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AVICENNA IX. MUSIC
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Islamic writings on music are often theoretical treatises concerned with the analysis of pitch and duration, the constituent elements of melody. They are conceived less as descriptive accounts of contemporary practice than as systematizations of possible structures, utilizing, in the case of pitch, mathematical formulations derived from the Greek legacy. Among the most impressive examples of such writings are the relevant chapters in Avicenna's *Ketāb al-najāt*, *Dāneš-nāma-ye ʿalāʾī*, and *Ketāb al-Šefāʾ*, where music is considered as one of the mathematical sciences (the medieval q*uadrivium*).

Not unexpectedly, matters of incidental relevance occur in other works also. Thus the *Resāla fi'l-nafs* contains a passage on the perception of sound (*ZDMG*, 1875, pp. 355-56); the first chapter of the *Resāla fī maḵārej al-ḥorūf* concerns itself with the physics of sound production; and the *Qānūn fi'l-ṭebb* discusses the pulse by analogy with musical proportion conceived, interestingly, not only in terms of rhythm but also of intervallic relationships (ed. Cairo, 1294/1877, I, pp. 125-26; see also the parallel passage in *Ragšenāsī*, ed. M. Meškāt, Tehran, 1370/1951, pp. 31-36). There is, further, a brief definition of the scope of the science (*ʿelm*) of music in *Fī bayān aqsām al-ʿolūm al-ḥekmīya wa'l-ʿaqlīya* (BM. MS. Add. 7528, fol. 44v).

Nevertheless, any assessment of Avicenna as a theorist of music must concern

itself essentially with the chapters on music in the *Najāt*, *Dāneš-nāma*, and *Šefāʾ*, and for our purposes they may be considered together, as representing more or less extensive versions of the same analysis. The expositions in the *Dāneš-nāma* and in the *Najāt* (which also occurs separately, with a few minor omissions, as the *Resāla fi'l-musīqī*) may be regarded as Persian and Arabic versions of the same text, and they contain virtually nothing that is not examined in greater depth in the *Šefāʾ*. The nature and quality of Avicenna's treatment of the subject may thus best be demonstrated by specific reference to this work, presenting as it does the most detailed theoretical analysis to appear between the *Ketāb al-musīqī al-kabīr* of Fārābī (d. 339/950) and the treatises of Ṣafī-al-dīn Ormavī (d. 693/1294).

Avicenna's general approach in the *Šefāʾ* is, not unexpectedly, similar to that of Fārābī (The scope is undeniably narrower, but his formulations are sometimes more succinct and his organization of material more rigorously logical.) Noteworthy among the introductory remarks are peremptory dismissal of the doctrine of ethos (prominent in Kendī [d. ca. 260/874] and central to the *Eḵwān al-Ṣafāʾ* [second half of the fourth/tenth century]), and an interesting discussion of the nature of sound viewed first functionally (as a signaling device aiding, ultimately, the survival of the species) and then as a means of expression with, in its more strictly musical form, a particular esthetic potential. The main body of the chapter then falls into two parts in accordance with the initial definition of the subject as a science concerned with notes (*nagām*) and the times separating them (*al-azmena al-motaḵallela baynahā*), its ultimate goal being knowledge of compositional procedures (*kayf yoʾallaf al-laḥn*).

The first part, dealing with notes, begins with a discussion of the physical causes of differences in pitch, and provides definitions of the basic concepts of note, interval (*boʿd*), genus (*jens*), and group (*jamāʿa*), the last three of which are then amplified in subsequent sections. Intervals are handled in terms of the mathematical ratios by which they may be represented, and are ranked according to their relative degrees of consonance. Two categories are recognized. The first is divided into large (octave), medium (fifth and fourth), and small (the series of superpartial intervals from the major third down to an approximate quartertone), with the small being subject to a further threefold division. The second consists of combinations of the above (e.g., octave plus fourth). The mathematical emphasis is equally apparent in two further sections dealing respectively with the addition and subtraction of intervals

and their doubling and halving, and culminates in the extensive survey of the genera or tetrachord types. An initial discussion of the esthetics of different interval sizes considered in relation to melodic function gives pride of place to the class of small intervals, and these are then variously combined into 16 tetrachords (yielding a possible 48 permutations in all) grouped according to the usual categories of strong (*qawī*), chromatic, and enharmonic. Here, oddly, Avicenna reverses the normal terminology, calling the chromatic *rāsem* and the enharmonic *molawwan*. The first part ends with an outline of the notion of group, essentially the various combinations of tetrachords and whole-tones within the Greek two-octave Greater Perfect System, and with a brief schematic survey of elementary types of melodic movement.

The material elaborated in the course of this analysis should not be thought of as constituting a description of the modal structure of the contemporary Arabo-Persian musical system. It is explicitly stated, for example, that the chromatic and enharmonic tetrachord species portrayed in such detail were not in normal use. We are thus presented here not with the results of empirical observation, but with a sophisticated adaptation and development of material derived from the Greek theorists. In the less technical areas there are, predictably, Aristotelian echoes, and Avicenna himself refers to Euclid and to the more important figure, in musical theory, of Ptolemy. While problems remain with regard to the way in which the material was transmitted, there are fewer difficulties in identifying the ultimate sources, and a comprehensive survey of these may be consulted in the appendix to D'Erlanger's translation of the music chapter in the *Šefāʾ* (*La musique arabe* II, pp. 258-306).

Seemingly less remote from contemporary practice, even if just as schematic, is the second major part, on rhythm (*īqāʿ*). Nevertheless, it is only at the end that some indication is given of which particular cycles were in current use: The main body of this section, for which Fārābī is again the model, presents a set of possible structures in terms of which rhythms could be formulated. Greek influence recedes, and the main analytical tools are derived rather from the Arab science of prosody, so that there is nothing unexpected in finding certain sequences discussed in terms of their varying suitability for verbal as against instrumental articulation, or the inclusion (specifically in the *Šefāʾ*) of a section devoted to prosody. The theoretical introduction begins with the notion of a basic recurring pulse to which can be related the concept of a minimum (indivisible) time unit, defined in articulatory (prosodic) terms as CV

(*ḥarf motaḥarrek*) and symbolized as *ta*, and alternatively in relation to the circular physical movement of a player's hand between one percussion and the next. Discussion of the maximum possible number of time units between two precussions involves psychological considerations, the definition being that it must not be so great as to undermine the subjectively perceived relation between them. With regard to the structure of the rhythmic cycles, an immediate distinction is drawn between conjunct (*mowaṣṣal*) and disjunct (*mofaṣṣal*). The former, generically termed *hazaj*, are speedily dismissed, being equated with the basic recurring pulse (in different tempi), and attention is focused on the more flexible and complex patterns of the latter. Each cycle is analyzed as a set (*dawr*) of primary percussions separated from the next set by a disjunction (*fāṣela*). The number of primary percussions ranges from two to six, distributed over two to ten time units (sets with more time units are mentioned, only to be rejected as too long). Alterations to which the set may be subject involve the elimination of percussions (with or without deletion of the related time unit) and adding secondary percussions to otherwise unmarked time units, this latter feature being associated particularly with the slower rhythms. It should be noted, too, that the disjunction is also a variable. A given rhythmic type could thus comprise a number of cycles differing not only in the internal patterning of percussions but also in the total number of time units.

It is in the briefer final section that attention is turned more specifically to aspects of contemporary practice. The opening passage on the process of composition is an essentially abstract formulation, but includes nevertheless references to such techniques as trills and glissandi, and was to have ended with a specimen melody in *hazaj* rhythm, the notation for which, if it ever existed, has unfortunately failed to survive. There follows a short survey of instruments in which chrodophones figure prominently, being divided organologically according to both the way of mounting the strings (thus contrasting, e.g., harps and zithers) and the way of playing them: stopped or free, plucked or bowed. Aerophones are differentiated by whether the air stream passes through a hole, across a free beating reed, or is produced by means of an air reservoir. Only one (hammered) percussion instrument is mentioned, those of unturned pitch being ignored. Avicenna gives finally a fretting for the lute, called both *ʿūd* and *barbaṭ* (details in Farmer, *Lute scale*, and Manik, *Tonsystem*, pp. 47-52), and then (in the *Šefāʾ* only) defines, largely in terms of that fretting, the intervallic structure of the more common melodic modes of his time. These show an interesting transitional phase between the early diatonic system and that described by Ṣafī-al-dīn; thus alongside purely

diatonic modes are found others utilizing, in addition or exclusively, genera containing three quarter-tone intervals (associated with the *wosṭā zalzal* fret) and including, Arabized as *mostaqīm*, the earliest recorded version of the mode *rāst*.

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