The Music Theory of Al-Farabi

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Farabi's concept of music theory, performance, and philosophy

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The Music Theory of Al-Fārābī

Al-Fārābī has based much of his philosophy and theory, including that of music, on Greek philosophers such as Aristotle, Pythagoras, Aristoxenus, and Plato. He is considered, in addition, to have explained what they left unexplained, to have reconciled or to have chosen among their different ideas and to have advanced beyond their contributions. He uses the practiced music of his times in the Arabic Empire as source data for determining what is "natural" or not in music. He lived (872-950 A.D.) just after the Golden Age of Islamic civilization, which was the early Abbasid period (750-847 A.D.). He studied in Bagdad at the House of Wisdom (considered to be the first known college) particularly the many works of Greek authors which had been recently translated into Arabic.

In music, he pioneered in the mathematical computation of intervals, although his division of the octave and of the 4th into three genres was based on Greek theory. He knew principles of harmony, but applied them linearly rather than vertically. His work was the basis for writings of all Moslem theorists who followed him. His Kitābu L-Mūsīqī Al-Kabir is considered the most important treatise on the theory of Oriental music and was the greatest work of music which had been written up to this time (Encyclopedia of Islam, ii: 54). It is organized into introduction, elements of composition, instruments, and composition and is written as a well-organized and defined theoretical-scientific treatise touching on philosophy and practice of music as well as theory.

Relation of Philosophy to Theory and Practice

To the Arabs, music was a part of the macrocosmic system. Modes were linked closely to the motion of the universe. The concept of ethical power

is based on the mathematical analogy between ratios of the soul's motion, vibration of strings, and movement of heavenly bodies (Wenne: 262). Pythagoras, earlier, had said that the human soul is in constant motion, which is defined by physical properties which go with harmonic relations of the tones. Certain tunes evoke certain motions of the human soul. However, while Pythagoras believed in the actual harmonic sounding of the spheres, Al-Fārābī did not. Contrasting with this theoretical notion of harmony and proportion, the Arabs as a people preferred emotional excitement (Wenne: 280). Arab thinkers, perhaps as a result, did not mention harmful and unpleasant emotions and Al-Fārābī himself stated that expression was important in music.

Music was linked to elements, seasons, planets, and temperment and was considered to have these functions, according to the Arabian Nights: "To some people music is like food, to others like medicine, to others like a fan" (Farmer: 433). Arab concept was that music was moral and useful versus aesthetic. In its therapeutic function, the philosophers stressed allopathic treatment based on Pythagorean thought: The use of solemn, soothing melodies in order to bring order to disorganized souls and attune them to the properties of the universe through numerical order. Other Greeks made no comment on the exact nature of the effect of music or stressed the acoustic point of view.

Stringed instruments predominate in the Arabic Empire, perhaps due to the strong emphasis on interval determination by string lengths. The 'ud, the favorite instrument, is said by Al-Fārābī to serve as experimental verification of theory (along with other stringed instruments). The practioner's ear is the actual verification and is co-existive in importance with mathematics and physics in the science of music. Each mode, each string of the 'ud, fit into the order of the universe. Because of this so-called

link with the universe, the 'ud had 4 sides, 4 parts, and 4 frets and its dimensions were subject to mathematical formulas. Instruments were indeed given almost human attributes. Each of the 4 strings of the 'ud were given certain natural properties (Wenne: 276):

String	Element	Humour	Quality	Season
Zīr (treble) $b^{\flat}$	Fire	Yellow Bile	Hot	Summer
Mathnā (2nd) f	Air	Blood	Humid	Spring
Mathlath (3rd) c	Water	Phlegm	Cold	Winter
Bam (bass) G	Earth	Black Bile	Dry	Autumn

When a 5th string was added ($e^{\flat}$), this was justified by having it represent the soul. The mixture of these elements represented in the 'ud were pain-relieving or invigorating in appropriate melodies and at appropriate times of the day.

In relation to the ethical properties of music, there is a saying (hadith): "Allah listens more intently to a man with a beautiful voice reading the Qur'ān than does the owner of a singing-girl to her voice." (Farmer: 439). Sufi and earlier beliefs connected music to religion, with music as an aid or approach to religion, stating that this influence is because of its musical structure (physical) and spiritual structure (similarity to the soul). Some have gone so far to say that music is the "eternal will itself" (Farmer 440-441) and that ultimate truth could be apprehended only through divien ecstasy, the most potent means being music.

For Al-Fārābī, who was a philosopher, "The knowledge of God is the object of philosophy and the duty of man is to rise, as far as is humanly possible, up to the likeness of God" (Hammond: 19). Further, in relation to ethics, the end of human actions is happiness and that which leads toward it is called good and that which leads away from it is called bad. Evil is linked to corruptible things, but is under divine control and connected to

the operation of good (Hammond: 32). Music is part of Al-Farabi's grand philosophical scheme and utilizes methods and concepts that are part of this scheme. For example, the passions are part of the 9 basic substance and ~~accidents~~ and include the concuspicle (lust) and irascible (anger) passions. First principles are self-evident, non-demonstrable premises. Al-Fārābī believed in and utilized the principle of causality and explains derivations of musical expression of the passions in those terms.

God is the prime source, the prime cause and the prime being, who relates to the world through a process of emanation through the intellects of the spheres. Six kinds of bodies make up the universe: celestial, rational animal, irrational animal, vegetal, mineral, and 4 elements: air, water, fire, earth (which are then attributed to the 'ud strings). Man is composed of body and soul, the latter of which has vegetative, sensitive, and intellectual powers (growth; senses, emotions; perception, will). All knowledge comes from and starts with sense experience, which in music is the musician's sense perception, his hearing, which is the correct and ultimate judge of what is right and wrong in music. All beings and entities are a part of God's order, whether it be human being, celestial bodies or acoustics. Such forms as social structure, man's behavior, and music must be modeled after this order.

Al-Fārābī's Philosophy of Music

In pursuing some matter, it is the goal that is important not the matter itself, according to Al-Farabi. Life is a serious affair with leisure being only a rest from work and not a goal in itself. Thus it is in music, which has two kinds of melodies, those for the soul and those for pleasure, useful melodies being the former. These are perfect and poetic words draw the greatest profit from them. These perfect melodies are of forceful, soft,

or moderate type and are used to produce certain dispositions, morals, and desired actions and also to acquire spiritual beauties such as wisdom and science.

Concerning the relation of passions to music, Al-Farabi feels that music expresses passions and also indicates the state of soul of the person expressing it. Sounds are the perfection of a passion. They can also revive or accentuate a passion. Music gives the illusion of a passion. The notes which provoke the passions are of those three types mentioned above. Al-Farabi lists the following passions and the quality of notes they accompany:

Passions			Names of Qualities of Notes Which Provoke the Passions
Arabic	French	English	
ḥazan	tristesse	sadness	muḥzan, ḥazanī or taḥzīn or taḥzīnāt
ʾasaf	affliction	distress	ʾasafi
jazaʿ	inquietude	anxiety	jazaʿī
ʿizz	force	power	muʿizz
salw	consolation	solace	muslī
maḥabbah	affection		muḥabb
biġḍah	haine	hatred	biġḍī
raḥmah	compassion		raḥmī (and its opposite)
ḫawf	crainte	fear	muḫawwaf (and its opposite)

(D'Erlanger, II: 93)

Natural music is that which produces the effect of pleasure, passion, or imagination. Man's inner instincts cause him to rest after work. The function of music in this respect is to dissipate fatigue by allowing man to forget the passage of time. Music, in Al-Fārābī's terms, is considered to be melody, which is notes in a determined order and manner or associated with phonemes forming words which express a thought. This music is a

combination of pure reason, imagination, and the senses and is formed from true images in the soul and realized through voice or instrument. There are three musical forms, which are listed in order of lower to higher:

1. that which provokes agreeable, delicious, restful sensations
2. that which is inspired by passions, state of soul
3. that which in addition excites imagination, suggests ideas. This form emphasizes poetry and oratorical forms, uniting words and music.

(D'Erlanger, I: 13-14)

Music which has all three qualities is the most perfect and is like a poem, but is less perfect. When combined, words and music are both more expressive. Musical instruments sometimes possess certain of these qualities, but voice is superior to them. Voice accompanied by an instrument has a richer, more brilliant agreeable sound. The hierarchy of musical means of production is as follows:

1. movements of the body which suggest the illusion of sound
2. impact which produces sound but not notes; e.g. drums, clapping
3. note-producing instruments, particularly those imitating voice (rebab, flute)
4. voice--reunites all qualities of sound.

Theory and Practice

Al-Fārābī states that theory and practice complement each other and their combination constitutes the science of music. Theoretical principles permit us to conceive of state and qualities, while practice furnishes us with determining rules of naturalness of sensation. Theory of music has as its principal object the study of that which is for us a natural sensation. According to Al-Fārābī, the determination of what was natural and consonant is that which always satisfied our ears and those who are qualified to judge this are the inhabitants of the Arabic Empire. Natural notes, then, are

those which are in current favor amongst these people. When a questions comes up concerning a difference between theory and practice regarding consonance, Al-Farabi refers to the practioner's "unerring" sense. What is natural in music is too obscure or too fleeting to capture, however. So, beyond practice there is a need to c eate an artifial harmonic so that the means of examining and acquiring the experience of music is available. A theoretician doesn't need to be a practioner, as he can refer to the practioner's ear.

Natural or perfect music is that by which one can attain the three forms of music. There are 10 "perfections" (parts) to this music:

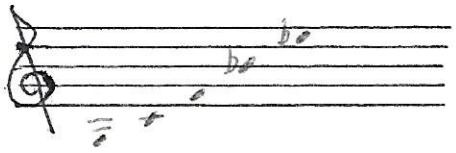
1. all that can be joined onto a composition and which can adorn or harm it
2. rhythm
3. genres
4. mode, scales
5. mode, evolution
6. consonance
7. evolution
8. intervals separating degrees of mode in order of their scale degree
9. transposition (same genre, different tonality)
10. high or lowness (pitch)

(D'Erlanger, I: 67)

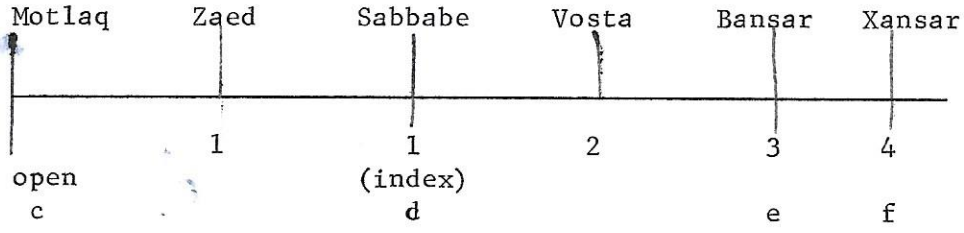
Al-Farabi takes up the matter of consonances first. He compares perfect consonance to essential food. Sharp, deafening sounds are not natural as are not the instruments that produce them and their effects are comparable to remedies or poison. Al-Farabi classes consonance into great--octave and double octave, medium--5th, 4th, octave and 5th, octave and 4th, and small--tone and other intervals smaller than the 4th. In order of appearance, the octave is the most perfect consonance. The 5th is next, with the addition of the 4th completing the octave. Subtracting the 4th from the 5th obtains the tone. Within the <u>genre</u>, which is the 4th divided into three parts, are found to be two tones with an amount left over, which is called the <u>limma</u>, c. 90 cents.

In practice, this becomes a ½ step and in practice, interval quantities are not exact. Also, Al-Farabi states that musicians do not use the octave and 4th but do use the limma as a consonant interval.

The 'ud is the primary instrument of working out of intervallic relations. It was considered to be the instrument upon which the most perfect melodies could be played. Figure 1 refers to the 5-string 'ud, tuned to



At the time of Al-Farabi, the Pythagorian system of limma and comma had been the basis for fretting instruments. This fretting was a tetrachord which was subdivided on the basis of open position and four fingers:



Vosta and zaed are movable, while the other positions are fixed. Zaed replaces sabbabe when used, while vosta replaces bansar. A number of vosta had been in use up to Al-Farabi's time and ranged from $d^{\#}$ to $e^{\flat}$. Figure 1, which is a diagram of the 'ud fretting, represents three types of vosta: "voisine" du medius, medius des persans, and medius zulzul (D'Erlanger, I:46). Al-Farabi employs the following intervals for zaed and vosta (from motlaq) (Farhat: 18):

zaed: 90, 98, 145, 168 cents vosta: 294, 303, 354 (zulzul) cents

Farhat states that exactness of scale was impossible to achieve on instruments with movable frets and especially voice or instruments with no frets.

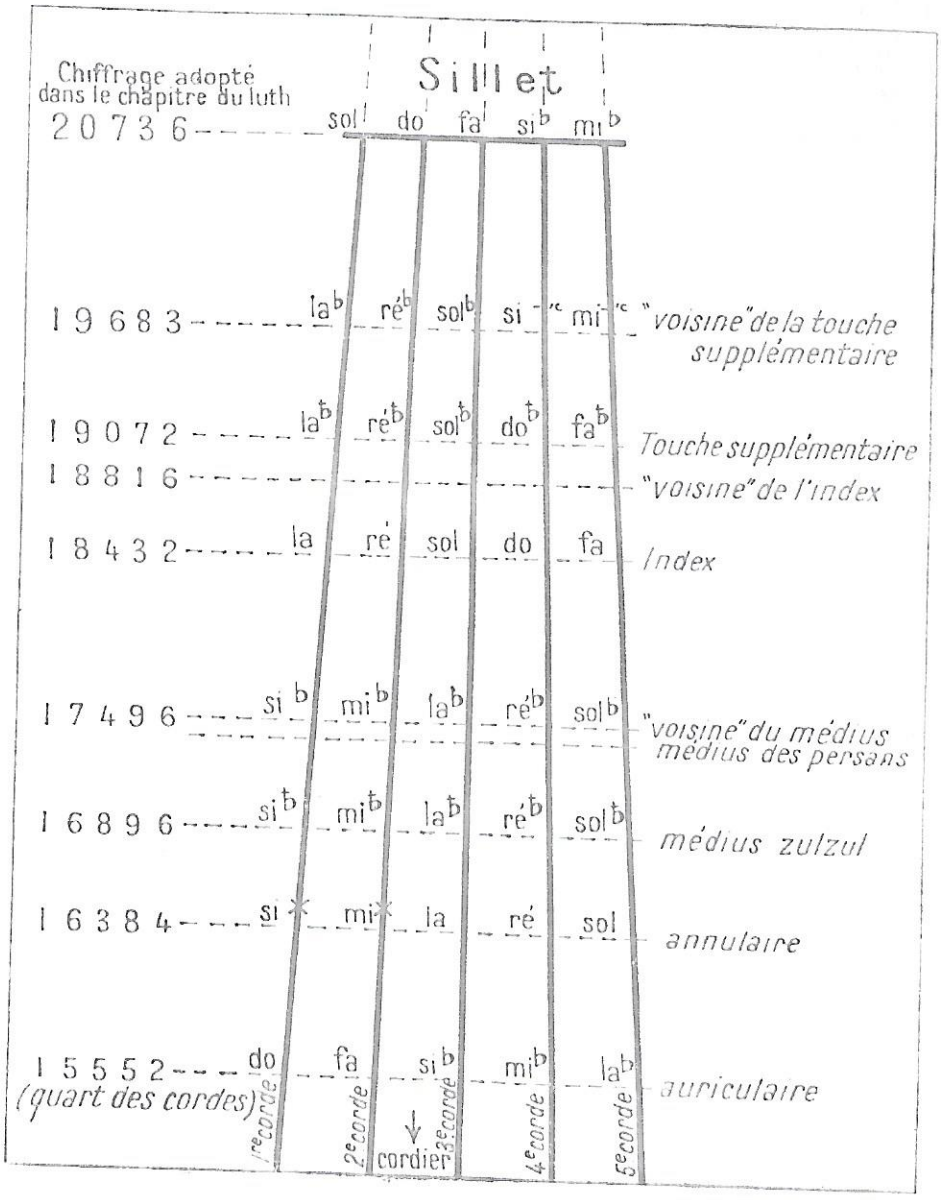
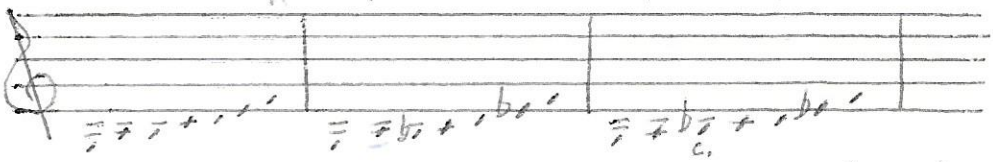

Chiffrage adopté
dans le chapitre du luth
Sillet
20736 sol do fa si♭ mi♭
19683 la♭ ré♭ sol♭ si mi "voisine" de la touche supplémentaire
19072 la♭ ré♭ sol♭ do♭ fa♭ Touche supplémentaire
18816 "voisine" de l'index
18432 la ré sol do fa Index
17496 si♭ mi♭ la♭ ré♭ sol♭ "voisine" du médius
médius des persans
16896 si♭ mi♭ la♭ ré♭ sol♭ médius zulzul
16384 si mi la ré sol annulaire
15552 (quart des cordes) do fa si♭ mi♭ la♭ auriculaire
1re corde
2e corde
cordier
3e corde
4e corde
5e corde

FIG. 1.

Three species of genre, based on bansar, zulzul, and perse are



Other species were constructed. Three general types were called diatonic, chromatic and enharmonic. Diatonic was considered natural and more perfect and was based on the sum of the 2nd and 3rd intervals being greater than the 1st interval. The other two were considered weak and superficial and were based on the 2nd and 3rd intervals being less than the first. Other names for these types are strong and weak (fort and doux, refer to Figures 39 and 40, pp. 14-15). Eight finger modes were developed by Ibn Misjah (d. 715) which were all but one identical with Greek and church modes and were based on this system of 'ud fingering and intervals (see list following, Farmer: 448, also refer to Farmer: 460 for intervals recognized in lute playing).

Intervals were the relationship between two notes of different degrees. Certain intervals are perfect and others are not (concord and discord), with consonances and dissonances determined from the tuning of the 'ud and other instruments. For each note in a particular tuning there are different consonances and dissonances. For example, in the following, G and A bam have consonances and dissonances:

	Consonances	Dissonances
G	tone, 5th, octave octave and 5th double octave	major 3rd, tritone, major 6th major 7th, octave and tone, octave and major 3rd, octave and tritone, octave and major 6th, octave and major 7th
A	tone, dim. 4th, perf. 4th, 5th, octave, octave and 4th, octave and 5th	dim. 7th, min. 7th, octave and tone, octave and dim. 4th, octave and dim. 7th, octave and min. 7th

In both cases the 7th is discordant and in G, the major 3rd and 6th.

See Figure 126 for further listing. These notes which compose melodies
(D'Erlanger, II: 6)

Al-Kindī's scale reveals that the Persian and Zalzalian accretions at 303 and 355 cents had lost recognition in Mesopotamia, and this inhibition partly continued, as we know from the *Risālat al-mūsīqī* of the Ikhwān al-Ṣafā (*c.* 980).[1] In Syria, however, these anomalies were at least acknowledged, together with their concomitant notes, as we see in Al-Fārābī:[2]

	4th string	3rd string	2nd string	1st string	Extreme string (*lādd*)
Open string (*muṭlaq*)	0	498	996	294	792
1st finger (old *mujannab*)	90	588	1086	384	882
1st finger (Persian *mujannab*)	145	643	1141	439	937
1st finger (Zalzal's *mujannab*)	168	666	1164	462	960
1st finger (*sabbāba*)	204	702	1200	498	996
2nd finger (old *wusṭā*)	294	792	90	588	1086
2nd finger (Persian *wusṭā*)	303	801	99	597	1095
2nd finger (Zalzal's *wusṭā*)	355	853	151	649	1147
3rd finger (*binṣir*)	408	906	204	702	1200
4th finger (*khinṣir*)	498	996	294	792	

The above scheme represents all the intervals recognized in lute playing at this period, and does not necessarily imply that any one lute was so fretted. According to Muḥammad b. Aḥmad al-Khwārizmī (*fl.* 976–7), writing in Khorasan and Transoxiana, the Persian and Zalzalian thirds were being used in those lands, revealing how far afield they had been accepted.[3] Al-Fārābī was a good mathematician and physicist, and his *Grand Book of Music* (*Kitāb al-mūsīqī al-kabīr*) is not only 'the most important treatise on the theory of Oriental music',[4] but the greatest work on music which had been written up to his time. He was certainly in advance of the Greeks.[5] Later came the Ikhwān al-Ṣafā (*c.* 980), whose contribution

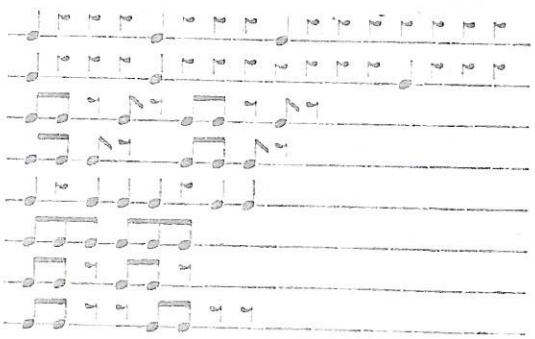
[1] F. Dieterici, op. cit., pp. 118–20.
[2] *Mafātīḥ al-'ulūm*, pp. 240–2; Farmer, *Studies*, ii, p. 50.
[3] Farmer, *Studies*, ii, pp. 49–50.
[4] *Encyclopaedia of Islam*, ii, p. 54.
[5] Baron Carra de Vaux, in R. d'Erlanger, *La Musique arabe*, i, pp. vii–xii.

This modal system, which Ibn Misjah seems to have consolidated, consisted of eight 'finger modes' (*aṣābi'*), as we read in the earliest period of the *Great Book of Songs* (*Kitāb al-aghānī al-kabīr*) of Al-Iṣfahānī (d. 969), and each of these modes was classified according to its 'course' (*majrā*) either with the middle finger (*wusṭā*) on the lute, giving the minor third, or with the third finger (*binṣir*), giving the major third. That these modes may have been suggested by the Syrian *ikhadias* is most likely, but that they were not quite identical may be assumed from Al-Kindī,[1] although the last word has not yet been said on this problem.[2] These 'finger modes' dominated Arabian practical theory until the eleventh century when Persian ideas took a firmer hold on Islamic culture. They have been fully described by Ibn al-Munajjim (d. 912) in his *Risāla fi'l-mūsīqī* (*Treatise about Music*). With one exception (No. 7) all of these modes were identical with the Greek and church modes. They are given here with the fourth string taken as base (*'imād*):

1. *Muṭlaq fī majrā al-wusṭā* G. A. B♭. c. d. e. f. g.
2. *Muṭlaq fī majrā al-binṣir* G. A. B. c. d. e. f. g.
3. *Sabbāba fī majrā al-wusṭā* A. B♭. c. d. e. f. g. a.
4. *Sabbāba fī majrā al-binṣir* A. B. c. d. e. f. g. a.
5. *Wusṭā fī majrāhā* B♭. c. d. e. f. g. a. b♭.
6. *Binṣir fī majrāhā* B. c. d. e. f. g. a. b.
7. *Khinṣir fī majrā al-wusṭā* c. d. e♭. f. g. a. b. c'.
8. *Khinṣir fī majrā al-binṣir* c. d. e. f. g. a. b. c'.

The rhythmic modes (*īqā'āt*), and there were eight of these also, are described by Al-Kindī (d. *c.* 874) as follows:

1. *Al-thaqīl al-awwal*
2. *Al-thaqīl al-thānī*
3. *Al-makhūrī*
4. *Khafīf al-thaqīl*
5. *Al-ramal*
6. *Khafīf al-ramal*
7. *Khafīf al-khafīf*
8. *Al-hazaj*



[1] Farmer, *History*, p. 151, and *Historical Facts for the Arabian Musical Influence* (London, 1930), pp. 240–6.
[2] X. M. Collangettes, *Journal Asiatique* (1906), pp. 167–8. The present writer has dealt with the question fully in his *Music in the Kitāb al-aghānī*, still unpublished. Meanwhile consult Farmer, 'The Song Captions in the Kitāb al-aghānī', *Transactions: Glasgow University Oriental Society*, xv (1955).

Le groupe Disjoint Invariable renfermant les intervalles du genre *Conjoi*
Modéré. Ce genre doit être employé dans le jeu du luth au lieu du « Diatonique » s

octave grave	genre	sol_1	A 1620	Grave Supposée	consonances	B H Ḥ Ḷ L S
					dissonances	J D W Z Ṭ Y K M N
		la	B 1440	Grave des Principales	c	A J D H W Ṭ L M
					d	Z Ḥ Y K N S
		si	J 1280	Moyenne des Principales	c	A B D W Z (faible) Y
					d	H Z (forte) Ḥ K Ḷ M N S
		ré ♭	D 1152	Aiguë des Principales	c	J B H Z K N
					d	A W Ḥ Ṭ Y M Ḷ S
	genre	ré	H 1080	Grave des Médianes	c	D B A W Z Ḥ Ṭ L S
					d	J Y K M N
		mi	W 960	Moyenne des Médianes	c	H J B Z Ṭ Y M
					d	D A Ḥ K L N S
		sol ♭	Z 864	Aiguë des Médianes	c	W H D J (faible) Ḥ Ṭ Y K N
					d	B A (forte) L M S (naturelle)
		sol_2	Ḥ 810	MÉDIANE	c	Z H A L Ṭ S
					d	W D J B Y K M N
octave aiguë	genre	la	T 720	Suivante de la Médiane	c	Ḥ Z W H B Y K L M S
					d	D J A N
		si	Y 640	Grave des Elevées	c	Ṭ W J K L M (faible)
					d	Ḥ Z H D B A N (forte) S
		ré ♭	K 576	Moyenne des Elevées	c	Y Ṭ Z D L M N
					d	Ḥ W H J B A S
		ré	L 540	Aiguë des Elevées	c	K Y Ṭ Ḥ H B A M N S
					d	Z W D J
		mi	M 480	Grave des Aiguës	c	L K Y Ṭ W J B N S
					d	Ḥ Z H J A
		sol ♭	N 432	Moyenne des Aiguës	c	M L K Z D S
					d	Y Ṭ Ḥ M H J B A
		sol_3	S 405	Aiguë des Aiguës	c	Z L Ḥ H A
					d	M K Y Ṭ N W D J B

Fig. 126.

function as phonemes do in words, with their number and order being determined by convention, however. Within a mode, position of notes is "natural".

For the ancient Greeks, the term consonant applied to melodic progression. Intervals were analyzed in terms of the stretched string. Al-Fārābī refers to the 'ud or a stretched string for illustration of his harmonic principles. As mentioned earlier, there are three types of consonant intervals; the great consonant intervals, the octave; the medium consonant intervals, the 5th and 4th; and the small consonant intervals, which are smaller than a 4th. In order to illustrate what these many small consonant intervals are, the 4th is divided into 3 parts in various ways, with the resulting division different species of various genre. The following tables (Figures 39 and 40, D'Erlanger, I: 113-114) illustrate the various types of genre. Extracting the fractional intervals and arranging them in a progressive order following the harmonic series, one obtains the following series of intervals recognized as consonant in appropriate species of genre:

2/1	octave	21/20	
3/2	5th	22/21	
4/3	4th	24/23	256/243=diatonic semi-tone
5/4		25/24	(Pythagorean)
6/5		28/27	
7/6		31/30	
8/7		32/31	
9/8	whole tone (Pythagorean)	36/35	
10/9		46/45	
11/10		49/48	
12/11			
13/12			
14/13			
15/14			
16/15	semi-tone		
81/75			
19/18			
20/19			

These intervals constitute 29 consonant intervals, not including intervals larger than the octave.

References

Al-Fārābī, Grand Traite de la Musique or Kitābu L-Mūsiqi Al-Kabir. trans. Baron Rodolphe D'Erlanger. Paris, 1930. V. I and II.

Farhat, Hormoz, Dastgāh Concept in Persian Music. Ph. D. Dissertation. University of California, Los Angeles, 1965.

Farmer, Henry George, "The Music of Islam," New Oxford History of Music, XI: 421-503.

Hammond, Robert, The Philosophy of Alfarabi and Its Influence on Medieval Thought. Hobson Book Press, New York, 1947.

Werner, Eric and Isaiah Sonne, "The Philosophy and Theory of Music in Judeo-Arabic Literature", Hebrew Union College Annual, v. 16. Cincinatti, 1941.