

CHAPTER 11
JOSEPH YASSER

Joseph Yasser's major work, A Theory of Evolving Tonality, is the only one of the large writings advocating 19-tone temperament to have been published in the United States. It is by far the most substantial work on the subject to have been published in the English language. For these reasons it is far better known in this country than the other important writings on the subject, and many of its readers may be under the illusion that the arguments Yasser offers are the standard or even the only ones used in support of 19-tone temperament. Actually, even within its highly specialized area, Yasser's work represents a highly individual viewpoint which is independent and perhaps almost oblivious of the principal lines of theoretical development. Where Kornerup and Ariel approach 19-tone temperament on an acoustic-harmonic basis, Yasser is far more concerned with the socio-melodic aspects. Where the search for a consistent acoustical system with modulational possibilities combined with the purest possible intonation for chords leads Kornerup to his "Golden System" and Ariel to his universal just intonation, concern about the modality of scales leads Yasser to what he calls the Supra Diatonic Scale. To Yasser the ear perceives intervals not through absolute acoustic value but through their position in the

scale.¹ If Ariel, with his emphasis upon harmony, might be loosely considered a follower of Rameau, Yasser might similarly be considered to be in the camp of Petis.

TONALITY, MODALITY, AND THE PRINCIPLE OF DIATONICITY

In Yasser's view, the real basis for the perception of tonality in music is in an abstract principle which we might call diatonicity. Diatonicity results when the actual scale used in a piece of music contains inequalities in its intervals. These inequalities result from the absence from the scale of certain tones which are nonetheless present in the complete system from which the scale is taken. "Diatonic," as we know it, refers to a seven-tone, unequal scale within a closed twelve-tone system. Yasser holds that the abstract principle of diatonicity is essential to the spontaneity and coherence of musical expression, but that the specific manifestation, the seven-tone scale in a twelve-tone field, is only one of many possible systems embodying the principle of diatonicity. If the resources of a specified diatonic system are exhausted, a new system may be evolved which supplies new tonal resources. Such a new system should, according to Yasser, continue to embody the abstract principle of diatonicity.

Yasser is particularly concerned with the course the

¹Theory of an Evolving Tonality, page 56.

evolution of such a new system should take. Yasser examines musical systems more primitive than ours and traces the probable evolution of our diatonic system from them. He concludes that musical systems evolve by a procedure wherein the entire gamut of tones of the earlier system becomes the functional scale of the more advanced system. This later system in turn acquires new auxiliary tones in the number and approximate pattern of the earlier functional scale.

This evolutionary process Yasser demonstrates most thoroughly by examining the relationship between the common-practice diatonic system and the pentatonic system which is alleged to be its predecessor. He points out that in most pentatonic systems there were generally two additional tones, "pian-tones" in the usage of the Chinese, which Yasser refers to as "auxiliary tones" in the complete system, making the pentatonic scale part of a 7-tone system.² The evolutionary process develops from a natural tendency to use the auxiliary tones of a musical system more and more freely until they begin to function as scale tones. At some point in the process the need for new auxiliary tones and for a modal shape for the increased scale (to be created by making unequal its intervals) makes itself felt.

²Yasser points out that just as Western music has developed 12-tone equal temperament to facilitate the modulation of its 7-tone scale, Siamese pentatonic music is drawn from a 7-tone field very closely approximating equal temperament.

In Yasser's view the 14th Century Ars Nova was the period in which Western practice reached this point in departing from the pentatonic scale.³ Today, according to Yasser, a similar process on a more advanced level is called for.

In the diatonic system are five auxiliary tones, equal in number and approximate contour to those of the older pentatonic scale. In like manner, Yasser postulates, the next system will contain seven auxiliary tones equal in approximate contour to the diatonic scale. The twelve tones of our present system will become the functional scale of the next system, bringing the total number of tones in the new system to 19. This system, which Yasser refers to as "12 plus 7," he calls the Supra-Diatonic system.

Yasser postulates universality to the method of growth illustrated above. According to his theory of evolution, tone systems must expand from member to member of the Fibonacci series (2, 5, 7, 12, 19, 31, 50, etc. This series is identical with Kornerup's although the premises on which the two men derive their series are markedly different.⁴

³Tonality and Atonality as Synthesized by Supra-Tonality, in Modern Music, supplement to issue of Nov.-Dec., 1950, page 347.

⁴Kornerup sees desirable acoustic principles in the Fibonacci principle itself. He makes the Golden Cut, which is the limit of the ratio of $\frac{a}{n-1}$ in the Fibonacci series, the basis for acoustic valuation of all intervals. Kornerup sees in the series 12, 19, 31, 50, acoustic superiority on the basis of characteristics inherent in the series as a

THE VARIABILITY OF JUST INTONATION

Having established primarily that a 19-tone system will arrive by the evolution of the scale, Yasser is nonetheless concerned about the acoustical and harmonic basis for such a system. He acknowledges that there should be a just intonation for the supra-diatonic scale, just as it is generally recognized that a just intonation exists for the diatonic scale. He asserts, however, that such an intonation will have harmonic value only; that the artist and not the scientist will determine the melodic intonation of 19-tone music.

To Yasser, the problem of determining the proper just intonation for the 19-tone system is far more difficult than it was for Ariel who simply subdivided the larger intervals of the just 12-tone system. Yasser is bound by his view that the origin of music is in its scale and by his sociologically oriented reasoning method whereby future development is postulated on the social events of the past. He holds that there is no absolute just intonation, even though he readily concedes that the harmonic series is involved in all just intonations.⁵ "The harmonic series,"

Fibonacci series. Yasser, who considers psychological conditioning far more important than acoustics, postulates the system on the grounds of empirically demonstrated tendencies in social evolution.

⁵Just intonation is subject to the acoustical laws of the natural harmonic series but in no specified form.
⁴Theory of Evolving Tonality, page 177.

explains Yasser, "affects the scale through the medium of consonant chords."⁶ However, the determinant of consonance in the chords is, once again, the scale. "Musical intervals are perceived by the human ear, not through their absolute acoustic value (or, at least, not always so) but through their relative position in one scale or another."⁷ And so, in the quest for the consonant chords which will determine the just intonation of the 19-tone system, we are brought back to the scale.

THE DISSONANT SECOND AND THE CONSONANT THIRD

Yasser's formula for the determination of consonance and dissonance from the scale is the essence of simplicity. In any of Yasser's systems, dissonance is the property of consecutive members of the functional scale, while consonance is the property of alternate members of the scale. As the number of tones in a functional scale increases, it can be seen that the size of both the consonant and the dissonant intervals decreases, with the dissonant intervals always the smaller ones. Since Yasser chooses to name the intervals in each system ("second," "third," "fourth," etc.) according to the number of functional scale degrees involved, his seconds are always dissonant and his thirds are always

⁶Ibid., page 179.

⁷Ibid., pages 56-57.

consonant though they vary in size from system to system. The "Infra-thirds" of pentatonic music are the size we consider to be a perfect fourth. The "Supra-thirds" of Yasser's 19-tone system are $3/19$ and $4/19$, respectively. All, according to Yasser, are consonances.⁸

The basic consonant chord of any tonal system is produced by superimposing as many "thirds" as will "fit" into an octave without leaving the inversion of a "second" as a remainder. In our diatonic music this is the triad, since the seventh chord leaves a dissonant remainder. For the same reason, the consonant chord in pentatonic music is the simple diad. A third tone can not but leave a dissonant "Infra-second" as a remainder. But in 19-tone music, employing 12 tones in the functional scale, it is possible to form a hexad out of superimposed "Supra-thirds," such that no consecutive scale members are present in the sonority. This hexad is, to Yasser, the basic consonance of his Supra-Diatonic System.

All intervals produced by the superposition of supra-

⁸Yasser expatiates at considerable length upon the consonant and dissonant intervals in each of the three systems he is considering. He is careful to show, for example, that Pythagorean intonation is the just intonation of Pentatonic music (this corresponds with its almost universal usage prior to the early Renaissance) because the intervals $5:4$ and $6:5$ are not the pure infra-thirds but are smaller intervals in the system, while $4:3$ is the perfect infra-third. The thirds of the diatonic system are, of course, precisely what we know today as thirds, are consonant, and require the use of the 5th partial. The supra-thirds will be smaller and will be based on higher partials ...see below.

thirds Yasser labels consonant, and all intervals not produced by this process he calls dissonant. This process leads to most interesting and questionable results. The consonances are $3/19$, $4/19$, $6/19$, $7/19$, $9/19$, and their inversions. Dissonant, besides the supra-seconds $1/19$ and $2/19$ (and their inversions), are $5/19$ and $8/19$ and their inversions, including $11/19$, the perfect fifth! The two fundamental consonances of the system according to Ariel are thus treated as dissonances by Yasser. In a single stroke Yasser thereby eliminates the interval which has played the greatest role in the evolution of musical systems (not counting the octave), and the interval in which the small-number ratio and its equivalent in 19-tone temperament are in closest correspondence.

Having declared $11/19$ and $5/19$ to be dissonances, Yasser concludes that the small-number ratios $3:2$ and $6:5$ cannot function as consonances and therefore should be eliminated from supra-diatonic music altogether. The 3rd partial, a factor common to both of the rejected intervals, is therefore eliminated from Yasser's theoretical basis for the system. Yasser goes even further, suggesting that in constructing supra-diatonic instruments the builders consider eliminating the 3rd partial as far as possible from the timbre of the tones (as present-day instrument makers

are sometimes said to do with the 7th partial).⁹

Yasser's consonant hexads consist of the six lowest partials which are possible without any octave replicas or any 3rd partials. These are the 1st, 5th, 7th, 9th (1), 11th, and 13th partials. Condensed into the octave 8-16, the hexad contains the ratios 8:9:10:11:13:14:(16). The twelve-tone supra-diatonic scale consists of two such hexads, the roots of which are 11/19 apart. Again Yasser rejects the interval 3:2, although he admits that it would be the best interval to use in separating the hexads if the goal were simplicity of ratios for the combined system. The interval 11/19 must, according to Yasser, be treated as a dissonance. Therefore, Yasser separates the hexad roots by the interval 182:121, larger than 3:2 by almost five cents.¹⁰ The two hexads result in a twelve-tone scale with very complex numerical relationships, and considerable discrepancies from the nearest possible intervals in 19-tone temperament.¹¹

⁹Op. cit., page 285. Tillman H. Schafer and James Piehl, in constructing a 19-tone instrument actually followed this mandate of Yasser's, Schafer reporting in a letter to Yasser an instrument whose sounds did not include the 3rd or 6th partials to any significant extent.

¹⁰That this is, Yasser's logic notwithstanding, a most difficult doctrine to accept, hardly needs to be stated here. By Yasser's own frequently stated viewpoint, the ear does not hesitate to render "corrections" for intervals whose deviation greatly exceeds 5 cents. Furthermore, Yasser's just dissonant interval, 182:121, is farther from the tempered interval 11/19 than either is from the perfect fifth, 3:2. Thus, to equate 11/19 with 182:121 while ignoring the intermediate interval 3:2 represents a theoretical juggling act of no mean proportions.

EQUAL TEMPERAMENT

Since Yasser uses his elaborate and questionable scheme for just intonation merely as a basis for recommending the practice of 19-tone equal temperament, it is fortunately possible to consider his ends without accepting his means. Yasser is particularly interested in the phenomenon of equal temperament and its role in the evolution of musical systems. His conclusions are indicative of his preference for empirical and sociological data as the basis for aesthetic doctrine.

Toward 12-tone temperament Yasser is, unlike Ariel, hardly an implacable enemy. Its widespread use alone affords grounds for accepting its validity. The phenomenon of equal temperament in widespread musical practice shows, according to Yasser, that "The human ear adjusts itself with comparative ease to artificial intonations even if their deviations from Just Intonation are very perceptible."¹² Yasser adds that "Equal temperament in no way impairs the inherent qualities of a scale . . . providing its (the scale's) most characteristic feature--the chain of specifically alternating, if somewhat acoustically changed, whole steps and half steps--is preserved."¹³ Yasser goes a step farther, to the

¹¹This aspect of Yasser's theory is considered and evaluated at some length in Chapter 12, beginning with the chart on page 314.

¹²Op. cit., page 55.

¹³Ibid., page 57.

assertion that deviations from just intonation might in fact be a positive artistic factor in music.

However, equal temperament is of relative rather than absolute advantage. It is valuable in that it facilitates modulation within a system containing more tones than are used in the scale. It is, however, an unfortunate hindrance in that it interferes with evolution. This it does, because the next scale, containing the same number of tones as the previous complete system, will arrange these tones on an unequal basis. As illustration, Yasser suggests that it would be most difficult for the Siamese, with their 7-tone equal temperament, to imagine the intonation of our diatonic scale, so different is the tuning. Similarly, he concludes, it is difficult for us to comprehend the most desirable intonation for the 12-tone scale. Our atonal music represents only a shadow of the best possible music using the 12-tone scale, much as Siamese experiments involving the use of all 7-tones of their system could hardly begin to realize the aesthetic possibilities of the Western 7-tone diatonic scale. In this argument, Yasser returns to his much-repeated premise that the most important ingredient of a musical scale is a modal physiognomy, i.e., a pattern of larger and smaller intervals the differentiation of which provides the structural basis for the comprehension of the music and for the development of subtlety of expression.

As mentioned above in Chapter 3, Yasser devotes

considerable attention to what he regards as evidence from musical practice that the next stage in the evolution of tonal systems is near at hand. He cites octave displacements, whole-tone music, the harmonic concepts of Scriabine, and the phenomena of polytonality and dodecaphony as evidence in support of his assertion (for details see above, pages 129-133). Nearly 30 years later, events have not borne out Yasser's premise that such practices as cited above would lead to a major change in our concepts of intonation. However, it is worth noting, that except for dodecaphony (which was least stressed among the above as indicative of a shift toward a 19-tone system) the practices Yasser cites have all but proved untenable in the long run with 12-tone temperament.

THE INFLUENCE OF YASSER'S THEORY

Yasser's theory of the evolution of tonal systems has influenced several fields of musical endeavor, through both his own further activities and those of others who have accepted all or part of his doctrine.

Yasser himself has worked at considerable length on the analysis of what he calls infra-diatonic music, especially of the Gregorian chant. His views on the suitable harmonization for Gregorian or Chinese music, based entirely on his theory of Infra-diatonic harmony, correspond remarkably closely to one's impressions of such Oriental polyphony as exists and to the practice of Organum.

Several writers in the field which might broadly be called Ethno-musicology have been attracted to Yasser's views as an approximate basis for studying the history of differences between one musical society and another. Curt Blaukopf, in particular,¹⁴ has cited Yasser's theory as a valuable breakthrough toward the understanding of the bases for the various musical systems of the different peoples of the world.

Within the more specific field of 19-tone temperament, Yasser's work led directly to the experiments of Tillman Schafer and James Piehl, and to the recognition of multiple division as a major challenge by such leading acousticians as Robert W. Young.¹⁵ Schafer's thesis¹⁶ combined a summary of Yasser's writings with research on methods for constructing electronic instruments embodying 19-tone temperament. Schafer and Piehl have built several 19-tone instruments together, several of which still survive in Denver. Schafer presented a report to the

¹⁴Blaukopf is the author of *Musiksoziologie*, 1947, a work of some considerable prestige in the field of Ethno-musicology. His acknowledgment of Yasser's influence demonstrates that Yasser's writings have attracted attention in Europe as well as the United States.

¹⁵"Some Problems of Postwar Musical Acoustics," in the *Acoustical Society Journal* of October 1944. Young lists the ten most challenging problems for musical acoustics and lists the testing of Yasser's theories as one of them.

¹⁶The Music of Tomorrow: The Supra-Diatonic Scale, A New Concept of Timbre, The Electronic Musical Instrument, an unpublished thesis presented to the Division of Mathematics and Natural Science, June 1941, Mills College.

Acoustical Society of America in 1947 in which recordings of music by Scriabin and others were played. Schafer reports in a letter to Yasser the favorable impression made by a Scriabin sonata when played in 19-tone temperament.¹⁷

Yasser appears to have been the principal influence on McClure in England, who built a 19-tone harmonium. According to Schafer, who maintained a correspondence with McClure (now deceased), McClure was not altogether satisfied with the results and finally decided that the fifths and thirds were too small.¹⁸ According to Schafer, McClure preferred X-comma meantone temperament as a compromise. One can infer that McClure, if he were alive today, might be a disciple of Pokker's 31-tone school.

Yasser has maintained a record of his correspondences which has enabled some contact to be retained among American theorists interested in the possibilities of 19-tone temperament. The group has been small but distinguished, representing most of the great regions of the country, with scientists and musicians about evenly divided. If 19-tone temperament should develop into a substantial musical movement in this country, a major share of the credit will certainly belong to the preliminary work of Yasser.

¹⁷Letter from Schafer to Joseph Yasser.

¹⁸Letter from Schafer to the author.