

## CHAPTER 3

## MULTIPLE DIVISION AS THE RESULT OF EVOLUTION

In the words of Roger Sessions, "It is hardly necessary to point out on these pages that change is inevitable at any period in the development of an art."<sup>1</sup> For about two centuries, the changes which have taken place have not involved the essential manner of tuning, but there have been a considerable number of theorists in recent years who believe that a stage in musical evolution has been reached where changes in the manner of tuning would be most desirable.

The view that the process of evolution calls for new concepts in the field of intonation does not necessarily carry any implicit disapproval of 12-tone temperament as an acoustical entity. The advocate of multiple division through evolution may be very favorably disposed toward 12-tone temperament and may prefer it to earlier historical systems of intonation. He is likely, in fact, to regard 12-tone temperament as a step in a long chain of progress; a chain whose next link must soon be found.<sup>2</sup>

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<sup>1</sup>Musical Quarterly, April 1960, p. 159.

<sup>2</sup>A typical representative of this view is Kornerup, who regards musical evolution as a series of victories for the harmonists (Harmoniker) over the canonists (Kanoniker), that is to say of the progressives over the rule-bound conservatives. The original advocates of the 12-tone system of tuning Kornerup places among the harmonists. Today's advocates of 12-tone temperament who oppose an extension in musical resources to 19- or 31-tone systems, Kornerup considers canonists. Akustische Gesetze, p. 35.

Advocacy of multiple division as evolutionally decreed implies either a critical view toward the materials and practices of contemporary music or else the view that contemporary practices are transitory or transitional. This might be best brought in relief by a citation of the opposite, conservative viewpoint. "An 'exhaustion' of the resources of the 12-tone system in the relevant future is not only unforeseeable, but unthinkable. . . . In its vastness of structural means, its flexibility, and its precision, the 12-tone system cedes nothing to any musical system of the past or present that has engaged the mind of musical man."<sup>3</sup> The above statement, by Milton Babbitt, does not necessarily represent the thinking of all contemporary dodecaphonists, however.<sup>4</sup>

Besides a limited estimate of the growth possibilities of present musical practice, the advocate of multiple division through evolution tends nonetheless to regard organic growth as a necessity. He tends to see as important the inter-performability of new and old music in the same milieu, preferably on the same instruments. Particularly stressed is the viewpoint that a new system can be defined only through practice, rather than through theory.

Finally, many of the advocates of multiple division

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<sup>3</sup>Babbitt, Musical Quarterly, April 1960, p. 259.

<sup>4</sup>This will be developed in some detail later in this chapter.

through evolution are concerned with signs they believe already to be present which indicate leanings toward a new musical system involving more tones to the octave.

#### INTONATION SYSTEMS BY HISTORICAL DIALECTIC

In his article in 1930, Tonality and Atonality as Synthesized by Supra-Tonality, Yasser states directly a dialectic concept which is implied throughout his writings. In the very title of the article, Yasser conveys his view that tonality and atonality represent thesis and antithesis within the tuning system of 12-tone temperament. From their clash must come a synthesis wherein the 12-tone scale, previously atonal owing to its lack of a modal physiognomy (through the fact that its intervals are all equal), becomes a tonal entity as part of a larger unit, 19-tone temperament.

Hermann Pfrogner also sees in tonality and atonality the coexistence of a kind of thesis and antithesis, but he finds harmony rather than disharmony in the presence of opposites. Where Yasser sees a new system as resulting from and resolving the conflict, Pfrogner sees the conflict as self-sustaining and creating a balance of nature within the 12-tone system. Any changes which might occur in the tuning system must come from the tonal aspects of the system alone, for it is in its tonal sense that the 12-tone system contains the enharmonic equivalents which may force

expansion.<sup>5</sup>

Yasser discusses the evolution of our own and other musical systems, attempting to demonstrate a similar dialectic process to that which he holds will resolve the conflict between tonality and atonality. He considers the Siamese scale to have evolved from a simple 5- to a more complex 7-tone system.<sup>6</sup> The necessity for 12 tones in Western music he considers to have arisen from the gradually evolving tendency to use all seven of the tones of the preceding ("infra-diatonic") system as scale members. Yasser believes the 14th century Ars Nova to have been the point in musical history where the "infra-diatonic" yielded to the diatonic. Jean de Muris, in his attacks on the music of the Ars Nova, betrayed himself to be an infra-diatonicist, according to Yasser.<sup>7</sup>

Melchior Sachs, in asserting that our 12-tone system is the result of evolution by accretion from a simpler 7-tone system, points out that our means of notation is a carry-over from an earlier stage in the evolu-

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<sup>5</sup>Pfrogner, Die Zwölfordnung der Töne, pp. 252-3.

<sup>6</sup>A Theory of Evolving Tonality, p. 43.

<sup>7</sup>Tonality and Atonality... op. cit., p. 347. Modern scholarship seems to indicate that Yasser picked the wrong man in Jean de Muris, but his observations would be equally valid if assigned to the real opponents of Ars Nova.

tionary process.<sup>8</sup> Sach's assumption, like Yasser's after him, is: as twelve was evolved from simpler systems, so can more complex systems evolve from twelve.

#### IMPLIED RESERVATIONS ABOUT CONTEMPORARY PRACTICE

Since the evolution of whole musical systems has always been demonstrably slow, there would be little reason to advocate further evolutionary transformation at this time were all theorists as satisfied as Babbitt (above) with the state of musical materials at the present time. It is hardly necessary to be a specialist in multiple division, or even in theory and composition, to be aware that this is not the case. Indirectly, of course, any attack on present practices is an invitation for further search for alternate techniques. In addition, however, there is often a direct correspondence between the advocacy of multiple division and a negative view toward major aspects of contemporary practice.

Ariel, to cite an extreme case, advocates 19-tone temperament to regenerate a music which has become enfeebled.<sup>9</sup> A thread of very severe criticism of contemporary music runs through much of the literature of multiple

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<sup>8</sup> Report of the 4th Congress, International Music Society, 1911, p. 279. For further information on the work of Prof. Sachs see Chapter 8.

<sup>9</sup> Das Relativitätsprinzip, p. 164.

division.<sup>10</sup> Perrett cites with evident approval a violent attack on much contemporary music by G. Dyson.<sup>11</sup> Partch writes with strong disfavor on current trends away from "corporeal" music. The article by Scherchen in praise of Sauveur is full of predictions of the disintegration of 12-tone temperament:<sup>12</sup> "The science of acoustics will have to bear Sauveur's experiments in mind, as the disruption of our equal-tempered scale, and the musical system on which it is based, becomes complete."

The criticism of contemporary practice involves, either together or separately, both tonal harmonic practices and atonal, serial procedures. Yasser accepts the atonalists' view that the addition of chromatic tones eventually "dis-integrated tonality."<sup>13</sup> Elsewhere, however, he states that atonality was not a "better path."<sup>14</sup>

Almost one hundred years ago, Helmholtz foresaw the domination of music by dissonance. He considered this an

<sup>10</sup> The exception, interestingly enough, is the literature endorsing exact quarter-tones, wherein a majority of writers seem to be quite comfortable in their surroundings, and quite convinced that their work is but an extension of the work already begun in the 20th century. See Chapter 4.

<sup>11</sup> Some Questions of Musical Theory, page 11. Citation is from Dyson, J. The New Music, 1923, p. 75, to the effect that much new music is for the "tone-deaf."

<sup>12</sup> The Nature of Music, p. 42.

<sup>13</sup> Revised Concept of Tonality, M.T.N.A. Journal, 1935, p. 100.

<sup>14</sup> A Theory of Evolving Tonality, p. 237.

unfortunate development and placed the blame on the equal-tempered scale. His statement deserves to be quoted at some length, for it represents very probably the beginning of a pattern of dissent which has since characterized a large body of the advocates of multiple division. By an extension of Helmholtz' reasoning, opposition to extreme dissonance becomes opposition to the current tuning system which Helmholtz considers to be the cause for the trend toward dissonance.

Finally, we cannot, I think, fail to recognize the influence of tempered intonation upon the style of composition. The first effect of this influence was favorable. It allowed composers as well as players to move freely and easily into all keys, and thus opened up a new wealth of modulation. On the other hand, we likewise cannot fail to recognize that the alteration of intonation also compelled composers to have recourse to some such wealth of modulation. For when the intonation of consonant chords ceased to be perfect, and the differences between their various inversions and positions were, as a consequence, nearly obliterated, it was necessary to use more powerful means, to have recourse to a frequent employment of harsh dissonances, and to endeavor by less usual modulations to replace the characteristic expression, which the harmonies proper and the key itself had ceased to possess. Hence in many modern compositions dissonant chords of the dominant Seventh form the majority, and consonant chords the minority, yet no one can doubt that this is the reverse of what ought to be the case; and continual bold modulational leaps threaten entirely to destroy the feeling for tonality. These are unpleasant symptoms for the further development of art. The mechanism of instruments and attention to their convenience, threaten to lord it over the natural requirements of the ear, and to destroy once more the principle upon which modern musical art is founded, the steady predominance of the tonic tone and tonic chord.<sup>15</sup>

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<sup>15</sup>On the Sensations of Tone, p.

What Helmholtz regarded as a denial of primacy to consonance has developed toward the denial of harmony as an element of musical construction. Richard Franko Goldman, writing on Stravinsky,<sup>16</sup> considers this denial "basic in the post-Webern world," adding, "It is certainly possible that harmony is dead, that the composers of the 18th and 19th centuries have explored all the possibilities of what we have come to call traditional harmony, and that the composer today can add nothing to what they have left us." Elsewhere in the same article, Goldman indicates that he is far from certain that this is so, and he does not suggest, as many of the advocates of multiple division do, a specific means of finding new facets or possibilities for what we have come to call traditional harmony.

While one branch of multiple division literature is devoted largely to the further development of traditional harmonic values, another is opposed to these values. Yasser believes, for example, that each musical system formed by evolution must have its own specially fitted harmonic language wherein consonances and dissonances are transfigured from less advanced systems.<sup>17</sup> Perrett, whose approach is more historical than evolutionary, decries the inherent poverty of materials in the restriction to two

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<sup>16</sup>Musical Quarterly, April 1960, p. 263.

<sup>17</sup>For a detailed treatment of this subject see chapter 11.



modes, major and minor, the purity of one of which he also questions.

Of atonality Perrett applauds the logic where there is equal temperament, but he considers it "unnatural," likening it to the completely egalitarian society "where no one's anybody."<sup>18</sup> Elsewhere, Perrett takes a more unequivocal position against atonality and a more conciliatory stand with respect to traditional harmonic concepts: "the future of music does not lie in atonality, but on the direct contrary, in extending the principle of tonality to and throughout the chromatic scale."<sup>19</sup> Perrett's prediction has not been realized in its first thirty-five years but there continue to be musicians who, for the long run, would agree with Perrett.

A somewhat atypical view of the disintegration of tonality, a view which traces its lineage to Helmholtz and leads to an acoustically oriented advocacy of multiple division, is Ariel's. He feels that major and minor have been weakened primarily because of the acoustical deficiencies in their representation by equal temperament. The difference in nature between the two kinds of third is about 70 cents, Ariel maintains, while the smallest unit in 12-tone temperament is 100 cents. A tonal system with an interval close to 70 cents (19-tone temperament contains

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<sup>18</sup>Perrett, op. cit., p. 29.

<sup>19</sup>Ibid., p. 110.

the interval 63.16 cents) would, according to Ariel, strengthen anew the dualism between major and minor.<sup>20</sup>

While opposition to present practice tends to be associated with the belief that something new will have to be found to replace it, sometimes the latter view appears coupled with a profound respect for current practice. Stravinsky, despite his current absorption in the technique of dodecaphony, is willing to concede the possibility that musical evolution may take another direction.<sup>21</sup>

The view that contemporary music is in a transitional state awaiting the development of a set of values which will effectively replace those of traditional harmony has been held by many distinguished commentators on new music for quite some time. René Lenormand, in the conclusion to his Study of Twentieth Century Harmony in 1914 states, "We should see new formulas arise of which we cannot at present foresee the character."<sup>22</sup>

Some musicians, such as Babbitt, have come to believe that 12-tone serial technique has fulfilled such predictions as Lenormand's. But as long as even such present

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<sup>20</sup> Ariel, op. cit., p. 164. For a detailed account, see chapter 10.

<sup>21</sup> Stravinsky and Craft, Conversations with Igor Stravinsky, p. 151. Our musical language, says Stravinsky, "is serial at present, and though our contemporary development of it could be tangential to an evolution we do not yet see, for us this doesn't matter. Its resources have enlarged the present language (of music). . . ."

supporters of dodecaphony as Stravinsky appear hesitant to make such claims, it is unlikely that its numerous critics will accept Babbitt's view. The adamant refusal of the majority of composers of electronic music to affix pitch boundaries along traditional lines may be a sign that the days of 12-tone temperament are, indeed, numbered.

#### GRADUAL DEVELOPMENT AND INTERPERFORMABILITY

Advocates of multiple division by evolution tend to stress the role of practice over theory, and of general and widespread practice over unique practice. Augusto Novarro, in his interesting study of various possible musical systems, pointedly reminds his readers that 12-tone temperament itself was imposed neither by a famous physicist nor by an eminent musician but rather by the public, by which Novarro means the Italian lute-players and the Spanish vihuelists.<sup>23</sup>

Yasser offers a rather precise and detailed theoretical system quite in advance of any popular clamor. Nevertheless he supports views similar to Novarro's on the primacy of practice over theory. It is the artist and not the scientist, maintains Yasser, who will first determine the melodic intonation of the 19-tone scale.<sup>24</sup> Opposition to

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<sup>23</sup>Novarro, *op. cit.*, p. 249. "El temperamento de doce sonidos actualmente en uso en occidente, no ha sido impuesto por ningún físico famoso o músico eminente, lo impuso el pueblo: los laudistas italianos, y más aun los vihuelistas españoles."

<sup>24</sup>A Theory of Evolving Tonality, p. 222.

the mechanical expansion of the resources of music has characterized the arguments of Wärschmidt<sup>25</sup> and other proponents of 19-tone subdivision against the quarter-tone advocates. 24-tone temperament is attacked as offering new tones through theoretical decree (based on convenience) rather than artistic necessity.

Proponents of 24-tone temperament, however, argue in the same vein, claiming that the truly organic growth is that which retains the present system lock, stock, and barrel. Needless to say, all 12-tone music is performable on equal-tempered 24-tone instruments, and an unquestionable advantage of quarter-tone music over other species of multiple division is the possibility of mixing the new with the old and thereby introducing new musical phenomena in digestible proportions.

The performability of 12-tone music on 24-tone instruments is incontestable. Similar claims have been made for 19-tone tempered instruments. According to the claims of some of the advocates of 19-tone temperament as a product of evolution, it is comprised of the 12-tone scale, plus 7 auxiliary tones based on the diatonic scale. Can both the diatonic and 12-tone chromatic systems as we know them be successfully played on 19-tone instruments? Melchior

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<sup>25</sup>Wärschmidt, Viertel- und Sechsteltonmusik, Neue Musik-Zeitung, Vol. 42, 1921, p. 183.

Sachs says yes,<sup>26</sup> while Yasser appears rather uncertain. In A Theory of Evolving Tonality, Yasser states that 19-tone temperament is satisfactory for diatonic melodies, although he concedes the discrepancies to be "somewhat greater" than in 12-tone temperament.<sup>27</sup> In a letter to John Redfield, Yasser concedes that 19-tone temperament possesses "little if any harmonic advantage over 12- for the performance of diatonic music," at any rate not enough to justify the shift to 19-tone temperament for this purpose alone.<sup>28</sup> According to Yasser as well as Sachs, then, diatonic music is performable on 19-tone instruments.

What about chromatic music? Chromatic materials are included in Sachs' outright assertion that 12-tone music is playable on 19-tone instruments. Rudimentary experimentation shows Sachs to be on rather shaky ground. The differences between the two systems of intonation are quite great as regards chromatic music. Assuming C to be the point of reference, the  $F\sharp$ 's of 12- and 19-tone temperaments are more than 30 cents apart.  $F\sharp$  involves a discrepancy between the two systems of close to 70 cents. The two systems can hardly be considered equivalent as regards chromatic music. It is

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<sup>26</sup>In his report to the 4th Congress of the I.M.S., op. cit., p. 69.

<sup>27</sup>A Theory of Evolving Tonality, p. 131.

<sup>28</sup>The letter is dated May 1, 1933 and is, of course, unpublished.

Yasser's contention that genuinely chromatic<sup>29</sup> music is wrong on 12-tone instruments and correct on 19-tone instruments. In view of the fact that composers were consciously working with the 12-tone scale, this is a questionable assertion, but it is more tenable than the argument of Sachs that the two systems are interchangeable in the rendition of fully chromatic music. Yasser supports his argument by referring to a number of features of music using the entire chromatic gamut (as a basic scale) as anticipations of 19-tone temperament.

#### SIGNS OF CHANGE

It is inherent in the evolutionary process that the seeds of the new are, at some stage, present in the old. Yasser believes that a number of contemporary practices show an instinctive leaning toward a new intonational system. Among the signs to which Yasser points is the extensive use of octave displacement. It is his view that in 19-tone temperament what is now called the chromatic scale will have great melodic value as a scale. It is not effective as a melodic scale today, according to Yasser, because it is "out of tune." Composers, instinctively sensing this, avoid the direct use of the chromatic scale but, desiring its benefits nonetheless, they disguise it

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<sup>29</sup>That is to say music in which all twelve tones function as part of the basic scale.

through the use of 7ths and 9ths in place of seconds, thereby hiding the unsatisfactory intonation.<sup>30</sup>

A rather revealing corroboration of this argument comes from Bosanquet, more than a half century earlier. In this instance Bosanquet is not speaking of multiple division. "In chords formed of a succession of minor thirds, major sixths frequently occur. Care must be taken to dispose them so as to make this interval correct. If a deviation is necessary, it is better, if possible, to extend the interval by an octave; the resulting major thirteenth (3:10) is not very sensitive."<sup>31</sup> It is the relative lack of sensitivity of the octave-displaced intervals which Yasser believes makes the phenomenon of octave displacement so attractive to composers.

Polytonality is another contemporary phenomenon cited by Yasser as evidence of the anticipation of a new system. He demonstrates how the diatonic scale and diatonic harmony can be produced by the simultaneous use of two pentatonic scales with simple quartal harmony. Postulating a similar synthesis at a more advanced state of musical development, Yasser asserts that there is no such thing as polytonality; that polytonal combinations represent single harmonic units in a more elaborate system.<sup>32</sup> Although this

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<sup>30</sup> A.M.S. Journal, 1953, p. 59.

<sup>31</sup> Bosanquet, op. cit., p. 72.

<sup>32</sup> A Theory of Evolving Tonality, p. 250.

view may be questioned on the basis of composers' awareness of the phenomenon of polytonality when they use it, Yasser is probably supported by the very difficulty a musician has in attempting to extract two or more separate chords from a single polytonal combination in listening. Nor is a polytonal sonority necessarily intended to be heard as two or more separate chords.

Yasser is especially interested in the harmony of Scriabin.<sup>33</sup> Scriabin's so-called mystical chord is treated by Yasser and others<sup>34</sup> as a combination of the following members of the harmonic series: 1, 5, 7, 9, 11 and 13. These are the very partials which Yasser considers to comprise the basic consonant hexad in 19-tone temperament. Yasser postulates from the above that Scriabin must have envisioned something like the 19-tone system in evolving his "mystical chord" and his harmonic thinking in general. This view has been experimentally corroborated by Tillman H. Schafer, a physicist who has long held a strong interest

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<sup>33</sup>It should be born in mind that for a period preceding the writing of Yasser's book Scriabin was regarded with considerable awe by a rising generation of composers and that his influence was once regarded as far greater than it is today.

<sup>34</sup>A Theory of Evolving Tonality, p. 232. Ernst Bindel has more recently published a similar analysis of the Scriabin chord: C F# Eb e ab d' 1 11 7 5 13 9. If this is, indeed, the Scriabin chord, it is dreadfully out of tune in both 12- and 19-tone temperaments. In fairness to Yasser, however, it should be stated that much the worse would be the 12-tone tempered rendition.



in Yasser's theories.<sup>35</sup> After participating in the construction of a 19-tone instrument, Schafer reported to Yasser that "A friend played Scriabin's 5th Sonata (on the 19-tone instrument) and evidence that he sensed the plane was everywhere."<sup>36</sup>

A phenomenon which occurs from time to time in the standard contemporary repertoire and can easily be interpreted as presaging an era of multiple division is the use of tones outside of the 12-tone realm for special effect. Among the works in the standard repertory which employ unusual subdivisions are Benjamin Britten's highly successful *Serenade for Tenor, Horn, and String Orchestra* which uses the natural 7th and 11th partials of the horn in solo passages, Aaron Copland's piano trio *Vitebsk* which uses approximate quarter tones in the two stringed instruments, and Bartok's *Violin Concerto*. Ernest Bloch and Charles Ives are among the other recognized composers who have made occasional use of microtones.

James Mursell writes of equal temperament that it has frozen the development of music, consigning innovation

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<sup>35</sup>His honors thesis is entitled The Music of Tomorrow: The Supra-Diatonic Scale, a New Concept of Timbre, The Electronic Musical Instrument (1941). His instrument-building was in collaboration with James Piehl.

<sup>36</sup>Letter from Schafer to Yasser, unpublished, dated February 14, 1947. Schafer offered a similar report to the Acoustical Society of America at about the same time.

to the speed of flow of a glacier.<sup>37</sup> On one level, Mursell appears wrong. Has there ever been a period in the history of music in which styles have changed as rapidly or as completely as in the last 70 years? On another level, however, the rapid changes of style can be construed as efforts to surmount an obstacle which blocks the entry into a more fertile domain. Change and progress need not be synonymous, and Mursell is clearly referring to the latter when he speaks of "innovation."

Advocates of multiple division through evolution believe that our general habituation to 12-tone equal temperament is the greatest obstacle to further progress in music and that a kind of "supermusic" is possible which awaits only the arrival of composers and performers equal to its superior challenge.

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<sup>37</sup>Mursell, James L., Psychology and the Problem of the Scale, Musical Quarterly, Vol. XXII, p. 565. Cited by Plaukopf, Musiksoziologie, p. 117.