Hearing ancient sounds through modern ears

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An ancient soirée

"Solon the Athenian, the son of Exekestides, was overcome with pleasure when his nephew sang some song of Sappho's at a drinking party, and asked the young man to teach it to him. When someone asked why he was so eager to learn it, he replied, 'So that I may learn it and die'".[1] This brief but powerful anecdote about the effect of a musical performance on a famous ancient listener, the archaic Athenian lawgiver Solon, is related by the second/third-century CE Roman polymath Aelian (Claudius Aelianus). Whether or not the story recalls a genuine historical episode, the sentiment put into the mouth of Solon is readily recognizable to a modern reader.[2] Music moves listeners to tears, to joy, and to the realm of the sublime.[3]

One might, however, wish to ask exactly what Solon heard – or what Aelian imagined him to have heard – that made him react so strongly. Leaving aside extraneous factors that might have contributed, if not negligibly, to Solon's emotional response – admiration of the performer's looks or skill, for instance, or pride in the achievement of his young relative – let us consider just the verbal and phonic dimension.[4] Was it the words and sentiments of Sappho's poem that Aelian supposed affected Solon so deeply that he would be happy to die only once he could possess them?[5] If so, was the impact made on him a function of their meaning or manner of expression, or was it crucially enhanced by the way they fell into the rhythms of the Sapphic stanza? Or was it something arguably more powerful still, such as the emotional character and affective qualities of a melody? Or did the effect derive principally from the boy's delivery or vocal expression – the pitch and timbre of his voice, the impression of innocence or pathos, his use of melodic slides and heart-stopping tremolos?

Some unquantifiable and wholly unrecoverable combination of all of these elements was, it seems likely, the cause of the deep emotional impact on Solon (as imagined by Aelian) of the boy's singing. Yet a further dimension of beauty and pathos might have been added by the accompaniment of an instrument such as the

[1] Fr. 187 Herscher (1866) = Stobaeus 3.29.58.

[2] Examples of closely similar statements, submitted by fans of popular music bands, abound on Youtube.

[3] Solon's linking of his response to the idea of dying resonates with the notion of sublimity: Bicknell (2009: 23–44).

[4] Experimental studies support the importance of visual stimuli in evaluating musical performance: e.g. Tsay (2013).

[5] The particular form of Solon's wish reflects the Socratic-Platonic formulation of *eros* as a desire "to possess the beautiful forever" (Plato, *Symposium* 207a); a short while later in the dialogue, Solon himself is cited as an example of someone who produced objects of deathless beauty (209d).

lyre, its strings plucked softly in unison or in poignant heterophony to the vocal melody.[6] For Solon, as represented in this account, the effect of the performance was evidently nothing less than sublime. But even were it possible to see and hear a faithful audio-visual recording of the boy's performance, we would surely not be in a position to understand and appreciate the impact it created on ancient ears. How much might such a recording teach us, not only about the melodic and instrumental sounds, but about the pronunciation and expression of the Greek language of antiquity. Writing some eight centuries after the presumed date of the episode he recounts, Aelian himself was surely too far distanced from the actual sounds and idioms of archaic Greek words and music to confidently assert what Solon had actually heard.[7] He cannot have been sure about what the melody, pitch, tonality, rhythms or tempi used by the young singer might have been, let alone how and why the sound of the music correlated with the overwhelming emotion, the mortal rapture, felt and expressed by the older man.

Nonetheless, Aelian was working within a world where both the spoken language and the musical traditions of ancient Greece still had an unmediated connection to the language and music that Solon would have known and heard. This is not the case for the twenty-first-century reader; so is there any hope at all for modern ears in attempting to understand something of the sensations aroused by ancient voices and music? To do so, it might seem a reasonable first try to try to recreate from available evidence some aspects of the various dimensions of sound and performance that have been mentioned, and then to ask how familiar or alien the musical idioms might be to modern ears. This is what I will aim to do here, but it has not been a common scholarly approach, partly owing to the widespread perception that ancient music is wholly lost. That view is now increasingly recognized to be erroneous in more ways than one, but remains an understandable assessment of our state of knowledge of, in particular, the music of archaic and classical Greece.

What resources, then, might we bring to bear first to hear how the words and music of that period may have sounded? And how might we seek to understand how these might have been heard and felt by those who spoke Greek as their native tongue and had imbibed from youth its musical idioms?

Approaching the sounds of music

Following the lead of ancient authors, scholars of ancient music have tended to focus on technical, literary and musicological rather than genuinely musical issues.[8] Indeed the study of the subject has been burdened no less than illuminated by a

[6] On ancient heterophony see West (1992: 205–7).
[7] The pronunciation of Greek in Aelian's time (let alone Sappho's Lesbian dialect) would have been notably different from Solon's: for an example with phonetic transcription, see Horrocks (1997: 89–90).
[8] Important studies in this category include West (1992), Mathiesen (1999), Barker (2007) and Hagel (2011).

weighty corpus of theoretical and technical writings (both ancient and modern) on rhythm, melody, instrumentation and musical history. Complex metrical theory and analysis has been substituted for rhythmical appreciation. The investigation of such things as the mathematical basis of scales and modes has overborne any attempt to listen to and evaluate extant ancient songs, whether by realising in practice the melodically notated documents or simply attending to the rhythms derivable from the metres of the texts. The attempt to use ancient theory as a guide to hearing the sounds of ancient music has led to eloquent counsels of despair.[9] On the other hand, attempts to realize the sounds of ancient music in practical performance (whether with scholarly or commercial ends in view) have not been strikingly successful, tending to fall between the stools of unacceptable speculation or restrictive positivism.[10]

Must the sounds and effects of ancient Greek music be reduced, then, to either a literary exercise or to esoteric technical exposition? The Greeks and Romans of classical times who danced and sang, singly or in choruses, learned and played lyres, *auloi* and *tibia*, hummed their favourite tunes and cheered on star musical performers, were neither lacking in aural appreciation nor steeped in theory. They experienced the music, its rhythms, melodies and idioms, as an aural phenomenon, and reacted to it, as Solon will have done, appropriately for their time and place. I would argue that the musical sounds to which they sang and danced, for which a range of evidence exists including the few dozen precious documents that survive with ancient musical notation, need not wholly bypass the taste and musical understanding of modern observers and listeners. Perhaps, then, it should be possible to find a means whereby we might better understand something, however slight, of the sensations these musical sounds were said to have aroused in their time.

Skirting past the thickets of theory, a few investigators of ancient music have occasionally sought to access and appreciate something of the sensations aroused by the actual sounds of the ancient world. They have done so in part by being alert to the evidence of what has been dubbed the "ancient phonograph", the rhythms and sounds inscribed in the words of ancient poetry.[11] The inherent metricality of the ancient Greek language gives rhythm a special claim to importance when considering ancient song. While elements of rhythmical realization, such as tempo, beat and dynamics, must remain a matter of intelligent conjecture, the regular and complex metrical patterns that gave rise to the rhythms of song, inscribed in the words themselves rather than being separately indicated in a musical score, have been subjected since antiquity to thorough and rigorous analysis.[12]

Meanwhile, scholarly attempts to elucidate the documents of ancient musical notation, combined with practical work on the reconstruction of archaeological relics of instruments, cognitive studies on musical perception and ethnographic perspectives

[9] Cf. the ringing pronouncement attributed to "a professor of Greek" of the 1930s quoted in Mathiesen (1999: 5): "Nobody has ever made head or tale of Greek music and no one ever will. That way madness lies."
[10] For a discussion of the shortcomings of various realizations see West (2013: 200–7).
[11] Butler (2015).
[12] The standard treatment of Greek metre is West (1982).

on ancient musical idioms, are beginning to allow for a greater breadth of approaches to the music of ancient Greece – and to a lesser extent ancient Rome, for which no such documents survive[13] – as a set of perceptible auditory phenomena rather than simply as a collection of complicated technical descriptions and theoretical constructs. In what follows I will first outline some features of the sounds, rhythmical and melodic, that may be heard as emerging from such investigations, and then explore how we might better understand some of the sensations that they were said to have created for ancient hearers. Finally, I will touch on the sensations aroused by the timbres of ancient musical instruments and voices, supported by recent projects such as the reconstruction of ancient *auloi*.

Throughout such an exploration, one must remain aware that "ancient music" is a deceptively unitary term. For Greeks of classical times, *mousikē* embraced song, dance, literature and instrumental music. Even if one restricts the examination to "song" (*melos*), the term covers a multitude of variegated musical genres and traditions in the ancient world.[14] The singing of Homeric epic in Ionia in the eighth and seventh centuries BCE, the "New Music" of tragedians and dithyrambists in the fifth century BCE, the cantica of Plautus from third-century BCE Rome, and the hymns of Mesomedes from the time of the Emperor Hadrian represent just a few of the varied strands of musical expression of which we know. In between these termini of Homer and Mesomedes, ancient music will have included the singing of Greek lyric poetry in diverse contexts, the performances and reperformances of victory songs, the dancing songs of dramatic choruses in the theatre, the music of Roman pantomime and a huge range of other kinds of musical expression, private and public, formal and informal. The vast majority of this musical output lacked any kind of notation to record it other than the letters used to indicate the words and thus (up to a point) indicate the rhythms of songs. In what follows I will focus on explaining how one might hear musical elements that can be extracted from two rare documents of notated ancient music that happen to have survived from antiquity, the "Orestes papyrus" of c. 300 BCE and the "Seikilos Song" of c. 150 CE.

The sense of rhythm

Rhythm was as central to ancient as it is to modern music, and arguably more so in the classical period. But it is not something we can simply assume we can understand as the ancient Greeks did. In particular, anglophone ears will not be familiar with the precise sensations aroused by the quantitative verse patterns of ancient Greek verse. English verse makes use not of quantities but stresses; thus when we recite "Tyger Tyger burning bright" we hear four equidistant stresses (located on the syllables here underlined) among eight syllables all of roughly equal duration. An equivalent unit of utterance as heard or enunciated by an ancient Greek listener would involve an

[13] For a thorough survey of the material see Moore (2012).
[14] For the different spheres constituted by *mousikē* see D'Angour (2015: 189–91).

alternation of four long and four short syllables, as if the words were sung strictly to the time values represented by the musical notes ♩♩♩♩♩♩♩♩. The impression on the ear is distinctly different, and the difference is not easily gauged. But while Blake's simple four-beat line may impart an aura of solemnity for modern ears, we are immediately cautioned to acknowledge that Greek associations to the quantitative pattern may have been quite different.

This particular pattern of alternating long and short syllables – long-short-long-short-long-short-long – forms a colon (Greek for "limb," in conformity to a terminology of body-parts attached by ancient metricians to metrical units, e.g. foot = *pous*, finger = *daktylos*) to which was given the name *lēkythion*. The latter word literally connotes a small earthenware flask ("bottle of oil") used for unguents. The metre's name was born of a scenario in the comedy *Frogs* of Aristophanes of 406 BCE, in a scene of which the character of the tragedian Aeschylus repeatedly uses a form of this rhythmical pattern in interjecting the words *lēkuthion apōlesen* ("lost his bottle of oil, he did") to undercut the solemn prologue openings of his rival Euripides with what was probably heard as a ribald *double entendre*.[15] One might compare a narrator beginning with a solemn introduction "There was once a…" being hijacked by an interjection that turns the words into a limerick, e.g. "…young lady from Ryde, who ate sour apples and died." Rather like the rhythm of the limerick for us, then, the rhythm of the *lēkythion* may have had far from solemn associations for the Greeks; in fact, its most characteristic occurrence in *Frogs* is in the regular *brekekekex koax koax* that represents the amphibians' rudely insistent croak. [16]

The Greeks recognized that the rhythmical elements of words, their long and short syllables, could be used to create expressive effects.[17] Some were obviously mimetic and the effects are no less evident to modern ears as they would have been to ancient ones. In the *Iliad*, for instance, a verse consisting of just twelve long syllables (*Iliad* 23.221, *psuchēn kiklēskōn Patroklēos deiloio*, "invoking the spirit of piteous Patroclus") serves to represent the long drawn-out keening of Achilles over his slain friend. Elsewhere in Homer, predominantly dactylic verses (*DUM-di-di DUM-di-di*) may imitate the agitated galloping of mules (*Iliad* 23.116) or the clattering descent of Sisyphus's rock ("down to the ground with a bump and a bound the disorderly boulder descends" *Odyssey* 11.598). Such metrical word-painting combines assonance and consonant clusters to represent, for instance, the rattle of hooves or the

[15] The point of the joke is debated; for a catalogue of suggestions and a new one see Sansone (2016). I suggest that it may relate to the use of *lēkythia* as dildoes: modern data indicate that the loss of such objects during use is not a negligible phenomenon (Cologne and Ault 2012), with the number of medical incidents related to such activity in the US over a five-year period reported as nearly 18,000 (http://flowingdata.com/2016/02/16/million-to-one-shot-doc).

[16] Metrical lekythia may also be solemn, however, as frequently in Aeschylus, e.g. the invocation to Zeus in *Agamemnon* 160–91; while four-beat verse in English may be trivial, as in the children's riddle "Eeny-meeny-miny-mo." The picture is complicated, and context is crucial; metre itself rarely determines a particular ethos (Dale 1969: 139–55). The rhythm of the limerick itself may be plangent (as heard, for instance, in the second theme of the last movement of Beethoven's D minor violin concerto).

[17] Aristides Quintilianus 2.11.35–42.

clatter of a falling rock. Verbal music of this kind, of which many instances of a more subtle kind may be detected, was subsequently imitated and put to artful use by Latin poets.[18]

While ancient theorists tend to focus more on the choice of words than on qualities of rhythm and sound, such devices show the undoubted awareness of Greek musician-poets that metre and rhythm might be employed for auditory effect. However, the purely quantitative approach to metrics elides questions of pulse and tempo, leaving it unclear how most rhythms were heard in practice. A few surviving instances of the use on the musical documents of dots or points (*stigmai*) placed above syllables on the musical documents to indicate *arsis* (the raising of a foot or part of the body, or the upbeat of a rhythm) and *thesis* (the placing of a foot or downbeat) offer invaluable pointers to how certain rhythms might have worked. They importantly demonstrate that we cannot wholly rely on our own rhythmical assumptions or aesthetic intuitions when attempting to appreciate the sense of "beat" or pulse in Greek metre.

The earliest evidence for the articulation of something akin to a "beat" is found on the papyrus fragment that contains part of a choral ode from Euripides' tragedy of 408 BCE *Orestes* (lines 338–44), which presents what scholars generally suppose was Euripides' own musical setting.[19] The ode is composed in dochmiacs, a metre known for exhibiting qualities of agitation or passion. The words fitted to dochmiac rhythms make the emotional associations clear: in this instance, the chorus are singing to the matricide Orestes of "your mother's murder, which makes you leap in frenzy like a bacchant" (*māteros haima sās ho s'anabakkheuei*). The basic form of the dochmiac *metron* (measure) is ∪ – – ∪ – (short-long-long-short-long), although it regularly allows resolution (e.g. ∪ ∪ ∪ – ∪ –). The modern reader is inclined to stress the longs in enunciating the basic pattern, producing a rhythm as indicated by the mnemonic "the wise kangaroos […*tum*]/ prefer boots to shoes […*tum*]." This regularizes the metre in a way that appeals to modern sensibilities, by attributing syllable durations to each *metron* that effectively creates three equidistant beats by according time values to each element of 1-3-2-1-3 [+2] (i.e. ending with two beats rest) i.e. ♩𝅗𝅥. 𝅗𝅥♩𝅗𝅥. 𝄽.

Ancient musical theorists, however, note that the relation of heavy to light syllables was 2:1, which would make the correct time-durations of syllables in a pair of dochmiac cola 1-2-2-1-2/1-2-2-1-2 (♩𝅗𝅥𝅗𝅥♩♩𝅗𝅥 / ♩𝅗𝅥𝅗𝅥♩♩𝅗𝅥), a far less sedate rhythm. In addition, the marks (*stigmai*) on the Orestes papyrus indicate that the downbeat (*thesis*) fell, at least in this case, on the second and fourth/fifth elements (as shown here underlined). This creates a very different effect to "the wise kangaroos": a more accurate mnemonic representing these dynamic stresses would be "that *ol*' man *riv*er /

[18] Wilkinson (1963); Butler (2015).
[19] *DAGM* No.3 (*Pap. Vienna* G2315).

he *jus'* keeps *ro*lling."[20] The strict time-durations split the colon into an unequal ratio of syllable-lengths 5:3, a measure roughly divided by the two downbeats (indicated by the absence of *stigmai*). This combination of uneven and regular rhythms will have reinforced what ancient musical authors speak of as the "mixed" rhythm of the dochmiac. We can begin to understand how, with the cross-rhythms and offbeat stresses thus emphasized, this was considered a "naturally" agitated rhythm.[21]

The ditty composed by Seikilos around 150 BCE, preserved almost intact on a marble column (grave stele) with its words supplemented by ancient notation, offers further insight into sounds, effects and idioms of ancient music:

> Ὅσον ζῇς, φαίνου,
> μηδὲν ὅλως σὺ λυποῦ·
> πρὸς ὀλίγον ἐστὶ τὸ ζῆν,
> τὸ τέλος ὁ χρόνος ἀπαιτεῖ.[22]

Taking rhythmical issues first, the poem may be translated isometrically (i.e. with the same number of syllables in English as there are in the Greek) as follows:

> While you live, shine bright.
> Don't let sorrow you benight.
> We don't have life for long, my friend:
> To everything Time decrees an end.

Had the text been unaccompanied by further rhythmical and melodic signs, the syllables of the Greek words would indicate the following metrical shape:

∪ – – – –	♩ 𝅗𝅥 𝅗𝅥 𝅗𝅥 𝅗𝅥
– ∪ ∪ – ∪ – –	𝅗𝅥 ♩ ♩ 𝅗𝅥 ♩ 𝅗𝅥 𝅗𝅥
∪ ∪ ∪ ∪ – ∪ – –	♩ ♩ ♩ ♩ 𝅗𝅥 ♩ 𝅗𝅥 𝅗𝅥
∪ ∪ ∪ ∪ ∪ ∪ ∪ – –	♩ ♩ ♩ ♩ ♩ ♩ ♩ 𝅗𝅥 𝅗𝅥

Duration-signs place over the inscribed text on the Seikilos column show, however, that the intended rhythm had evenly-spaced pulses. To indicate the regularity of the balanced phrases of the resulting rhythm, the syllables are better presented as follows (using ʌ to mark the prolongation of a phoneme):[23]

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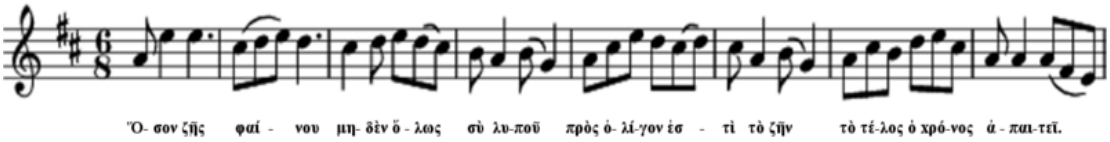
[20] For the origin of this mnemonic see D'Angour (2006b: 492).
[21] Aristides Quintilianus 2.15.34–44.
[22] *DAGM* No. 23.
[23] In metrical theory, this element is referred to as *syncope*, which literally connotes a "missing beat"; however, the term is misleading since in practice the beat so indicated is not an absence or a rest, but a prolongation of a syllable.

∪ – ∧ –	∧ – ∧ –
– ∪ ∪ –	∪ – ∧ –
∪ ∪∪ ∪ –	∪ – ∧ –
∪ ∪∪ ∪ ∪∪	∪ – ∧ –

The combined rhythm and melody may be transcribed into modern staff notation as follows:



While you live, shine bright; don't let sorrow you benight; We don't have life for long, my friend; To everything Time de-mands an end.

Given the standard pronunciation of Greek in the period of its composition, it is notable that the line endings create assonances AABB (*-ou, -ou, / -een, -ee*) as in the English version. This rhyming ditty is thus not best analysed according to strict classical canons of metre (which did not use rhyme), as is generally attempted.[24] To a modern ear, the overall effect of the four balancing verses, divided as two rhyming couplets and with regular up and down beats, is that of a leisurely tune; and it seems likely that the ancient composer designed the melody to suit the meaning of a text advocating a tranquil acceptance of the shortness of life. Perhaps above all what makes the shape of the piece strikingly familiar to a contemporary musical sensibility is the fact that it falls into the pattern of a four-bar period. Since at least the eighteenth century this pattern has notoriously become, consciously or otherwise, a staple element of the composition of Western classical music.[25] We should not rule out the possibility that its appeal to Western ears derives from origins that lie much further back in the European musical tradition.

The effect of melody

An equally significant aspect of the Seikilos song is the way the composition reflects mimetic sensibilities, as regards both rhythm and melodic shape, that are familiar to a modern listener. Although the melodic profile rigorously accords with the word-

[24] Formally the metre can be analysed (cf. West 1982: 301) as a series of iambic dimeters (∪ – ∪ – | ∪ – ∪ –) with syncopation (∪ – ⋀ –) and resolution (∪ ∪∪ ∪ ∪∪) ; but the movement of verse 2 (and arguably verses 3–4 as well) is heard more readily as trochaic e.g. that of "Humpty Dumpty sat on the wall."

[25] "On the whole, it is clear that by the 1820s the four-bar period has extended its dominion over musical composition" (Rosen 1995: 261). A similar four-bar period is observable in two other musical documents of the period, Mesomedes' (?) *Invocation to the Muse* and *Hymn to Calliope* (*DAGM* nos. 25, 26).

pitches of the Greek, it combines this principle with a clear mimetic approach to the meaning of the verses.[26] The upbeat mood suggested by the opening verses is programmatically represented by a melody created of rising patterns, before it falls at the halfway mark on the word "benight" (λυποῦ). The poem then turns to warn of the shortness of life with a rhythm that increasingly emphasizes short syllables. A sharp melodic rise and fall then imitates life's brief trajectory, and the final verse comes to a dejected cadential close.

In its general musical effect, the melody of the Seikilos poem would not be out of place in the context of Gregorian chant from seven or more centuries later; the tune can still be sung with pleasure. It seems perverse to rule out a connection (as has often been done) of this late example of pagan music to the earliest acknowledged Christian roots of the European musical tradition.[27] It offers important confirmation to the student of ancient Greek music that even the musical idioms of much earlier periods may have exhibited connections to the way music is still heard and appreciated in contemporary Western(ized) contexts.

While hard evidence is largely lacking, we may suppose that the musical idioms that are observable in the Seikilos song did not vastly alter across the centuries that divide it from its classical predecessors. However, in the classical period – some half a millennium earlier than Seikilos – conformity to the rhythms of everyday speech seems generally to have required setting no more than a single musical note of appropriate duration to a syllable, a practice indicated by the strictness with which metres are generally handled and responsional verse is composed. "Every Greek poet was his own composer," writes A. M. Dale, "and no poet would write words in elaborate metrical schemes merely to annihilate and overlay these by a different musical rhythm."[28] This dictum is unduly restrictive. It is perfectly possible, and there are parallels in many traditions including English sung verse, for the composition of words to adhere to strict metrical rules even if the subsequent addition of melody more or less distorts the underlying quantities. In any case, an authoritative ancient source, Dionysius of Halicarnassus, who was in a position to hear ancient performances of song, asserts a strikingly contrary claim:

> Prose diction does not violate or change round the quantities of any word, but keeps the long and short syllables just has they have been handed down naturally; but *music and rhythm* alter them, diminishing or increasing them, so that often they turn into their opposites, for they *do not regulate their time-values by the syllables but the syllables by the time-values*. (Dionysius of Halicarnassus, *On Literary Composition* 64. Emphasis added).

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[26] The opening rise of a melodic fifth, a notable exception to the principle of accord with word-pitch, is explained as representing a "conventional *incipit*" (West 1982: 301). A similar convention may operate in popular English nursery songs such as "Baa-baa black sheep" and "Twinkle twinkle little star", which exhibit a rising fifth in their opening phrase.

[27] Some early commentators were even tempted to suppose that it was a Christian composition, and it has been noted that the melody has a close parallel in the Gregorian antiphon *Hosanna filio David* (Reese 1940: 115).

[28] Dale (1969: 161).

Even in the classical period, deliberate deviation from note-for-syllable melodic accompaniment was notoriously attested for Euripides, whose prolonged setting of the first syllable of *heilissete* ("twirl") is repeatedly parodied by Aristophanes. Deviation from word-pitch in a composed melody may also have been a New Musical innovation adopted or pioneered by Euripides.[30] Significantly, such non-conformity is a feature of the *Orestes* musical papyrus, where the melodic line appears to be composed to match words' meanings rather than the pitch inflections. Thus the words *katolophuromai* ("I lament") and *kathiketeuomai* ("I beseech") are set to a falling cadence, while the latter three syllables of *anabakcheuei* ("makes you leap like a bacchant") are set to a note pitched around a fifth higher than the latter, suggesting the use of a mimetic "leap." This kind of programme music was considered a notable feature of the New Musicians' oeuvre, and it is likely to have struck listeners as a powerful new way of expressing musical meaning.[31] As with the melody of the Seikilos song, Euripides' application of a falling melodic cadence to fit a word connoting dejection, and an apparent upward jump in pitch to indicate a leap, conforms to modern Western intuitions about the meaning of melodic shape.

A more obviously alien feature, however, of Euripidean and earlier melody, which has given pause to modern commentators seeking to "hear" the music and gauge its effect, is the use of quarter-tones.[32] The use of scale-structures employing microtones in some form is indicated by ancient authors, who expound (in some cases with mathematical precision) the structures of the enharmonic genus. ("Genus" refers to the internal structure of intervals in a section of the scale.) Enharmonic melody was said to be characteristic of the music of fifth-century poet–composers such as Simonides and Pindar, although it was acknowledged as having yielded to "sweeter" and less demanding chromatic melodies (using semitones) by the fourth.[33] The use of distinct intervals smaller than a semitone is unfamiliar in modern Western music, although of course prevalent in other traditions such as those of Middle Eastern and Asian music. Cognitive studies on the perception of microtonal intervals confirm that the appreciation of such intervals is a matter of acculturation.[34] Once the prejudice is abandoned that a quarter-tone is "a note played out of tune", it is clear that different kinds of expressive effect might be achieved by using scale-systems to which microtones are integral.

More important than the simple perception of microtonal intervals as involving separate notes is an understanding of how such intervals may relate to broader melodic structures such as the modes (*harmoniai*) of early Greek music. A

[30] D'Angour (2006a).
[31] D'Angour (2015: 199). The fact that captives in the Syracusan quarries in 413 BCE were able to save their lives by singing Euripides' lyrics (Plutarch, *Nicias* 29) is indicative of the sensational effect of his new musical style.
[32] It is not certain whether the setting of the *Orestes* passage indicates quarter-tones or semitones: the notation could indicate either, but the common use of the enharmonic genus in fifth-century tragedy has led most interpreters to assume a quarter-tone reading.
[33] Aristoxenus, *Harmonics* 1.23.
[34] Kendall & Carterette (1996: 97–8).

few musical documents show that Greek melodies tend to revolve around distinct tonal centres, and the limited evidence for the placing of microtonal intervals has suggested that they may often have served as "passing notes" leading to these "standing note" pitches.[35] A practical attempt to fit words to an attested ancient musical scale incorporating microtones was made for a UK television documentary, in which Sapphic stanzas were set (following word pitch) to notes of the so-called Mixolydian mode.[36] It is certainly evident to a modern musical ear that a song composed to this scale, defined in modern terms as *e e♯ f a a♯ b♭ e'* (the sharp notes indicate quarter-tones higher than those preceding), will gravitate to tonic centres formed by the lowest and central note of the tetrachord, *e* and *a*. The latter note, identified as the *mesē* (in principle the "central" strings of a seven-stringed lyre) was heard as equivalent in importance to the tonic of a scale. The outlying high *e'*, forming an interval above the *b♭* of what we would call an augmented fourth, allows a plangent rise and fall, perhaps for occasional emphasis of the syllables of significant words. The overall effect to the modern Western ear is that of a song composed in D harmonic minor, revolving around the dominant *a*, and with some leaps from the dominant *b♭* to the high-pitched tonic *e* above. Combined with the rhythms of the Sapphic stanza, the result is a sad-sounding, haunting melody, a striking analogue to the "lamentatory and tragic" effect attributed by the ancients to the Mixolydian mode.[37]

While the associations of the minor key for the modern listener cannot simply be mapped onto that of the Mixolydian mode for the ancient, some support for the connection emerges from cognitive studies showing that the perception of the emotional resonance of intervals can be similar in Western and non-Western musical traditions. Thus in Indian ragas, the minor second has a "tensed" emotional effect that bears comparison to the effect of sadness attributed to the minor third in Western music.[38] Given the broader recognition of allied rhythmical and melodic effects in ancient and modern ears, our agreement with ancient sources about the lamentatory effect of a minor-sounding mode is unlikely to be a coincidence. To that extent, we may be one small step closer to understanding something of Solon's emotional rapture in response to his nephew's singing.

Listening to voice and instrument

Along with rhythm and melody, there remain various aspects of the sensations aroused by ancient musical sounds for which modern parallels may be found. The word most commonly used to commend a quality of musical sound produced by voices or instruments is *ligus,* which was said to connote a sound that is

[35] Monro (1894: 93–4).
[36] BBC TV4, "Sappho: Love and Life on Lesbos," broadcast in May 2015, featured two stanzas of Sappho sung by Kalia Baklitzanaki (podcast: http://www.bbc.co.uk/programmes/p02qpz87).
[37] Aristoxenus fr. 81, Pseudo-Plutarch, *On Music* 1140f.
[38] Mathur *et al*. (2015).

> pure and penetrating, like the voices of cicadas, grasshoppers, and nightingales, and generally like any pure vocal emission with no extraneous noise mixed in. It is characterized not by loud volume, low register, or interacting sounds, but by a high-pitched utterance that is pure and well-defined. (Pseudo-Aristotle, *On Things Heard* 804a21–8)

The term, used to describe voices, both human and animal, and instruments including lyre and *auloi*, highlights the importance of a piercing sound-quality. It would have been an important aspect of the *aulos* sound used to accompany of fifteen singer/dancers in the chorus a Greek tragedy, or for the performance of the Pythian Air (*Pythikos nomos*), a popular semi-improvised set-piece for solo *kithara* or *aulos* that celebrated Apollo's slaying of the python at Delphi.[40] The latter piece encouraged the use of virtuoso technical techniques to create strident instrumental sounds that sought to imitate the contest between beast and god, and the screams of the dying snake.[41] A similar expressive mimeticism evidently informed the narrative songs (*nomoi*) of the avant-garde late-fifth-century performer Timotheus, who was known for exploiting musical onomatopoeia and dynamic extremes. The music of one of his showpieces (*Nauplios*) was said to have represented a storm and a shipwreck, while another (*Birthpangs of Semele*) imitated the cries of a woman in labour.[42] The continued reperformance of these pieces suggests that audiences were enthralled by their mimetic vigour.[43]

Ancient commentators lack, however a discriminating range of terms to describe their responses to music. Positive evaluations were commonly made using terms as beautiful, pleasing and sweet (*kalos*, *hēdus, glukus*). Music might be said to convey delight, pleasure and enchantment (*terpsis, hēdonē*, *thelxis*), and could, along with accompanying words, move listeners to laughter or tears.[44] "May I not live if *mousikē* is absent," declares the chorus in Euripides' *Heracles* (676), linking in a manner reminiscent of Solon the pleasure of life itself to the presence of song and dance. However, ancient authors are inclined to conflate the effects of musical sound and poetic meaning, and evaluations of specifically musical rather than verbal qualities of specific performances are virtually nonexistent.[46] It is not clear whether music alone is the object of Socrates' commendation of Tynnichus' well-known paean as "virtually the most beautiful of all songs," or whether occasional references

[40] West (1992: 212–14).
[41] A prize-winning fifth-century reperformance of the "Many-Headed Air" (*polykephalos nomos*), a piece with similar mimetic and structural qualities depicting the slaying of the Gorgon by Perseus, may be the event celebrated by Pindar in his Twelfth *Pythian* Ode. Cf. Phillips (2013).
[42] Athenaeus 8.337f, 352a; see Csapo & Wilson (2009: 283). A parallel interest in mimeticism may be drawn with contemporary aesthetic criteria for judging classical visual art: D'Angour (2011: 151–3).
[43] Csapo & Wilson (2009).
[44] *Homeric Hymn to Hermes* 419–20; Peponi (2012: 51–8); Halliwell (2011: 45–9).
[46] Havelock (1963), reaffirmed by Ford (2003: 8–9), stresses that music and words were conceived as a unity.

by Aristophanes to the sweet songs of the tragedian Phrynichus refers solely to the sound of the melodies.[47]

Even if these remarks are taken to suggest a distinction of the melody of a song from its "lyrics", the descriptions tell us nothing about the sensations aroused by the individual pieces other than to suggest that their sound was considered appealing. We are made aware, however, of changing attitudes in the late fifth century BCE towards earlier musical sounds. Some styles that in their own time were no doubt unexceptional had come to seem old-fashioned, while new sounds were being welcomed by audiences in the Odeion and theatre.[48] In Aristophanes' *Frogs*, the character of Euripides scorns his rival Aeschylus for being a "poor song-composer who always repeats the same thing time and again" (1249–50). The Aeschylean verses to which he alludes to illustrate this alleged inadequacy are rhythmically identical, and interspersed with the *tophlattothrat* that imitates the strumming of a *kithara*. The verses may also have been sung to identical melodies, given that the pitch accents on the words used in the different verses fall in very similar places.[50] By contrast, the music of Timotheus and Euripides was distinguished by qualities of rhythmical and melodic variation and innovation.

In addition to the rise of famous *kitharodes* such as Timotheus, the enjoyment of musical sound was enriched by the elevation of the *aulos* as a solo instrument.[51] The star *aulete* of his day, the Theban Pronomos, was reported to have "delighted his audiences with his facial expressions and bodily movements" (Pausanias 9.12.5–6); and the sounds he produced on the pipes were enhanced by his own invention of rotatable collars to adjust the pitches and modulate between modes. Recent work on the reconstruction of double pipes, and the revival of techniques that were used to produce its sounds, have begun to show how the instrument could be both the vehicle not only of the high-pitched screech suitable for imitating the sounds of the contest of Apollo and the Python, but also of blended sounds of deep and sinuous beauty.[53] Plato would have banned the instrument, with its dangerously emotional associations, from his ideal state, but his recognition of the sheer sensual power of sound is evidenced by his concern that a young man should not be "unharmonized" by allowing music "to captivate his soul … so that he spends his whole life humming, enraptured by music" (*Republic* 411a5–9). We may perhaps imagine Solon in such a state of rapture and seeking to recapture through internal iterations, just as we might today, the sublime effect of the song he so fervently desired to possess.

[47] Tynnichus: Plato, *Ion* 534d5–e1; Phrynichus: Aristophanes, *Birds* 748–51, *Wasps* 220.
[48] D'Angour (2010).
[50] Danielewicz (1990); cf. D'Angour (2007: 296–7). The critique may be about repeated words as well as music, since "Euripides" parodies a repeated verbal refrain of a kind recognizable from Aeschylus' surviving choruses: Dover (1993) on *Frogs* 1264–77.
[51] *Kitharodia*: Power (2010).
[53] The practical fruits of ongoing research on the reconstructed Louvre *aulos* by the piper Barnaby Brown may be heard on http://www.doublepipes.info/category/louvre-aulos/.

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