The Sound of Music: On the Ancient Greek Modes
(Peter L.P. Simpson)

Introduction: Two Problems

My discussion begins from the well-known but still obscure facts alleged about music and its moral effects by Plato and Aristotle, and also by the Pythagorean tradition more generally. The problems these facts pose are basically two: what were the Greek modes, and how could they have the alleged moral effects? I will take each problem in turn beginning with the first.

False Solution to the First Problem

a) The Solution: I will illustrate the standard modern way of understanding the ancient Greek modes from an article by Robert Wallace.[1]

> It is the standard view that Damon correlated *harmoniai* with *ethos*: that is, with types of behavior and character. We find such correlations in book 3 (398c-399c) or Plato's *Republic* and many later sources… How did the correlations work? It has always puzzled scholars that a shift even of one note in a scale could have produced profoundly different emotional and behavioral effects. For example, as the scales in Barker and West indicate, the Dorian *harmonia* differs from the Phrygian *harmonia* only in the last note of the scale… Yet every ancient source describes these *harmoniai* as entirely different in character…
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> …in Damon's period the *harmoniai* in themselves mostly did not have simple *ethos* correlations. Sad or happy or serious music could be played in any *harmonia*… If [Damon] could not have categorized the *ethos* of each individual *harmonia* because that *ethos* varied from song to song, what remains are the other variable qualities of music, the *poikilia*, including pitch and tempo, *agoge*, an in interest in which *Republic* 400 expressly attributes to him…

Other scholars say similar things. Whatever the ethos of the different modes was it could not, despite the unanimous testimony of ancient authors, have been a matter of difference in scale. It must have been a function of many other things and in the end, perhaps, just a matter of subjective preference or national prejudice.

b) The Falseness of the Solution: The result of this view of Greek music is that the Greek modes cannot have had the effects alleged by Plato and Aristotle, or that the effects were largely subjective to the Greeks of the day (or to Plato and Aristotle in particular), or that they were in fact brought about, not by the mere difference in intervals between the several modes, but by a whole range of differences extending to style, pitch, mannerisms, cultural associations, and the like. But none of this is plausible. Plato and Aristotle were not prey to irrational illusions; they were not modern subjectivists or caught by merely subjective phenomena; they were not speaking of differences in style and mannerisms.

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[1] 'Performing Damon's *Harmoniai*,' in *Ancient Greek Music in Performance* eds. Stefan Hagel and Christine Harrauer (Verlag der Österriechischen Akademie der Wissenschaften, Vienna, 2005): 148,155-56.

We should conclude, therefore, that modern scholarship about the ancient Greek modes is mistaken and, indeed, that it is looking in the wrong place for answers. If the modes were anything like what Plato and Aristotle and the Pythagoreans said they were, they were not differentiated in the only ways that modern scholars speak or think of.

c) The Reason for the Error: The main reason that this solution does not, and cannot, work is that it confessedly starts from the standard accounts of Greek musical theory that we get in the ancient writings on the subject. The surprise here is that these texts themselves, or rather the text to which they all go back and rely on even when they criticize it, confess ignorance of the Greek modes as they were understood in the time of Plato and Aristotle.[2] One wonders, therefore, why modern scholars insist on using these texts as their guide. If one says that scholars have no choice, this is first not true (the essential facts of music are not time-dependent and can be investigated with as much direct experiment now as they ever were in the past), and second not an answer. For if the ancient texts say they don't know what they are talking about, that is a reason to ignore them, not a reason to use them.

The text to which all other texts go back is the *Harmonic Elements* of Aristoxenus, the early books of which, at any rate, survive largely intact. These books contain a sustained attack and critique of those whom Aristoxenus calls the harmonists, or in other words the modalists (for *harmonia* is the Greek for a musical mode). Aristoxenus basically says, and several times, that these modalists did not understand the first thing about music and got just about everything wrong. To correct their errors and to put the science of music on a sound footing, Aristoxenus undertakes to expound the science properly and for the first time. In other words, Aristoxenus is throwing out all the theorizing that was going on in his own day and replacing it with something new. One of the significant things about the something new he introduces is that it has no place for the modes as traditionally understood. Indeed Aristoxenus dismisses these modes as so much confusion and even childish ethno-centrism. We ought, therefore, to conclude, and certainly scholars of ancient Greek music should conclude, that everything about Greek musical theory that comes to us from Aristoxenus is going to be of next to no help in understanding what Plato or Aristotle or Pythagoras meant. We ought, therefore, to throw out from the very start that archetypal piece of Aristoxenan musical theory, namely the division of scales into tetrachords (or at least into tetrachords that are understood as always intervals of a fourth) According to Aristoxenus the way to understand music is to understand singing, and the way to understand singing is to start with the smallest consonant interval, namely the fourth. The next consonant interval, the fifth, produces, when joined to a fourth, the final consonant interval of the octave (according to Aristoxenus only these three intervals are consonant). Actually the way that Aristoxenus does this is by combining fourths through the interval of a tone, since a fourth plus a tone produces a fifth, and a fourth plus a tone plus a fourth produces an octave. All Aristoxenus' scales, including his equivalents of the ancient modes (for he uses the names of the modes for some of his scales), are constructed out of different kinds of tetrachords and their combinations.

Aristoxenus's tetrachords are intervals of a fourth, and in order for them to remain so the two notes that bound the interval must be immovable with respect to each other

[2] Wallace, *op. cit.,* p. 147

(for if either moved in pitch while the other did not the interval would cease to be a fourth). The two notes that are internal to the tetrachord can, however, be moved for they will not affect the overall interval of the tetrachord. Aristoxenus' theory, therefore, consists of tetrachords composed of two immovable and two movable notes. The two movable notes produce, by moving closer to each other and to the lowest of the two immovable notes, the three genera or kinds of tetrachord: the diatonic when these two notes are separated from each other and from the lowest note by intervals of a tone; the chromatic when they are separated by semitones; the enharmonic (that is, the modal as Aristoxenus understand modes) when they are separated by intervals of a quartertone. Aristoxenus is not precise in the way that we are about the intervals of the semitone or the tone because he allows there to be semitones and tones of different sizes. In fact he has three sizes of semitone and two sizes of tone. This produces six varieties in all: one size of quartertone (Aristoxenus did not allow that there could be intervals smaller than the human voice could easily sing, and the quartertone, or diesis, is the smallest such interval and cannot be divided further), three of semitone, and two of tone. Hence we get not only chromatic and diatonic tetrachords but also the soft and hemiolic and tonic chromatics and the soft and tense diatonics which, with the single enharmonic, give six genera in all[3]

But all this is merely by way of curiosity. It has, and can have, no relevance for understanding what Plato and Aristotle meant by the modes. It only has relevance for understanding all the extant texts of Greek musical theory, every one of which follows Aristoxenus in talking about tetrachords and the division and classification of scales according to different ways of combining different kinds of tetrachord.

How and why Aristoxenus ended up inventing a theory of music based on tretrachords like this would make an interesting story, but essentially a useless one. The theory, while of enormous importance historically (for it influenced thinking and practice right through to the end of the middle ages), is musically arbitrary. There is no necessary reason to base scales on Aristoxenan tetrachords; there is no necessary reason to construct tetrachords downwards (as Aristoxenus always does); there is no necessary reason to confine consonant intervals to fourths and fifths and octaves; there is no necessary reason to limit tones and semitones and quartertones to the few varieties that Aristoxenus allows. Of course, Aristoxenus could, and did, appeal to the limits imposed by the capacity of the human voice, but there is no necessary reason to construct music, or its theorizing, according to those limits. Our modern music has long abandoned Aristoxenus' inventions and for the most part much to the improvement of both practice and theory. Music is much richer in its possibilities than Aristoxenus allowed, although his way too is one of those possibilities which deserves its place in the sun, provided it not exclude, as Aristoxenus made it exclude, all the others.

My concern, however, is not with Aristoxenus and his legacy, except to dismiss it from further consideration as a way to understand the modes. But since dismissing Aristoxenus means dismissing the whole of extant ancient Greek writing on music, one is forced, if one wants to find out anything about the ancient modes, to start, not with any writings (nor indeed with any of the musical scores that survive, since the interpretation of them depends on a prior interpretation of the scales they are based on), but with

[3] See M. L. West's helpful summary of these points, as well as of the variants of them given by Ptolemy and Didymus, in his *Ancient Greek Music* (Oxford, 1992): pp. 169-70.

timeless musical facts. The question is which musical facts should these be, since there are many facts one could start with. Fortunately there is here a modern guide we can follow instead who herself, by virtue of her extensive theoretical and practical knowledge of music and instruments as well as by a process of inspired investigation, marked out the path to follow, or at any rate the first path to follow. For even if there are other paths to follow too, there is no doubt, as I hope to show, that this path must, in many respects, be the correct one and certainly one that cannot be ignored in any attempt to understand the ancient Greek modes.

True Solution to the First Problem

a) Some Musical Facts: The guide I mean is Kathleen Schlesinger in her superb and unjustly maligned book *The Greek Aulos*.[4] But let me begin, as she does, with certain key facts about music that, as will emerge, must have been at the origin of the Greek modes whatever else may be true of them and whatever else may still be hidden from us about them.

The facts are fundamentally two: first about the monochord and second about the aulos. The monochord, which is, as its name helps to indicate, an instrument of one string stretched over a sounding board, is an invention of Pythagoras for exploring musical intervals. It is still in fact an essential tool for theorizing about music and sound. Unfortunately, the way the monochord is now usually explained and used is misleading. This way consists of dividing the whole string into a series of different fractions, first that of a half, then that of a third, then that of a fourth, and so on. The first division, with the string divided into two, produces, when the whole string is sounded and then half of it, the interval of an octave. The second division, with the string divided into three, produces, when the whole string is sounded and then two thirds of it, the interval of a fifth. The third division, with the string divided into four, produces, when the whole string is sounded and then three quarters of it, the interval of a fourth, and so on. This is, of course, one way of experimenting with a monochord. The main problem is that it requires dividing and then re-dividing the whole string into several different divisions one after the other. A simpler and more obvious way of using the monochord consists in dividing the whole string only once, but dividing it into multiple equal divisions, as many as 16 or 30 or 60. One then proceeds to sound the string at the first of these divisions, say at one sixteenth of its length. Then one sounds it at two sixteenths, then at three and so on to the end. This process too produces the same intervals as before but without the need for repeated division of the string. For the second note, sounded at two sixteenths, produces, with the first note at one sixteenth, the interval of an octave; the third note produces, with the second note, the interval of a fifth; the fourth produces, with the third, the interval of a fourth; and so on. In this way one gets all the intervals simply by moving progressively down the string and so by increasing the length to be sounded by an equal increment each time.

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[4] London, 1939. West says of this book (*op. cit.*, p. 96): "Kathleen Schlesinger wrote a massive, a terrifying book, *The Greek Aulos*, based on the belief that Greek pipes too had equidistant finger-holes. She was untroubled by the fact that this is not true of the only surviving classical auloi that she studied…" This remark is demonstrably false as a look at p.97 of her book, where this very fact is noted and explained, will show. Was West intimidated by the "massive" and "terrifying" character of the book into not reading it properly? Andrew Barker, in his *Greek Musical Writings* (CUP, 1984) vol. 2 p. 154 n.33, is also dismissive of Schlesinger, if less harshly. Barker's preference is clearly for Aristoxenus.

There are two features of this way of using a monochord that deserve notice. First, one will in this way produce progressively smaller intervals in a systematic (and indefinitely extendable) series, in fact in the harmonic series; second, one will produce these intervals *downwards* and not *upwards* The previous way of using a monochord, the standard modern way, produces the intervals upwards. But this second and simpler way cannot but produce the intervals in the opposite direction. The Greeks, we know, constructed their scales downwards, and certainly Aristoxenus did. But there was no compelling reason for Aristoxenus to construct his intervals downwards rather than upwards. The fact that he went downwards rather than upwards is almost certainly due to the fact that previous theorists, the modalists whom he criticizes, went downwards. So Aristoxenus not unnaturally did it the same way despite, or rather because of, his criticism of them. But why did the modalists go downwards? Perhaps this too was arbitrary, but we should take seriously the possibility that it had a reason, the reason intrinsic to the simplest and obvious way of using the monochord (that we don't use the monochord in this simple and obvious way is no doubt because in our modern music, for historical reasons, we construct our scales upwards, and so we construct intervals on the monochord upwards too). That Pythagoras and his followers used the monochord by constructing intervals downwards can be almost taken for granted, if only because it makes the whole thing simple and obvious. Constructing the intervals upwards, while possible, would not add anything to musical understanding (since everything that can be done one way can be done the other) while nevertheless adding a great deal to practical inconvenience.

That the modalists whom Aristoxenus criticized constructed their scales downwards we can know for certain from two facts that Aristoxenus himself reveals in his criticism of them, namely that they took their musical bearings by the aulos and that they constructed their diagrams with densely packed intervals. For, to take the second point first, if one descends down the monochord through equal increments, all the early intervals reappear but with lesser intervals between them. So the interval of the octave appears between the eighth note sounded and the fourth note sounded, but with the intervals formed by the fifth and sixth and seventh notes in between; the octave also appears between the sixteenth note sounded and the eighth note sounded, but now with lots of other intervals in between, intervals that are themselves duplicates, but lower down, of intervals already sounded higher up. This phenomenon leaps at once to the eye, and to the ear, from the descending series of intervals on the monochord as the accompanying diagram (by no means complete in its listing of intervals) will show.[5]

This diagram explains at once what the modalists were up to, which is something Aristoxenus could not understand at all and dismissed as sheer ignorance. But it was Aristoxenus who was ignorant, as the diagram and its musical fact make clear. For even if many of the intervals one discovers on the monochord in this way are unsingable or unmelodic, as Aristoxenus complains (for Aristoxenus insisted on taking his bearings in musical theory by what was singable by the human voice), they are nevertheless soundable and hearable, for the monochord will sound them. They are therefore certainly musical intervals even if they are not singable ones, and that, as far as the modalists and the traditional modes were concerned, could well have been enough.

The second fact concerns the musical properties of the aulos (brilliantly

[5] See diagram 1 in the appended file.

expounded and experimentally proved by Schlesinger). For the aulos functions in effect as a wind monochord. Certainly it will function this way if one follows the easiest and most practically obvious way of making and playing an aulos. For we must keep in mind that there was in ancient Greece, even in its most sophisticated age let alone in its more primitive ones, none of the modern techniques and machines that we now have to produce instruments of almost any dimension and divisions (and in particular to produce instruments tuned to our highly artificial and mathematically sophisticated tempered scale) The first aulos players, shepherds in the fields with their flocks, would have been reduced to the simplest of techniques. If one plays an aulos, or a simple length of reed, one will notice, if only by accident, that the reed will sound one note when blown without any holes along its length, and another note, or several notes, when it does have holes and these holes are opened and closed by the fingers. First, perhaps, the holes, if accidental, might be placed anywhere on the length of the reed and no systematic connection would be found between the notes that it sounded. But if a shepherd, idling away his time while the sheep grazed, decided to make holes for himself, how would he do so? Well, he would follow a method, and the natural and obvious method would be to place holes at equal distances from each other. He might begin with one placed at half the length of the reed and then another placed at half the length again and so on; or perhaps he might place them at a third and two thirds of the length, and then half way between these; or in other ways. We should add to this that the aulos is actually two reeds, the main bulk of which acts as a resonator (this part is all that survives when the remains of auloi are discovered in archaeological digs), and a smaller reed inserted into the top of it which, by the beating of the flattened edges placed in the mouth (the double reed) or by the beating of a hinged oblong tongue cut into it (the single reed), actually produces the sound. For since this smaller reed would add to the overall length of the aulos, a division of the main resonator into six, say, would actually be a division into seven if the smaller reed was equal in length to one of those six divisions. At any rate, we can easily imagine how shepherds could produce auloi with holes in them spaced at several different series of equal intervals.

What is the musical result of an aulos so divided? The answer is that it produces notes related to each other as the notes of the monochord are when formed in descending order. If all the holes on an aulos are left open, it will sound its highest note, namely the note formed by the hole nearest the mouth. If this hole is stopped it will sound the note formed by the next hole down which, by the very nature of the case, must form with the first note (and with the other notes too) an interval that is related to it as is some numbered interval on the monochord. Let us say, for the sake of argument, that the aulos is divided into 12 equal segments with the interval numbered 12 being the fundamental note, or the note that the full length of the aulos sounds when all holes are stopped. Let us further suppose that the holes in the aulos are at the segments numbered 6 through 11. When all holes are open the sound is produced through hole 6, and this note will form with the fundamental the interval of 6 to 12 (which is an octave, 1:2). When this hole is closed the sound will be produced through hole 7, and this note will form with the note of hole 6 the interval of 7 to 6 (which is a septimal third) and with the fundamental note the interval of 7 to 12 (which is a sharpened sixth); the succeeding holes will produce notes in the intervals of 8 to 7 (the septimal tone) and 8 to 12 (the fifth, 2:3), 9 to 8 (the tone) and 9 to 12 (the fourth, 3:4), 10 to 9 (a minor tone) and 10 to 12 (the minor third, 5:6), 11

to 10 (a smaller tone) and 11 to 12 (an even smaller tone).[6] If the aulos is divided according to some other number (say 11 segments instead of 12) the intervals and divisions would be something completely different. What is important to note is that any aulos, if only it is constructed (as it almost certainly would be in primitive conditions) with holes spaced at equal divisions, would of necessity produce a series of notes, a scale in other words, that would be related as are some or other of the intervals on a descending monochord. It just could not be otherwise.

But now what follows? Reeds can be found in many different places but the people who live in those places have different languages and traditions and habits and preferences. A reed with holes in it according to one set of equal divisions might produce a series of notes that would please one group of people, while a reed with holes in it according to another would please another. Accordingly reeds divided in one way would tend to dominate in one place and reeds divided in another in another. The Phrygians would have reeds and auloi constructed to produce one set of musical intervals; the Lydians another; the Dorians a third. As these groups interacted, by trade or war or chance, and compared their different auloi, they would begin to notice the differences and start referring to each others' auloi and intervals as the Phrygian way, or the Lydian way, or the Dorian way. In short they would refer to each others' scales as constructions of notes (harmoniai) after the Phrygian or the Lydian or the Dorian fashion (which is actually what the Greek words used for the modes—*Phrygisti*, *Lydisti*, *Doristi*—literally mean). That, I submit and as Schlesinger submitted long before me, is an ancient Greek mode, and is what Plato and Aristotle were talking about. It has nothing at all, therefore, to do with anything Aristoxenus dreamed up or that any other Greek musical theorist whose works survive has bequeathed to us. We can, however, confirm, or even prove, that this is what a mode is from what Aristoxenus said in criticism of the modalists. For in his very misunderstanding, as Schlesinger shows, he left decisive clues as to what the modalists were really doing.

<u>b) Proof from Aristoxenus' anti-modal Polemic</u>: To prove the points argued above it will suffice to quote some passages from Aristoxenus.[7] Everything that Aristoxenus rejects as absurd and simple-minded in the modalists is neither absurd nor simple-minded but rather makes perfect sense when seen in the light of the facts adduced by Schlesinger.[8] This shows that it was not the modalists who did not understand what they were talking about but Aristoxenus who did not understand what the modalists were talking about.

1. [2.39; Barker p. 155] As to the objective that people assign to the science called

[6] According to Schlesinger this is actually the Phrygian mode (*op. cit.* pp. 19-23), but showing how she concludes that would involve going into details unnecessary for my present purpose. See diagram 2 in the appended file for how this mode looks on a monochord, together with how the other modes according to Schlesinger look.

[7] I use Barker's translations, *op. cit.*

[8] Aristoxenus' misunderstandings could be explained, and even to some extent excused, if in his day, because of sophistications in the construction and playing of auloi (and principally the use of the single as opposed to the double reed), the holes on these auloi were no longer as reliable in giving notes in the descending harmonic series and so were no longer as reliable in preserving the structure and character of the modes. Schlesinger explains what could have been going on here in some detail in chapter two of her book.

harmonics, some say that it lies in the notation of melodies, claiming that this is the limit of the comprehension of each melody, while others locate it in the study of auloi, and in the ability to say in what manner and from what origin each of the sounds emitted by the aulos arises. But to say these things is a sign of complete misunderstanding...

2. [2.41; Barker p. 157] No less absurd is the conception relating to auloi... It is not because of any of the properties of instruments that harmonic attunement has the character and arrangement which it does. It is not because the aulos has finger-holes, bores, and other such things...that the fourth, the fifth, and the octave are concords, or that each of the other intervals has its own appropriate magnitude...
3. [2.42; Barker p. 158] If anyone imagines that because he sees that the finger-holes are the same every day...he will therefore find the attunement permanently fixed in them and maintaining the same organization, he is thoroughly simple-minded.
4. [2.43; Barker p. 158] It is clear, then, that there is no reason for basing the study of melody on the aulos, since this instrument cannot establish the true order of attunement...

True Solution to the Second Problem

The second problem concerns the ethical effect of the modes as modes, that is, as systems of musical intervals. That modes could have such diverse effects is perfectly plausible if the modes are what Schlesinger says they are and what the evidence she adduces proves they must have been. For now, instead of the modes differing only in pitch or in order or in one or two intervals alone, they differ in everything. For if we take a string sounding some fundamental note, say F two octaves below middle C, and if we then divide it, in turn, into 9 or 10 or 11 or 12 equal divisions, we will produce a completely different series of intervals descending to that same fundamental note. More than that, since this series will be a descending harmonic series in each case, it will have a principal note (namely the highest note from which the series begins and so also, by derivation, from any octave interval thereof, as the fourth or the eighth or the sixteenth degree downwards) that will be located at different points in the series. If the division is by 12 this principal note, or its octave derivative, will be four degrees from the fundamental (8 from 12); if the division is by 11 it will be three degrees; if the division is by 16 it will be eight degrees; and so on. This principal note has nothing to do with what we call the tonic of a scale. For our scales are not based on the descending harmonic series (or even on the ascending one). Moreover, the tonic in our scales is always on the same degree of the scale, namely the first note going upwards. But the principal note for the Greeks, which they called *mese*, is not anything like our tonic and it appears at different degrees in each of the modes (as even Aristoxenus admitted). Since, therefore, each mode will differ both in every one of its intervals and in the relative position of its principal note, each mode will be *toto caelo* different from every other. There could, therefore, be nothing surprising in modes which differ like this differing also in their ethical effect. Accordingly the assertions of Plato and Aristotle and the Pythagoreans about the extraordinarily diverse effects of the different modes can be taken at face value and do not have to be dismissed as subjective or obscure or mistaken. Schlesinger herself asserts:

> No one who is familiar with the modal sequences of the Harmoniai in Ancient

> Greece remains in doubt as to the potency of this Ethos. To play a simple melodic phrase on the same degrees of each Harmonia in succession furnishes a convincing demonstration of the reality of the characteristic Ethos of the Modes (p. 135).

Given the proven reliability of Schlesinger in other matters as to the Greek modes, and given her extensive experimentation with reconstructions of auloi and with monochords, we should accept the truth of her assertion. Of course, it would be nice if we could ourselves confirm what she says by doing what she did and what she recommends, namely listen to the Greek modes ourselves and in particular to a simple melodic phrase played on each mode in turn. For the question that cannot but now excite the keenest interest is precisely what the modes, as distinguished by Schlesinger, actually sound like and how they do diversely affect us. Unfortunately, here I am brought to a stand. I do not have the instruments to hand, nor the facility in playing them, that could provide such a practical experiment. Nor indeed, now that Schlesinger is long departed, does anyone else. Certainly the recordings of ancient Greek music that are currently available do not follow Schlesinger's discoveries, but follow rather what is found in the extant writings of Greek theorists and what modern scholars make of these writings. Hence, while they may accurately represent what some Greek music sounded like in post-Aristoxenan performance, they do not, and cannot, represent what the modes sounded like for Plato and Aristotle. So until I have made myself a few auloi (or rediscovered what happened to those made by Schlesinger) and learnt how to play them, I must leave you, not to mention myself, in the dark, or rather in the silence.