication here, that each string is tuned in relation to μέση, is stated explicitly by Dio Chrysostomus:

χρῆ δὲ ὡσπερ ἐν λύρᾳ τὸν μέσον φθόγγον καταστήσαντες ἔπειτα πρὸς τοῦτου ἁρμόζονται τοὺς ἄλλους· εἰ δὲ μὴ, οὐδαμῶν οὐδέποτε ἁρμονίαν ἀποδείξουσιν.<sup>13</sup>

And as in the lyre, one must establish the middle tone, and then tune the others to it; otherwise, they will never display any ἁρμονία.

By the late first or early second century A.D. when this was written, the Platonic (perhaps Damonian, perhaps Pythagorean) analogy, between harmony of mind and that of the lyre, was a hackneyed conceit. Without devotion to knowledge, rather than opinion (φρόνησις vs. δόξα), one's life will be “discordant” and “out-of-tune” (ἀναρμόστου, ἐκμελῆ). But the passage, unless it be dismissed as pure archaism—elsewhere Dio uses the Spartans' treatment of Timotheus as an exhortation to virtue<sup>14</sup>—is valuable for showing that a centralized approach to lyre-tuning persisted into the imperial period. This provides a practical basis for the epicentric string/planet lists of Nicomachus (cf. 9.41-42), doubtless to be connected with the continued use at the popular level, and despite the theorists' elaborate constructions, of the seven-stringed lyre (cf. 7.15).

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<sup>12</sup> Ps.-Arist. *Pr.* 19.36.

<sup>13</sup> D. Chr. 68.7.

<sup>14</sup> D. Chr. 32.67, 33.57.

- 10.17 Thus μέση was “the cause of attunement” (τοῦ αἰτίου τοῦ ἡρμόσθαι), and a proper ἄρμονία was produced only when the other strings were tuned towards this central tone. This lets us understand another passage of Aristotle which attributes to ἄρμονία an ἀρχή, proving that for the philosopher μέση served an important tonal role, and did not merely occupy the central position:

ὅσα γὰρ ἐκ πλειόνων συνέστηκε καὶ γίνεται ἢ τι κοινόν, εἴτε ἐκ συνεχῶν εἴτε ἐκ διηρημένων, ἢ ἅπασιν ἐμφαίνεται τὸ ἄρχον καὶ τὸ ἀρχόμενον, καὶ τοῦτο ἐκ τῆς ἀπάσης φύσεως ἀνυπάρχει τοῖς ἐμψύχοις· καὶ γὰρ ἢ τοῖς μὴ μετέχουσι ζωῆς ἔστι τις ἀρχή, οἷον ἄρμονίας.<sup>15</sup>

However many things are composed of a number of parts, whether continuous (συνεχῶν) or discrete, and become some one common thing, in all there appears that which governs [τὸ ἄρχον] and that which is governed [τὸ ἀρχόμενον], and this principle is innate to animate creatures from the whole of nature; and even in things which do not partake of life there is a sort of ἀρχή, as in ἄρμονία.

Aristotle may not be restricting himself to musical ἄρμονία here, but his statement will at least accommodate it. The philosopher uses the word in a number of senses, but, broadly speaking, ἀρχή describes that which begets something dependent, gives it contextual meaning, or renders it knowable.<sup>16</sup> As in the Aristotelian *Problem*, then, μέση is a sort of leader, while the other strings are those which are led.

- 10.18 This passage and *Problem* 19.36 are of further interest for their use of the Peripatetic, ultimately pre-Socratic (7.46), terms συνεχῶν and τοῦ συνέχοντος, for this shines further light on the Aristoxenean rule of συνέχαια. Aristotle allows that a unified group (ἢ τι κοινόν) may be composed of either discrete or ‘continuous’ elements. By contrast, *Problem* 19.36 defines “attunement” as something which is “continuous”—or as I have argued (7.30), “cohesive”. The source of this ‘cohesive attunement’ is said to be μέση.

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<sup>15</sup> Arist. *Pol.* 1.2.1254a28-33.

<sup>16</sup> See for example *Metaph.* 4.1012b34-1013a23 for various definitions, such as ἡ δὲ ὅθεν πρῶτον γίνεται ἀνυπάρχοντος . . . ἔτι ὅθεν γνωστόν τὸ πράγμα πρῶτον, καὶ αὕτη ἀρχὴ λέγεται τοῦ πράγματος (“[An ἀρχή] is whence it first begins when something exists . . . and again whence a thing is first known, this too is called the ἀρχή of the thing”).

- 10.19 At first glance, there appears to be some disparity between these passages and Aristoxenus' use of *συνέχεια*. Aristotle and the author of *Problem 36* have made *μέση* the “first principle” (*ἀρχή*) of attunement (*ἄρμονία* or τὸ ἡρμόσθαι), while for Aristoxenus the first principle of *ἄρμονική* is the rule of *συνέχεια*, which creates a coherent *μέλος ἡρμωσμένον*. Yet *Problem 19.36* provides a lexical bridge between these two Peripatetic *ἀρχαί*. Here *μέση* is said to be the “cause” of both “the cohesive” and “attunement” (τοῦ αἰτίου τοῦ ἡρμόσθαι καὶ τοῦ συνεχόντος). The syntactical coordination suggests that the two gloss each other as parallel creations of the generative force of *μέση*.
- 10.20 In fact, this linguistic connection between *μέση* and *συνέχεια* appears to be echoed in some dry word-play typical of Aristoxenus.<sup>17</sup> For *συνέχεια*, he asserts, “must be put in the position of a first principle” (θετέον οὖν τοῦτο πρῶτον εἰς ἀρχῆς τάξιν).<sup>18</sup> While *τάξις* and *ἀρχή* are common Peripatetic terms, both also have their specific uses in musical terminology. As we have seen, *τάξις* had long been the proper musicological term for the tuning of strings (cf. 9.31), while *μέση* was the *ἀρχή* in both reckoning them (9.28-34) and giving them their point of tonal reference. There is thus a secondary, almost allegorical, level to Aristoxenus' phrase, which might be rendered (somewhat tendentiously) as “this rule of *συνέχεια* must take the place of the [*sc.* old] position/tuning of *μέση*”. Without *συνέχεια*, he concludes, attunement is destroyed (οὐ μὴ ὑπαρχόντος ἀναρῆται τὸ ἡρμωσμένον), recalling the statement in *Problem 19.36* that “if *μέση* is changed, the other strings also sound spoiled” (ἔάν μὲν τις τῆν μέσην κινήσῃ, καὶ αἱ ἄλλαι χορδαὶ ἡχοῦσι φθειρόμεναι). And elsewhere the Musician wrote:

πολλὰς ἔχοντος διαφορὰς τοῦ ἡρμωσμένου κατὰ τὴν τῶν διαστημάτων σύνθεσιν, ἔστι τι τοιοῦτον ὃ κατὰ παντὸς ἡρμωσμένου ῥηθῆσεται ἕν τε καὶ

<sup>17</sup> Other examples of such humorless technical punning include the well-known jibe at *Harm.* 2 against the *ἄρμονικοί* as being interested only in *ἄρμονία* in its secondary sense of “enharmonic”, discussed in 7.6 (cf. ps.-Plut. *de Mus.* 1143e-f); the use at *Harm.* 1 of *δύναμις στοιχειώδη* (“elemental significance”) to describe the force of *ἄρμονική*, when the art itself is concerned with the specific *δύναμις* or ‘tonal significance’ of the various ‘harmonic elements’ which result when its own precepts are followed: cf. 7.30; the use at *Harm.* 54 of τὸ πρῶτον καὶ ἀναγκαιότατον τῶν συντηνόντων (“the first and most necessary of the things which apply”) to describe the cardinal rule of *συνέχεια*, which is best exemplified by the “tense” diatonic (διὰ τονον σύντονον).

<sup>18</sup> Aristox. *Harm.* 54.

ταύτων, τοιαύτην ἔχον δύνανται οἷαν αὐτὴν ἀναίρουμένην ἀναίρειν τὸ ἡρμωσμένον.<sup>19</sup>

Although attunement [τὸ ἡρμωσμένον] 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.

There is, then, strong lexical cohesion among the Peripatetic passages—unsurprising given the close professional association of the authors. For the Greek reader of decent musical education, it would be clear that Aristoxenus understands his cardinal rule of diatonic cohesion in relation to a classical method of tuning which is driven by μέση.

10.21 Plutarch provides further evidence for associating μέση with συνέχεια:

συνηρτησθαι δὲ πάσας καὶ συνετάχθαι κατὰ λόγους ἁρμονίους, ὧν ἑκάστης φύλακα Μοῦσαν εἶναι, τῆς μὲν πρώτης Ὑπάτην, τῆς δ' ἑσχάτης Νεάτην, Μέσην δὲ τῆς μεταξύ, συνέχουσας ἅμα καὶ συνεπιστρέφουσας . . . τὰ θνητὰ τοῖς θεοῖς καὶ τὰ περίγεια τοῖς οὐρανόις.<sup>20</sup>

All are harmonized and deployed together in accord with harmonic ratios, of each of which a Muse is guardian—Ὑπάτη of the first, Νεάτη of the last, and of the middle there is Μέση, holding together [sun<sup>o</sup>xousan] and nourishing mortals with gods, earthly things with celestial.

This passage corroborates the Aristotelian Problems, making the “cohesion” of the other strings dependent upon μέση: here the inadequacy of the translation “continuity” for συνέχεια, at least in its musical sense, is obvious. As argued in the last chapter (9.38-39), the mention of only ὑπάτη, νήτη, and μέση—the last emphasized in the tricolon crescendo—serves to schematize the epicentric arrangement, what Plutarch had earlier called the “boundaries” (ὄροι).<sup>21</sup> His language is drawn from Plato, who, in comparing musical harmony to that which unifies the tripartite soul,

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<sup>19</sup> Aristox. *Harm.* 19.

<sup>20</sup> Plut. *Quaest. conviv.* 745b.

<sup>21</sup> Plut. *Quaest. conviv.* 744c: οἱ τὰ διαστήματα παρέχοντες ὄροι, νήτη καὶ μέση καὶ ὑπάτη.

states that the three strings are “the boundaries of ἄρμονία”—all but ignoring the others:

συναρμόσαντα τρία ὄντα, ὡςπερ ὄρους τρεῖς ἄρμονίας ἀτεχνῶς, νεάτης τε καὶ ὑπάτης καὶ μέσης, καὶ εἰ ἄλλα ἄττα μεταξὺ τυγχάνει ὄντα, πάντα ταῦτα συνθῆσαντα καὶ παντάπασιν ἓνα γινόμενον ἐκ πολλῶν, σώφρονα καὶ ἡρμοσμένον.<sup>22</sup>

. . . harmonizing the three things which are, like the three boundaries of ἄρμονία—quite literally νήτη, ὑπάτη, and μέση (and if there happen to be some other things in between)—binding all these things together and for all becoming one from many, wise, and harmonized.

- 10.22 The idea of harmonic boundaries (ὄρους . . . ἄρμονίας) recalls Aristotle’s use of the epicentric arrangement as an example of something “defined in relation to some one thing” (πρὸς τι ἐν ὁρισμένον: cf. 9.27). The notion of μέση as a conjoining force (συνθῆσαντα) is repeated in the Myth of Er, where the central light (κατὰ μέσον τὸ φῶς) is said to be the “binding agent of the universe” (σύνδεσμον τοῦ οὐρανοῦ), “holding together the entire rotation” (πᾶσαν συνέχον τὴν περιφορὰν)<sup>23</sup>—important testimony for connecting the diatonic cycle with epicentric arrangement (cf. 10.40). Plato’s language recalls another of the Aristotelian *Problems*, where μέση is compared to a grammatical conjunction (σύνδεσμος) in its “binding together” of the other strings:

καθάπερ ἐκ τῶν λόγων ἐνίων ἐξαιρεθέντων συνδέσμων οὐκ ἔστιν ὁ λόγος Ἑλληνικός, οἷον τὸ τέ καὶ τὸ καί. ἔτιοι δὲ οὐθὲν λυποῦσι, διὰ τὸ τοῖς μὲν ἀναγκαῖον εἶναι χρῆσθαι πολλάκις, εἰ ἔσται λόγος, τοῖς δὲ μή. οὕτω καὶ τῶν φθόγγων ἡ μέση ὡςπερ σύνδεσμός ἐστι.<sup>24</sup>

. . . just as it is not Greek when some conjunctions are removed from speech, for example τε and καί. But some words cause no problem, since it is necessary to use certain words often, if it is to be intelligible speech, but others not. Likewise, of musical notes, μέση is like a conjunction.

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22 Pl. *Resp.* 4.443d-e.

23 Pl. *Resp.* 10.616b-c.

24 Ps.-Arist. *Pr.* 19.20.

10.23 The analogy might seem inane and of little help in understanding the function of μέση. But the *Problem* derives from a larger pattern of involvement between the musical and grammatical. In the euphonist theory refuted by Philodemus, we find an inversion of the analogy in *Problem* 19.20, so that a musical example is used to illustrate speech: when phonological elements are assembled in certain correct sequences, proper Greek (ἑλλητισμός) supervenes as a sort of harmony (ἄρμογή τις).<sup>25</sup> Musical influence on grammatical language and concepts has been traced to the atomist and Pythagorean theory of the fifth century.<sup>26</sup> This surely derives from the pairing of the two in education. Indeed, Archytas and Aristoxenus both held that γραμματική was actually a subdiscipline of μουσική.<sup>27</sup> But that the two passages just cited exploit the same analogy from opposite viewpoints suggests that the relationship was generally bilateral. The Greek notation, with notes designated by letters, is a perfect fusion of the musical and grammatical, providing a pre-Democritan archetype which goes back to the sixth century (cf. 7.57). In their basic, unmodified positions, the letters follow the diatonic progression.<sup>28</sup> This shines light on Aristoxenus' comparison of συνέχαια to the composition of words from letters, which are combined, not at random, but according to meaningful, known sequences.<sup>29</sup> Indeed, Aristoxenus' title ἈΡΜΟΝΙΚΑ ΣΤΟΙΧΕΙΑ itself alludes to the notion of musical "letters" (στοιχεῖα), so that ἄρμονική becomes a harmonic grammar in accord with the diatonic principles of συνέχαια, "the practice concerning attunement" (τὴν περὶ τὸ ἡρμοσμένον πραγματεῖαν).<sup>30</sup> Thus, in *Problem* 19.20, μέση may be understood as joining disparate harmonic 'words', formed through the cohesion (συνέχαια) of individual elements (στοιχεῖα). These 'words' (tetrachords?) would have a certain independent

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25 Philodem. *Poem.* 1.94.22-5 (Janko): Ὡς ἂν πάντων ὀρθῶς [εὐρίσ]κομένων ἑλλην[ισ]μὸς ἀποτελεῖται, καὶ ἄρμογή τις ἔστι τούτων ("when all of which [sc. these phonological elements] are correctly found, true Greek is produced, and there is a sort of harmony of these").

26 See Janko (2000), 173ff.

27 Aristox. fr. 72 = Quint. *Inst.* 1.10.17: *grammaticae quondam ac musicae iunctae fuerunt, si quidem Archytas atque Aristoxenus [v.l. Euenus] etiam subiectam grammaticen musicae putaverunt*; cf. Isid. *Etym.* 3.16.2: *eratque tam turpe musicam nescire quam litteras*

28 West (1992), 262.

29 Aristox. *Harm.* 27: φαίνεται δὲ τοιαύτη τις φύσις εἶναι τοῦ συνεχοῦς ἐν τῇ μελωδίᾳ οἷα καὶ ἐν τῇ λέξει περὶ τῶν γραμμάτων σύνθεσιν κ.τ.λ.; cf. *Harm.* 37; *Rhythm.* 2.8; abstracted at ps.-Plut. *de Mus.* 1144a-c, where the connection with συνέχαια is again explicit.

30 Alyp. 1 (367.5f.).

intelligibility, but would still need a central binding agent (σύνδεσμος) to conjoin them in syntactically intelligible sequences. When all these elements are present, ἄρμονία supervenes.

- 10.24 The first part of *Problem* 19.20, which the grammatical analogy is intended to illuminate, proves that μέση was not merely a useful ‘conjunction’ in the theoretical analysis of scales, or simply a tuning-tone, but served rather a tonal role in both the composition and actual performance of music:

Διὰ τί, ἔαν μὲν τις τὴν μέσῃν κινήσῃ ἡμῶν, ἀρμόσας τὰς ἄλλας χορδὰς, καὶ χρήτῃ τῷ ὀργάνῳ, οὐ μόνου ὅταν κατὰ τὸν τῆς μέσης γένηται φθόγγου, λυπεῖ καὶ φαίνεται ἀνάρμοστος, ἀλλὰ καὶ κατὰ τὴν ἄλλην μελωδίαν ἔαν δὲ τὴν λιχανὸν ἢ τινα ἄλλον φθόγγου, τότε φαίνεται διαφέρειν μόνου, ὅταν κἀκεῖνη τις χρήτῃ. Ἡ εὐλόγως τοῦτο συμβαίνει πάντα γὰρ τὰ χρηστὰ μέλη πολλάκις τῇ μέσῃ χρήτῃ, καὶ πάντες οἱ ἀγαθοὶ ποιηταὶ πυκνὰ πρὸς τὴν μέσῃν ἀπαντῶσι, κἂν ἀπέλθωσι, ταχὺ ἐπανέρχονται, πρὸς δὲ ἄλλην οὕτως οὐδεμίαν.<sup>31</sup>

Why is it that, if someone moves μέση, after tuning the other strings, and uses the instrument, it grates and sounds out of tune, not only when it comes to μέση, but also during the rest of the melody; yet if someone changes λιχανός or some other note, then the instrument appears to be out of tune only when someone uses that string? Is this only to be expected? For all good melodies make frequent use of μέση, and all the good composers . . . if they depart from μέση, quickly return to it, as they do to no other string.

- 10.25 This passage provided Winnington-Ingram with the only real evidence bearing on his criterion for modal function, namely the hierarchical importance of notes within a tuning; it clearly shows that μέση was “the tonic (or something like a tonic) of all good melodies”. The question, then, was whether this *Problem* referred to thetic or dynamic μέση (cf. 8.2-4). Was the point of tonal reference always μέση as defined in the disjunct Dorian octave, regardless of where the structure appeared, for example, in a complex Hellenistic composition? Or was it the fourth note from the bottom in any species of the octave? Winnington-Ingram seems to have been drawn to the latter explanation, for it “at least provides modal variety; and some of the fragments seem to support it”—a view which had been held by Westphal, Gevaert, and Mountford. The opposite interpretation, embraced by Munro and Macran, was thought to be supported

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<sup>31</sup> Ps.-Arist. *Pr.* 19.20.

by the Aristotelian Problems, Aristoxenus, and Cleonides, where only the dynamic nomenclature of the *σύστημα τέλειον* ever seemed to be used. Yet this, too, was unacceptable to Winnington-Ingram, because “it cannot adequately account for the differences of character (ἡθός) so commonly ascribed to them [*sc.* the ἁρμονία]”. This dilemma ultimately led him to reject any original equation between the octave species and the Classical ἁρμονία; Dorian μέση, which he saw in *Problem* 19.20, was indeed the Greek tonal center, but this was “true only for a limited period, that which saw the systematization of Greek musical theory by Aristoxenus”.<sup>32</sup>

- 10.26 One can only wonder how Winnington-Ingram’s views might have changed with the knowledge that systematic, cyclical diatony was not first invented by the Greeks in the fifth or fourth centuries; for, to judge from his collection of offprints,<sup>33</sup> he was almost certainly aware of the cuneiform discoveries. At any rate, the arguments of the last two chapters have undermined some of the *a priori* assumptions he was forced to make by the limitations of the evidence available to him. He held, for instance, that the original thetic nomenclature “in itself . . . implies nothing about the functions of the notes”, while Aristotle, in the *Metaphysics* passage (9.27), was merely “contemplating the arrangement of notes in a scale rather than their functions”.<sup>34</sup> Yet it is now clear that Aristotle knew a definite function for μέση, that this was implicit in his example of the epicentric arrangement which looked back to the Archaic heptachord (9.35), and that this system of tuning was very much more ancient than the theorists would lead us to believe. Likewise, the Aristotelian *Problems*, though they do use the dynamic nomenclature of the *σύστημα τέλειον*, often do so in discussions about this ancient state of affairs; the ambiguities considered in the last chapter derive from a conflict between the dynamic and thetic approaches. Thus we arrive at the pre-Aristoxenean perspective. The Peripatetic testimony about μέση as a sort of tonal center cannot, in fact, be categorically restricted to μέση in the disjunction; Winnington-Ingram himself felt that this hypothesis was “perhaps not very likely in view of the general terms of the text”.<sup>35</sup> And yet how can thetic μέση, as the fourth string from either end in the ancient epicentric heptachord, fulfill a consistent role as tonal center in a variety of tunings, if these were not contiguous heptachords?

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<sup>32</sup> Winnington-Ingram (1936), 6-9; cf. 81-4.

<sup>33</sup> These are also kept at the Institute of Classical Studies in London and contain, like Winnington-Ingram’s edition of Jan (1895), valuable marginalia.

<sup>34</sup> Winnington-Ingram (1936), 4.

<sup>35</sup> Winnington-Ingram (1936), 8.

10.27 Given the great changes music had undergone since the heptachordy norm of the Archaic and early Classical periods, we might suppose that the epicentric method was no longer sufficient, or that its simple structure had now been obscured by the tonally more elaborate structures of the New Music. πολυχχορδία, I have argued, obscured the literal ‘continuity’ or ‘cohesion’ of the ancient seven strings on the crossbar of the lyre (cf. 8.74, 9.30). The rule of συνέχεια let these basic heptatonic structures maintain their identity in a variety of modulatory or ‘polymelic’ musical environments, for instance in the eleven-stringed accompaniments (ῥυθμοῖς ἑνδεκάκρουμάτοις) of the Timothean lyre. The new approach allowed dynamic μέση, as defined in the basic Dorian octachord of the σύστημα τέλειον, to be identified in tone-structures of more than seven strings; but the ancient heptachordal structures were still seen as ‘circulating’ in an abstract tonal realm. Thus we learn from Cleonides that the Aristoxenean revision could account for tuning systems (συστήματα) containing more than one ‘μέση’:

ἁπλᾶ μὲν οὖν ἔστι τὰ πρὸς μίαν μέσην ἡρμοσμένα, διπλᾶ δὲ τὰ πρὸς δύο, τριπλᾶ δὲ τὰ πρὸς τρεῖς, πολλαπλάσια δὲ τὰ πρὸς πλείους.<sup>36</sup>

Simple [*sc.* systems] are those tuned to one μέση, double are those [tuned] to two, triple are those [tuned] to three, multiform are those [tuned] to more.

10.28 Whether a system was single, double, triple, or multiple depends on how many properly constituted μέλη ἡρμοσμένα of the Dorian type could be detected. In the extant work of Aristoxenus, τὸ ἡρμοσμένον, the attuned scale, is only ever allied to the rule of συνέχεια. In Cleonides, however, ἡρμοσμένα shows that similar structures are envisioned, yet here συνέχεια is not adduced; the important thing is rather how the other strings stand in an attuned relationship to μέση. As an Aristoxenean writer, Cleonides’ statement serves to link the master’s definition of “cohesive attunement” (τὸ ἡρμοσμένον) with the Aristotelian descriptions about the prominence of μέση, illuminating an aspect of συνέχεια which has been obscured by the fragmentary state of the *Elementa Harmonica*.

10.29 There is, however, one passage of the treatise which touches on this hidden issue:

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<sup>36</sup> Cleonid. 11 (201.16ff.); cf. Aristid. Quint. 1.8 (14.23-26): τὰ δὲ μεταβαλλόμενα [*sc.* συστήματα], τὰ πλείους ἔχοντα μέσας.

διὰ τί γὰρ μέσης μὲν καὶ παραμέσης ἓν ἔστι διάστημα καὶ πάλιν αὖ μέσης τε καὶ ὑπάτης καὶ τῶν ἄλλων ὅσοι (μὴ) κινούνται τῶν φθόγγων, τὰ δὲ μέσης καὶ λιχανοῦ διαστήματα πολλὰ θετέον εἶναι.<sup>37</sup>

For why is it that there is one interval between μέση and παραμέση and again between μέση and both ὑπάτη and as many others as do not change pitch, while it must be ruled that there are many intervals between μέση and λιχανός?

Aristoxenus is paraphrasing a common musicological question, which he intends to refute. The form of expression (διὰ τί γὰρ) recalls the Aristotelian *Problems*, perhaps yielding a glimpse of how Aristoxenus' θεωρία represented a reconsideration of older concepts which he needed to justify to his Peripatetic colleagues—who, as we have seen, were concerned with the history of the ancient heptachord and its transformation. The issue at hand is the intonational variability of certain degrees of the scale—the so-called movable strings (οἱ κινούμενοι: cf. 7.2), of which λιχανός is adduced as an example—as against the fixed boundary notes μέση, παραμέση, ὑπάτη (and by implication νήτη). Aristoxenus imagines all possible intervals that might be taken with μέση, dividing them into those of fixed and variable size, as though this is how the problem would naturally be—or was in fact—posed.

- 10.30 Since a number of intervals can arise between a fixed and movable string, some wondered why a different name should not be devised for each magnitude. Aristoxenus rejects the proposal on the grounds that “we will need an infinite number of names” (ἀπείρων ὀνομάτων δεησόμεθα).<sup>38</sup> Conversely, such a nomenclature could not differentiate between intervals of identical magnitude which were *not* equivalent “with respect to their tonal meaning” (κατὰ τὴν ὄψιν).<sup>39</sup> According to the rule of συνέχεια, for example, a consonant fifth or fourth will occur between successive pairs of strings, yet each has a different tonal meaning within the tuning. By the same token, a distance of five strings might in one tuning span a consonant fifth, but not in another; hence the distinction between τὸ [διάστημα] διὰ πάντες and ἡ [συμφωνία] διὰ πάντες.<sup>40</sup> Aristoxenus insists that, though the moveable strings vary in

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<sup>37</sup> Aristox. *Harm.* 47.

<sup>38</sup> Aristox. *Harm.* 48.

<sup>39</sup> Aristox. *Harm.* 47.

<sup>40</sup> Aristox. *Harm.* 48.

their intonation, “the tonal meaning of the notes remain” (τὰς τῶν φθόγγων δυνάμεις διαμένειν),<sup>41</sup> and so he is justified in retaining a single name for each string.

- 10.31 Clearly, then, the concept of δύνάμεις is one of mutual relation. Thus Ptolemy defines it as “how something stands in relation to something else” (τὸ πρὸς τι πῶς ἔχου),<sup>42</sup> while Aristoxenus says that the names “have been so called in relation to each other” (πρὸς ἄλληλα γὰρ λέλεκται).<sup>43</sup> But since a collection of variable pitches can evince among themselves an infinite number of such dynamic relationships, a limited array of tonal meanings can only come through some structural constant. Cleonides provides us with the Aristoxenean position, that the δύνάμεις of a note was understood by “how it stands” (τὸ . . . πῶς ἔχειν) in relation to μέση.<sup>44</sup> The notion of musical “intelligibility”, bestowed by μέση, recalls Aristotle’s definition, cited above, of an ἀρχή as “that from which a thing is known” (ἡ δὲ . . . ὅθεν γνωστὸν τὸ πρᾶγμα). We come full circle to *Problem* 19.36, where the “attunement” and “cohesion” of ἀρμονία consisted in “each note standing in some relation to μέση” (τὸ ἔχειν πῶς πρὸς τὴν μέσην). Thus, Aristoxenus concludes as he began, with specific examples of δυνάμεις calculated in relation to μέση, where “let this be a sufficient response to their confusion” (πρὸς μὲν τὴν διαπορίαν τοσαῦτα εἰρήσθω) shows that these epicentric examples would be readily intelligible to his audience:

41 Aristox. *Harm.* 49.

42 Ptol. *Harm.* 2.5 (52.10); cf. schol. ad 51.18: δύνάμιν λέγει τὸν λόγον, ὃν ἔχει ἡ μία χορδῆ πρὸς τὸν ἕτερον.

43 Aristox. *Harm.* 50.

44 Cleonid. 11 (202.3-5): ἀπὸ δὲ τῆς μέσης καὶ τῶν λοιπῶν φθόγγων αἱ δυνάμεις γνωρίζονται, τὸ γὰρ πῶς ἔχειν ἕκαστον αὐτῶν πρὸς τὴν μέσην φανερώς γίνεται (“And the functions of the rest of the notes are known from μέση, for how each of them is clearly arises in relation to μέση”); cf. Aristox. *Harm.* 36: τὸ περὶ τῶν φθόγγων εἰπεῖν ὅσοι τ’ εἰσὶ καὶ τίμιν γνωρίζονται καὶ πότερον τάσεις τινές εἰσιν, ὥσπερ οἱ πολλοὶ ὑπολαμβάνουσι, ἢ δυνάμεις (“to speak about ‘notes’ [φθόγγοι], how many they are, by what means they are understood, and whether they are mere pitches [τάσεις], as most people suppose, or musical functions [δυνάμεις]”); 69: κατὰ . . . τὰς τῶν φθόγγων τάσεις ἀπειρά πῶς φαίνεται εἶναι τὰ περὶ μέλος, κατὰ δὲ τὰς δυνάμεις . . . πεπερασμένα τε καὶ τεταγμένα (“in terms of the *pitches* of notes, the components of a scale appear to be infinite, but in terms of ‘tonal significance’ they are bounded and ordered”); [Cleonid.] 14 (207.11f.): δύνάμεις ἔστι τάξις φθόγγου, δι’ ἧς γνωρίζομεν τῶν φθόγγων ἕκαστον.

ὡσπερ γὰρ ὁ τέταρτος ἀπὸ τῆς μέσης ὑπάτη πρὸς μέσην λέγεται, οὕτως ὁ ἑχόμενος τῆς μέσης λιχανὸς πρὸς μέσην λέγεται.<sup>45</sup>

For just as the fourth note from μέση is called ὑπάτη in relation to μέση, so the note adjacent to μέση is called λιχανὸς in relation to μέση.

- 10.32 Since δύναμις is defined by mutual relationship, μέση must have its own tonal significance from its relation to the other pitches of a tuning. Thus Cleonides defines the δύναμις of μέση as the position it occupies in the Dorian octave of the Perfect System.<sup>46</sup> This shows that his statement just cited—τὸ γὰρ πῶς ἔχαι ἑκάστου αὐτῶν πρὸς τὴν μέσην φανερώς γίνεται—refers specifically to the calculation of the normal Dorian dynamic values used throughout Aristoxenean theory. In other words, for Aristoxenus the structural constant which determines δυνάμεις is not the old thetic, but the new dynamic μέση.
- 10.33 Yet it should now be clear from the non-Aristoxenean material that a tonal organization around thetic μέση preceded the σύστημα τέλειον, being the essential function of the epicentric heptachord. The evidence of Dio suggests that it also endured beyond the theoretical innovations of the fourth century, and this is corroborated by Nicomachus and Plutarch, who preserve knowledge of the epicentric heptachord in cosmological contexts. Taken together, the evidence shows that the ancient thetic μέση provided tonal meaning for a number of heptatonic ἁρμονίαι. Variety of ‘mode’—a better word is now needed, perhaps ‘tonal construction’—comes from the changing δυνάμεις of the strings towards μέση, whose pitch is a constant. Conversely, the tonal significance or meaning of μέση would change from one ἁρμονία to the next, since it would be surrounded in each by a different set of pitches. μέση was the source of cohesive diatonic tonality, since these tunings were the original prerogative of the heptatonic lyre in its classical, Terpanorean form. We must accept, in short, that the Greeks knew the diatonic cycle at a very early date, and that this was the “ἁρμονία which our fathers handed down”. I have offered some suggestions as to how the irregular ἁρμονίαι of Aristides Quintilianus and the Libation Music of Olympus could have stood alongside this τέχνη (cf. 1.12, 7.62). Other explanations might be devised. But such tone-structures can no longer exclude the co- or pre-existence of the diatonic octave species.

<sup>45</sup> Aristox. *Harm.* 50.

<sup>46</sup> Cleonid. 11 (201.18ff.): ἔστι δὲ μέση φθόγγου δύναμις, ᾧ συμβέβηκε κατὰ μὲν διαίρεσιν ἐπὶ μὲν τὸ ὄξυ τόνου ἔχειν ἀσύνθετον κ.τ.λ.

- 10.34 The final proof the larger thesis, that the Greeks learned their diatonic cycle from the Near East, would be to demonstrate a similar epicentric tonal construction in the Mesopotamian musical evidence. It is inconceivable that two musical traditions, geographically adjacent, could not only develop, independently, analogous centralized string-nomenclatures, but also endow them with analogous musical functions. Indeed, given the historical and technical framework that has now been established, even the most distant sympathy should suffice to close the case—which is fortunate, because very little new information can be gleaned from the tablets.
- 10.35 One issue which has remained open is the extent to which the Retuning Text should be restored.<sup>47</sup> Gurney (1968), taking a practical view of the text, would restore the cycle from *išartum* to *īšartum*, that is, through eight phases—the cycle being complete only when the first tuning has been replicated one semitone higher or lower (depending on direction of pitch). A musician could then proceed to any of the seven tunings by the most direct route, three strings at the most ever needing to be retuned.<sup>48</sup> The change of pitch in the repeated first tuning would be unimportant if the musician were a soloist, since a pitch standard would not be needed to coordinate several instruments. In favor of the practical view, one might cite the text's second-person form of address.
- 10.36 Crocker (1997), however, sees the return to *īšartum* as redundant; the diatonic cycle comprises seven distinct pitch-sets, and when these have been shown, the text should be complete.<sup>49</sup> I have already argued that the Retuning Text was a universal tone-

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<sup>47</sup> See Wulstan (1968), 221; Gurney (1968) 232f.; Duchesne-Guillemin (1969a), 12; Gurney (1994), 102ff.

<sup>48</sup> Gurney (1994), 104: "It seemed obvious that without this the cycle would not be complete; there would be no instruction for retuning from *išartum* to *qablītum* or vice versa . . . This text would be used by any solo player who knew he had a particular tuning and wished to convert it into another. He was free to choose his own pitch, and with this scheme no more than three strings would ever need to be retuned at a time. But without the initial and final *īšartum* six steps would be necessary to convert *qablītum* into *īšartum* and vice versa, when it could be done in one".

<sup>49</sup> Crocker (1997), 193f.: "It seems to be essential to the tuning text to proceed by *consistently* tightening strings, or, alternatively, by consistently loosening them . . . When we execute the procedure in this way, each alteration of a string produces a new configuration of tones and semitones within the octave . . . Furthermore, while each

system useful for all musicians, not merely soloists (10.2-4). It also seems likely that a well-trained musician would know how to change his tunings without needing to consult a textbook; as I have argued (10.12), the lack of specific Akkadian terminology in the Greek evidence suggests that diatonic music could be learned orally, without the written documentation of the tablets. Important textual parallels come from CBS 10996 which, in its omission of the antiphonal octave (6.13), demonstrates a similar disregard for the redundancy of heptatonic phenomena; and from VAT 10101, which lists only the seven tuning names (U.3011 cannot be used to support either case, for the tablet is incomplete).

10.37 Beyond this, one can do no better than to cite the Greek view (cf. 7.25) that “Seven are the pitches of the octave, and the tunings are the same in number” (ἑπτὰ δὲ φθόγγοι τῆς διὰ πασῶν καὶ ἁρμονίαι τοσαῦται).<sup>50</sup> The most eloquent statement of this position is Ptolemy’s argument for seven rather than eight or more τόνοι; the technical perspective is different from that of the Retuning Text, but the underlying tonal issue is identical:

ὥς οἱ μὲν ἐνδοτέρω τοῦ διὰ πασῶν ἀφορίζοντες τοὺς ἄκρους τῶν τόνων οὐκ ἔστιν ἀποκαθεστηκότες τὸ ἡρμοσμένον—ἔσται γὰρ τις ὑπὲρ αὐτοῦ ἀνόμοιος ἅπασιν τοῖς πρώτοις—οἱ δὲ ὑπερακρίπτουτες τοῦ διὰ πασῶν τοὺς ἄπ’ αὐτοῦ τοῦ διὰ πασῶν ἄπωτέρω παραλκόντως ὑποτίθενται, τοὺς αὐτοὺς ἀεὶ γινομένους τοῖς προελημμένους . . . οὐ δεόντως οὖν οὐδέ οἱ μέχρι μόνου τοῦ διὰ πασῶν προελθόντες συγκαταριθμοῦσι τοῖς τόνοις τὸν τῷ ἕξαρχῆς διὰ πασῶν. ταῦτόν γὰρ φανήσονται πεποιηθέντες τοῖς ὑπερβαίνουσι τὸν ἐκκείμενον ὄρον, πλὴν καθ’ ὅσον οὗτοι μὲν ἐφ’ ἑνός, ἐκεῖνοι δὲ ἐπὶ πλείονων . . . εἰ γὰρ ἅπαξ λαμβάνεται τις ὁ αὐτὸς ἐπὶ τῶν προκειμένων ὥς ὁ διὰ πασῶν τῷ ἕξαρχῆς, τί κωλύει, φήσαιεν ἄν, προστίθεσθαι καὶ τοὺς τοῖς λοιποῖς ἕξης ὄντας ἀνάλογον.<sup>51</sup>

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configuration is different from the preceding one in the process, after seven such configurations the eighth is the same as the first. The order, then, in which the strings are to be altered is of the essence: “Do this, and you will create the seven tunings”. We can conclude that this most elegant expression of the seven tunings was the intended purpose of the retuning text”.

<sup>50</sup> Alex. Aphr. *In Metaph.* 1093a13.

<sup>51</sup> Ptol. *Harm.* 2.8 (59.6-20).

Thus, those who define the limits of the **τόνοι** at less than an octave would not have cycled through the attunement [**ἀποκαθεστηκότες τὸ ἡρμοσμένον**]<sup>52</sup>—for there will remain, besides them, some one **τόνος** beyond, different from all the first ones—but those who blunder beyond the octave redundantly hypothesize their **τόνοι** beyond the octave itself, since these are always the same as the previous ones . . . And so even those who go only as far as the octave ought not to number among the **τόνοι** that one which is at an octave from the first **τόνος**. For clearly they make the same mistake as those who exceed the stated limit, except that this excess is that of one **τόνος**, while theirs is of more . . . For if once some one identical **τόνος** is accepted in addition to those that have gone before, like that which is at an octave from the first, what, they might ask, prevents the next **τόνοι** in the sequence from being added by analogy?

- 10.38 In this light, one should consider a curious, seven-part division of the citharodic **νόμος**, attributed to Terpander himself:

μέρη δὲ τοῦ κιθαρωδικοῦ νόμου, Τερπάνδρου καταλείματος, ἑπτὰ: ἀρχά, μεταρχά, κατατροπά, μετακατατροπά, ὀμφαλός, σφραγίς, ἐπίλογος.<sup>52</sup>

The parts of the citharodic *nomos*, as apportioned by Terpander, are seven: beginning, after-beginning, down-turn, after-down-turn, center (lit. navel), seal, conclusion.

A number of sources attribute specific compositions to Terpander, allegedly named from ethnics, rhythms, and styles.<sup>53</sup> Like other **νόμοι** of which there is notice, these titles probably derive, for the most part, from the musicologists of the Classical and Hellenistic periods, on the basis of internal features or scholarly deduction.<sup>54</sup> But the passage of Pollux under consideration is somewhat different. It does not seem to be a

<sup>52</sup> Poll. *Onom.* 4.66.

<sup>53</sup> Heraclid. Pont. *ap. ps.-Plut. De mus.* 1132d: ἐκεῖνος γοῦν τοὺς κιθαρωδικοὺς πρότερος ὠνόμασε, Βοιωτίων τινα καὶ Αἰόλιον Τροχαίων τε καὶ Τερπάνδρειον καλῶν, ἀλλὰ μὴν καὶ Τετραοίδιον; Schol. EF *ad. Ar. Ach.* 13: τὸ δὲ Βοιωτίον μέλος οὕτω καλούμενον, ὅπερ εἶρε Τέρπανδρος, ὡσπερ καὶ τὸ Φρύγιον; *Suda* s.v. ὄρθιον νόμον καὶ τροχαίου: τοὺς δύο νόμους ἀπὸ τῶν ῥυθμῶν ὠνόμασε Τέρπανδρος, ἀνατεταμένοι δ' ἦσαν καὶ εὐτῶνοι; Phot. *Lex.* s.v. νόμος: ὁ κιθαρωδικὸς τρόπος τῆς μελωδίας, ἀρμονίαν ἔχων τακτὴν καὶ ῥυθμὸν ὠρισμένον ἦσαν δὲ ἑπτὰ οἱ ὑπὸ Τερπάνδρου ὄντες εἰς ὄρθιος, τετράδιος, ὀξύς.

<sup>54</sup> See Barker (1982-9), 1.250.

case of individual citharodic νόμοι, for he has already mentioned some of the more familiar Terpandrian pieces.<sup>55</sup> Nor does it seem to be a particular composition with many sections, for Pollux speaks of *the* citharodic νόμος, as though the sevenfold division somehow embraced the genre as a whole. These names are not attested elsewhere, but Photius also speaks of “the citharodic style of melody . . . there were seven according to Terpander (ὁ κιθαρωδικὸς τρόπος τῆς μελωδίας . . . ἦσαν δὲ ἑπτὰ οἱ ὑπὸ Τερπάνδρου). Interestingly, only three names are given here (ὄρθιος, τετραόδιος, ὀξύς)—all of which are attested in the other sources as titles of individual compositions. Together these sources suggest that Terpander was associated with some seven-fold organization of citharodic tuning, even if the precise terminology was largely forgotten.

- 10.39 And yet the names given by Pollux are quite suggestive in relation to the diatonic cycle. This is not to propose a one-to-one relationship with Akkadian terms—although κατατροπή is strikingly similar to *šihip* (“overturn”), which separates successive tunings in U.3011, as though encapsulating in a single word the modulatory process which is detailed in the Retuning Text. More important is the general sense of progression to the names, with a definite starting point (ἀρχή) followed by something of the same kind but next in sequence (μεταρχή); κατατροπή and μετακατατροπή lend themselves to a similar motion. This might recall the pairs Lydian/Hypolydian, Phrygian/Hypophrygian, Dorian/Hypodorian, the τόνοι separated from each other by a fourth in the Perfect System, but with the same structural differences as successive tunings in the Symphonic Circle. ὀμφαλός, occupying the fifth rather than fourth of seven positions, is not precisely the “navel”; but in view of the Greek and Mesopotamian emphasis on musical middleness, including the tuning *qablītum*, the term is certainly pregnant. σφραγίς and ἐπίλογος might seem better suited to sections of an individual composition, though ἐπίλογος could be the “conclusion” to any type of sequence. Overall, then, Terpander’s seven-part citharodic νόμος could distantly attest the full cycle that would naturally accompany the heptatonic instrument he is said to have invented. The motley collection of names might be accounted for by the same logic used to explain the titles of other νόμοι; an historically accurate sevenfold division could have been filled in with terms cobbled together from incomplete information by educated guess-work.

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<sup>55</sup> Poll. *Onom.* 4.65: νόμοι δ’ οἱ Τερπάνδρου ἀπὸ μὲν τῶν ἔθνων ὄθεν ἦν, Αἰόλιος καὶ Βοιωτικός, ἀπὸ δὲ ῥυθμῶν ὄρθιος καὶ τροχαίος, ἀπὸ δὲ τρόπων ὀξύς καὶ τετραοίδιος, ἀπὸ δ’ αὐτοῦ καὶ τοῦ ἔρωμένου Τερπάνδρειος καὶ Καπίων.

- 10.40 If one accepts that the Retuning Text gave seven rather than eight phases, a provocative correlation between the nine epicentric strings and the Symphonic Circle presents itself; for in this case, it will be noticed, the fifth string is the only one of the company whose pitch does not change (see diagram in Appendix B). This would let us see the arrangement 123454321, with all the strings so ordered to emphasize a centerpoint, as a sort of illustration of the musical phenomena of the Retuning Text. This would also serve to link the two halves of U.3011 column 1, where the epicentric strings are followed closely or immediately (depending on the exemplar) by a list of the tunings which they express, in the same order that they occur in the Symphonic Circle. The parallels to the Greek material discussed above should be obvious, in particular *Problem* 19.36 with its implication that the pitch of μέση is not to be moved, lest the tuning of the other strings be damaged.
- 10.41 The evidence is sufficient, I hope, to prove finally an historical connection between the Greek art of ἄρμονικῆ and the Symphonic Circle of Mesopotamia. The evidence suggests a centralized approach to diatonic music which goes far beyond a mere arrangement of convenience. *pitnu*, ἄρμονία, and διατόνος itself reveal a very ancient metaphor of tonal construction. This is consistent with the concept of δύναμις, the ‘tonal meaning’ which arises from the connection of two pitches. In the Archaic Greek heptatonic lyre, this tonality was built up through a tuning’s relation to μέση, and this τέχνη continued well beyond the polychordal period. Further examination of the evidence for “epicentric tonal construction” might yield a more coherent and detailed picture. For it is now seen that nearly every key concept of Greek theory—μέση, συνέχαια, δύναμις, the τόνοι, the mechanism of μεταβολή, the process of interval rotation, the names of the fourth, fifth, and octave—has its roots in the Archaic heptachordal melic. With the diatonic cycle as a constant in the history of Greek music from the Orientalizing period onwards, the possible explanations for the other phenomena—the scales of Aristides Quintilianus, the Libation music, the origin of the γάνη, πολυχχορδία, and the contributions of the New Musicians—may be greatly constrained. It may even be possible to deduce from the Greek evidence more information about the ancient Mesopotamian artform itself—the original Invention of Music.