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Microtonal intervals occupy an important place in ancient Greek music theory, beginning with Archytas and Aristoxenus, our earliest witnesses (early and late fourth century B.C. respectively). It is certain that their treatments reflect an important dimension of practice. Yet most performances today render the ancient Greek fragments with uniformly diatonic intonation. To be sure, many of the late pieces are in fact in the diatonic genus. And even for those which do exhibit the non-diatonic pykna - the 'close set' pitches at the bottom of a tetrachord - the notation system does not distinguish between enharmonic and chromatic, much less specify which 'shade' (chroa) is to be used. Furthermore, these microtonal shadings surely rank among the more culturally peculiar, and therefore elusive to the modern performer, elements of Greek practice. Nevertheless, Archytas, Eratosthenes (third century B.C.), Didymus (first century A.D.) and Ptolemy (second century A.D.) propose exact ratios for the intervals of non-diatonic systems, and even versions of the diatonic with microtonal modifications. It would be unfortunate if, in the current renaissance of performing Greek music, re-enactors continued to overlook this important material, which could bring greater life both to the fragments and to new music based on ancient principles.

That the practical and theoretical position of microtones in ancient Greek music may be understood as concretely as possible, this paper includes, in addition to the essential philological arguments, a number of audio demonstrations featuring the Virtual Lyre. It is therefore both about performance, and a sort of performance itself.

First I explain and demonstrate the basic acoustic phenomena which bear on the Greek use of microtonal intervals—namely the harmonic series, harmonic 'refraction', and resonance between musical tones. It is to be hoped that most researchers of ancient Greek music are already familiar with the physical laws involved. Yet probably even some of these scholars—alongside perhaps the majority of those philologists who have recently recognized the importance of music for the anthropology of ancient Greece, but are still daunted by the technical material of the ancient theorists—have never heard these phenomena demonstrated. And yet they are basic to the entire history of Greek tonality, which, though a 'technical' subject in the first instance, is often crucial for a proper understanding of the social and political dimensions of ancient Greek music.

I then discuss two distinct customs in the Greeks' use of resonance. The perfect fifth and fourth, the most audible resonances after the octave, characterized the diatonic, chromatic and enharmonic genera in their classical, textbook form. By the late fifth century, however, the lesser resonances were frequently used in some genres (especially citharody and the dithyramb) to give microtonal 'shadings' to all three genera, and this practice continued to grow for several centuries thereafter. Many of the tunings preserved by the theorists, and expressed as ratios between successive degrees, are commonly supposed to owe as much to mathematical fantasy as musical reality. An analysis of their internal relations, however, reveals how their scalar presentation conceals an extensive basis in lesser resonant relations. Since such intervals are easily audible even to us, one may be all the more certain that, if the ancient authors took the trouble to record them, they

reflect ancient musical practice quite faithfully. Some true mathematical fictions remain, but these exceptions mark the rule. Finally, there is a distinct tendency for these lesser resonances to be arranged in reference to the central string mesê, which was of great practical importance for the 'classical', i.e. Archaic, seven-stringed kithara, both in tuning and performance. I conclude therefore with an étude employing mesê in accord with allusions in ancient sources, thereby highlighting these intervals and the character they impart to the harmonia ['Introduction', 9-10].