

The present work is addressed mainly to composers and musicologists. However, due to the large quantity of information contained (I analyse the problem of modalism in general, from its beginning until the present day and, in order not to tire the reader with information available in music theory or harmony treatises, I approach modalism in general terms and in principle) and to the statement that 20th century music after Bartók – and not only him – represents an intersection between the modal and the tonal, this work can be useful to melomaniacs.

The central problem I start from is the fact that – unlike other forms of modalism (those of melodic principle) belonging to the various historic ages, Ambrosian, Byzantine, Gregorian and Ancient Greek music – 20th century modalism is of vertical essence; I understand by this the compulsory presence of harmony as part of it. Ample information regarding these musics is available in musical dictionaries.

The following procedure is common in the contemporary composition practice: a certain mode is proposed, then all its respective chords are sought, at any level of complexity of course, and a series of *typical relationships* are determined between these chords and used throughout the composition. The relationships are freely determined.

The modal system stands more possibilities of harmonic combination than the tonal system (here, by tonal I understand tonality only). A law as objective as that of tonality would be needed in order to avoid randomness and ensure the *functionality of the modal system*.

I deduced this modal law from acoustics, comparing the superior harmonics series with the inferior harmonics series. The existence of the so-called subtonic in relation with the tonic in the medieval modal system may lead to the idea that modal harmony may shift step by step – it is not a novelty. Unlike the tonal system, the modal one stands a lot. The law of modal is more flexible than that of tonal. Yet, it exists. It is based on the same principle: main IV and V

I. ABOUT MODAL FUNCTIONALITY. THE MODERN MODAL SYSTEM

Gheorghe Popescu

steps and their harmonic substitutes. The difference resides in that functionality is inversed.

Thus, I discovered the functionality of the contemporary modal system (which began in the early 20th century).

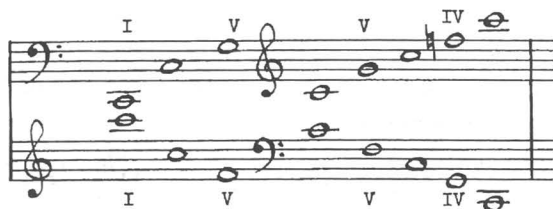
Modal harmonic linkages may have functional coherence but, as I have already mentioned, there is great freedom of linkage, greater than in the case of the tonal system. Functionality of the modal system aids in the composition as well as in the functional analysis of traditional cultures of modal nature.

According to this law, there are two ways to work: (1) strictly – according to the parallel law of the tonal system –, or (2) freely. To enhance clarity of the latter variant, it is preferable to consider the main functions IV and V in the first place. Thus, instead of step III, step V(III) will be noted.

I start from the premise that inferior harmonics series exist (a fact theoretically stated a long time ago). The two series of harmonics facing each other have the following aspect:



Starting from the principle of tonality (of harmonic functions I, IV and V) and seeking these functions within the harmonics series, we encounter the following situation:



Analyzing the above written scheme, we discover that:

(1) functionality is as reflected in a mirror;

(2) in the ascending series, step V appears twice while step IV appears only once. In the tonal system the basic cadence is I, IV, V, I, with step V having a far greater importance than step IV. This principle is present in the superior harmonics series. It is easily inferred that *the superior harmonics series generates the tonal system*.

(3) in the descendant harmonics series step V (all is as reflected in a mirror) also appears twice while IV appears only once. *The descendant harmonics series generates the modal system*. One could ask where note F[↑] and note G[↓] come from on the harmonic series. When the harmonics series generate the tonal and modal systems it is plausible that these notes be placed in the harmonics series. Such assumptions were made by Edmond Costère in *Lois et styles des harmonies musicales*.

Comparative analysis of tonal and modern modal

The basic relation of the tonal system (the problem is looked at from a tonal perspective) is I, IV, V, I. The basic relation of modal is I, V, IV, I; one of the reasons is that tonal refuses this relationship. Being very mobile, the modal system refuses neither the relationship I, IV, V, I, nor harmony based on adjoining steps.

I concluded that the descendant harmonics series generates the modal system. In the modal system functionality is inversed in relation with the tonal system. Thus, the harmonic function F plays the role of step V, while function G plays step IV. These functions usually have harmonic substitutes: step V has III and VII, step IV has II and VI. As we refer to a modal system, step I cannot be substituted by VI.

In reference to the ascendant or descendant character of modes, I mention that this feature is not determined by the mode's structure; it is only determined by the melodic profile based on this structure.

An example of intersection is:



I will exemplify the tonal and modal systems of harmonizing. Note F[#] cannot have functionality in the modal while having functionality in the modal system.

Considering the acoustic plan, the two following schemes result:

Functionality in the tonal system

I [C]

V(VII) H (ascending series)

V(III) E

I(VI) A

IV(II) D

IV F, G V

I [C] - generator note

Functionality in the modern modal system

I [C] - generator note

V, F, G, IV

IV(II) B^b, H (descending series)

IV(VI) E^b, E

V(III) A^b, A

V(VII) D^b, D

V F[#]

I [C]

Functionality of the modal is valid for any harmonizing system be it diatonic or chromatic

In order to simplify the matter, we will make two common schemes eliminating the acoustic plan:

functional control – according to a *sui generis* law – on the chordic structures.

We now have two types of modal system facing each other: the *modern modal system*, of vertical essence, which I theorized, and the medieval modal system (Ambrosian, Byzantine, Gregorian) along with the Old Greek modal system. One cannot state that the medieval modal system is false: a different point of view and different principles are involved.

The essence of the medieval and Ancient Greek modal systems is horizontal (melodic) while the essence of the *modern modal system* is vertical (harmonic).

Here is an example of application of the *modern modal system*. We propose a mode and look for its functionality in the table:

An apparent fact must not mislead us (as for example that, unlike in the tonal, note Db functions as step VII instead of step II). In the modal system, positioning of the harmonic functions is different from their common positioning in the tonal system, to which we are accustomed. This is due to the fact that (from a tonal perspective) step IV of the tonal becomes step V in the modal system and so on.

It is appropriate to remind you now what I was pointing out in the beginning of my work: if in the modal we do not work with the parallel laws of the tonal system (present in any treatise on harmony) it is preferable that the notation be not step III but V(III), thus considering only the main functions, in order to be able to exert

This *modern modal law* is not a speculation derived from the tonal. It is an objective law within which one may work either with laws concerning step succession taken from the tonal (I verified this) or freely, *the result being modal in either situation*.

Theoretical considerations

(I) If the superior harmonics series generates tonality, it is normal that it will also generate the scale family and the modulation in its 3 forms: diatonic, chromatic and enharmonic. Still, there is the theory of the fifths' spiral as well, elaborated a long time ago. Through these types of modulation, we can place ourselves in any zone of the fifths' spiral, very quickly even; that means we can easily pass from one tonality to another, however far it is.

This phenomenon represented a characteristic of romanticism, with Gabriel Fauré, Wagner, Max Reger, Richard Strauss and others as representatives. Where harmony is concerned, they practically exhausted all the resources of the tonal system, but we must not forget that most of their harmonic innovations, if not all, already existed with Bach, under different coordinates. Bach is a global innovator; he is not the first composer situated at the *intersection between the tonal and the modal* (there was Vivaldi as well). I leave here the considerations about Bach and return to (I).

Where modulation is concerned, the tonal system has immense possibilities. It is not the

same situation with modal system. The modal system does not enjoy the fifths' spiral, being, as experience shows, *a closed system*. I refer to the experience of cult medieval music and to the zone of traditional modal musical cultures, where the modulation concept hardly existed, or – in case it existed – it was very limited and present only as passing inflexions in another gamut.

The *modern modal system* is in its turn a closed system, as it does not benefit from the fifths' spiral either. The only possible thing is passing to adjacent modes, which does not go beyond the concept of gamut family from the tonal system. To do more would mean to contradict a fundamental law (thus not leading anywhere).

Going back to the adjacent comments in (I), we find that, after exhausting the possibilities of the tonal system regarding harmonic innovation, dodecaphonism appeared as a free form of combining the 12 sounds. Serialism further appeared in order to put order in this phenomenon somehow.

Serialism proposed a series of sounds arranged in a certain manner (yet orderly – this is the idea – overcoming the fact that random array is not compatible with musical laws). The working procedure was polyphonic, with the series passing from one voice to the other, according to the polyphonic procedures extracted from Bach (see *Baroque Polyphony* by Max Eisikovits – a works of reference¹ – practically a course of applied counterpoint) or simply from one instrumental group to another.

The series did not begin for all voices simultaneously but at intervals for each voice (after a number of notes for a voice, the series began for another voice either in the same form or suffering inversion or recurrence; it is purposeless to develop the theory of serialism here). All these procedures are random and are not linked to musical laws – for this reason, serialism was a failure.

After serialism, composers belonging to national schools, such as Janáček and Bohuslav Martinů appeared. Honneger is too subtle to be discussed. A bizarre intersection of the tonal and the modal is noted with these composers. The intersection between the tonal and the modal had begun. And it continued. Béla Bartók

was an exception from this phenomenon. He was the last tonal composer. He developed the concept of enlarged tonality by means of his tonal axis, which comprises relationships between both tonalities and chords.

In function of step I we have Eb — F# — A; similarly for functions of step IV and V. IC

Analyzing functionality within Bartók's axis, a functional equivalent of chords and unexpected tonalities are observed. It is the extreme extension of the tonal system. Judging from the point of view of closed tonality, a principal chord enjoys 3 substitutes. This fact opened the road for jazz where – in the early stages (the tonal stage) – the relationship V–(V)–I–G–Db–C – frequently appeared; it is a relationship with chords based on superpositions of thirds.

Thus, Bartók was the last tonal composer. His axis is the last conquest of the tonal system, but we cannot help recognize that – for example – Music for String Celesta and Percussion is an intersection between the tonal and the modal. Besides offering his tonal axis to music, Bartók was also a passionate researcher of modal structures.

At the beginning of this century a phenomenon of intersection is obvious: the intersection of the tonal and the modal. After Bartók, the reference work for composition, *Lois et Styles des harmonies musicales* by Edmond Costère appeared. It is a work which helped form generations of composers. He starts from the premise that sound C attracts some cardinal sounds



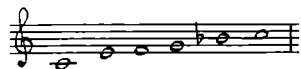
and further analyzes harmonic circumstances and develops a series of functional diagrams to be used by composers. However, the point of departure is axial and combines the modal and tonal (it is sufficient that harmonics series be consulted in order to assess this). It is a new theory that combines the tonal with the modal.

A few other such systems derived from the analysis of harmonics series can be proposed but, as they would only lead to new theories combining the modal with the tonal, I consider them inappropriate.

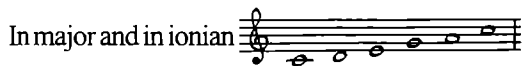
Messiaen's modes with limited transposition can be included in the same category of combination between modal and tonal. After Bartók, the intersection between the modal and tonal cannot be appreciated globally any longer – situations are much too diverse.


Utilization of this *modern modalism* may represent an alternative in the field of musical creation, with results that cannot be foreseen when developing a theoretical thesis. It is possible that separation between the modal and the tonal becomes a solution for tomorrow's composition.

The theory of pentatonic modes is present in every music theory treatise or musical dictionary. I will only make reference to aspects derived from actual reality and the experience of Western light music. In major,



is used in the melodic line with a background of mixolydian harmonizing (obviously using simple chords and a very well set rhythmic).



is used. In minor  is used with an eolian harmony background.

As a matter of fact, rock made a debut using this mode and structure on steps I, IV, V. Piens are sometimes introduced in such principal melodic structures. I end this work with a musicological consideration: Beethoven had already intuited Bartók's axis in his last quartets.

II. *A new system of differential quasitempered tuning*

The piano is tuned starting with central C up, in a perimeter of approximately one octave and a half, using an electronic apparatus (tempered) with LEDS (not pins). SABINE ST 1000 TUNER is such an apparatus. Apparata based on offer the advantage of not rendering precisely equal tempering. Starting from the tuned perimeter, *octaves are further compressed* (up and down) by auditory means, the working procedure being from semitone to semitone.

Octaves have to be compressed to a small extent. Due to the approximation of the ear, it is possible that an obtained note be a little higher or lower than necessary. For this reason, every series of octaves is verified (e. g. four at once, *successively* emitted and in order of appearance) so as to eliminate errors. *A uniform compression must be obtained* (which is easily noticed auditorily). *In no case a procedure of the old piano tuning system will be applied.* The differential and quasitempered tuning system eliminates the dry character of the tempered tuning system, having a specific melodicity (characteristic of non-tempered systems). Compression of the octaves gives force to the chords (sound forming zones are better combined); in other words, they are rendered compatible. In the grave register, chords in tight position become clear; clusters also become clear.

This tuning system hasn't got the deficiencies of non-tempered systems; thus, irrespective of the tonal zone, any harmonic combination sounds well and is rendered compatible with any other tonal zone. This is normal – the tuning system is tempered in principle.

Due to the octaves' compression a difference of pitch will be noticed between (let's say) the first C from grave register and the last C from the acute register. But, difference of pitch between sounds *on registers is not distinguishable* during the execution of a musical piece.

Compression of the octaves on registers has to be uniform (as much as possible). Due to the pitch difference on registers, combination of a chord (obviously in tight position) in a lower register with the same chord (in another overturning eventually) will result in a series of *superb* sonorities (the sound forming zones are better combined).

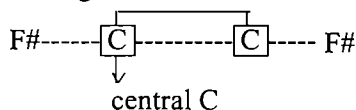
The tuning system is differential due to the difference of pitch in registers.

If only an octave was initially tuned by means of the apparatus, the system would be differential.

[1]. Tuning an octave and a half, the system becomes double differential with a segment of

the register being a little drier. I will explain.

Any obtainable variant is exceptional if only the octaves are compressed to a small extent. Difference of pitch among registers is not distinguishable during execution of a musical piece. Any music performed sounds *indefinably sensible*. I go back to point I. The ideal tuning is the following:



Essential: this tuning is centered on the tonality of C major. It is obvious that this perimeter is tuned using the electronic apparatus.

Segment C–F# up generates half a scale a little higher tuned in the superior registers. The other segment of the scale is generated by F#–C inside C–C (also in the superior registers). This is normal. It is obvious that both segments are compressed. (The octaves are compressed).

If we consider the inferior registers, the situation is the same (inversely). The system is triple differential. The advantage of this system is *unexpected*: the different character of tonalities was theoretically founded long ago, but could never be verified.

Every tonality has its own character in this differential quasitempered tuning system.

(Translated by ANITA R. CĂLINOIU)

Note ¹ Max Eisikovits, *Polifonia barocului. Stilul bachian*, București, 1973.