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Chapter VIII

Prescriptive and Descriptive Music Writing[1]

Three hazards are inherent in our practices of writing music. The first lies in an assumption that the full auditory parameter of music can be represented by a partial visual parameter. that is. by one with only two dimensions. a flat surface. The second lies in ignoring the historical lag of music writing behind speech writing and the consequent traditional interposition of the art of speech in the matching of auditory and visual signals in music writing. The third lies in our failure to distinguish between prescriptive and descriptive uses of music writing-between a blueprint of how a specific piece of music shall be made to sound and a report of how a specific performance of any music actually did sound.

I shall deal here with the writing of only the simplest kind of music-unaccompanied melody. All three hazards have combined to render it probable that speech conceptions of melody have played an important part not only in the development of the technique of writing but also in the composition and performance of melodies in writing. And the conditions of the musicological juncture, the situation in which we attempt to communicate in the art of speech relative to the nature of the art of music and what it communicates, render certain that speech conceptions of melody may sometimes outweigh music conceptions of it, particularly in any discussion of the problem of music writing. We cannot. Therefore dismiss with a wave of the hand the questions (1) to what extent do our speech conceptions of melody correspond to our music conceptions of it and (2) to what extent does the visual representation of melody condition both conceptions of it? While it is risky to think we can answer these questions definitively we can at least bear them in mind and set ourselves seriously to consideration of ways and means of evading or offsetting the hazards of the task. I shall refer only briefly to the problem of multidimensional visual representation of melody for technological advance upon which we must depend for aid in this respect, has not yet overcome the difficulties in the visual representation of the composite melodic functions of tonal and rhythmic densities. And since we cannot conceivably escape from the limitations of the musicological juncture, I shall single out two speech concepts of melody, not as comprehending the total range of the problem but as underlying the two methods of music writing now available to us-the one prescriptive and subjective, the other descriptive and objective.

On the one hand, let us agree, melody may be conceived (verbally, it must be remembered) as a succession of separate sounds, on the other, as a single continuum of sound-as a chain or as a stream. Conception as a chain tends to emphasize structure and entities that move; conception as a stream, function and movement itself as a transmission of energy. Neither, of course, tells the whole story as the musician knows it. Both distort this knowledge to extents we cannot precisely gauge. For many of the links of the chain may be fused together, and the stream may run through successions of comparatively stable levels. And there may be breaks in both. Like so many speech constructions, these verbal constructions are not mutually exclusive opposites, but can be shown to have possibilities of serving as complements to each other. And the truth may lie somewhere between them.

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[1] "Prescriptive and Descriptive Music Writing," *Musical Quaterly*, XLIV, 2 (April 1958), 184-195.

Visual representations of melody as a chain is comparatively easily done by a chain of symbols; as a stream, by a curving line. Symbolization inevitably results in sharp distinction between music space (tone) and music time (rhythm) as separate, independent factors; lineation, in non-separation of the two, as overlapping, interdependent factors. Within the incomplete frame of the two-dimensional page, both symbolization and lineation depend upon certain graphic conventions of obscure origin. One, identification of elapse of time with occurrence from left to right on the page, possibly borrowed from speech writing, underlies both factors. Another, identification of height in pitch with height on the page underlies some symbolic and all linear music writing. Uniform vertical coordinates for elapse of time (indicating tempo) and uniform horizontal coordinates for height of pitch form the basic chart for the most recent developments of linear music writing known as "graphing."

The history of the fine art European music shows that our conventional music writing was first a predominantly symbolic, second a predominantly linear, and third a mixed symbolic-Iinear notation. The Greek tradition as made known to us most clearly by Alypius was based upon the convention of representing elapse of time from left to right. Separate symbols for pitches of tones and for meter were placed accordingly. The accents and neumes of the early Christian era added the convention of identifying height of pitch with height on the page, but were linear in character, expressing movement rather than the points moved to and moved from. They seem first to have come into use to describe an existing practice of recitation. The notation became, however, more and more used for prescriptive purposes. First, ecclesiastical authorities and, later, composers began to specify exactly from where and to where movement was to go, and how long it was to take to do so. Addition of the lines of the staff and of the stems and barlines (prototypes respectively of the horizontal and vertical coordinates of the graph chart) were major steps toward the lineation of the graph; standardization of the notehead and the metrical flags and beams was a reversion to symbolism.

As we find it today, our conventional notation is still a mixed symbolic-linear music writing in which the symbolic element is the more highly organized and therefore dominates. It is practically entirely prescriptive in character. Emphasis is upon structures-principally of pitch and meter. It does not tell us much about the connection of the structures. It does not tell us as much about how music sounds as how to make it sound. Yet no one can make it sound as the writer of the notation intended unless in addition to a knowledge of the tradition of writing he has also a knowledge of the oral (or, better, aural) tradition associated with it-that is, a tradition learned by the ear of the student, panty from his elders in general but especially from the precepts of his teachers. For to this aural tradition is customarily left most of the knowledge of what happens between the notes," between the links in the chain and the comparatively stable levels in the stream.

In employing this mainly prescriptive notation as a descriptive sound writing of any music other than the Occidental fine and popular arts of music, we do two things, both thoroughly unscientific. First, we single out what appear to us to be structures in the other music which resemble structures familiar to us in the notation of the Occidental art and write these down, ignoring everything else for which we have no symbols. Second, we expect the resulting notation to be read by people who do not carry the tradition of the other music. The result can be only a conglomeration of structures part European, part non-European, connected by a movement 100 percent European. To such a riot of subjectivity it is presumptuous indeed to ascribe the designation “scientific."

There are three ways out of the dilemma. for that is what it is, so rare is the carriage by anyone person of more than one music tradition and so difficult the correction of the bias typical of

that one.[2] On the one hand, we may increase the already heavy overload of symbols in the notation, with a resulting increase of difficulty in reading and but little, if any gain in accuracy or objectivity. On the other hand, we may dispense with many of the symbols and extend the graphic potentialities of the notation. The handmade graph based upon the notation has its uses. But for purposes of formal description--0ur main concern here-the objectivity of the electronic reduction of the oscillographic curve, especially of the sound track of high-fidelity sound-recording, is vastly superior. As Bartok has said, 'The only true notations [music writing is what he might have said] are the sound tracks on the record itself."[3] These, unfortunately, are legible only through laborious mathematical calculation. For, when large enough to be seen in detail by the human eye, they are several feet long per second. Electronic analysis can reduce or compress them automatically, as desired. Compression within a range of about 2.5 to 25 mm. per second produces a graph legible by anyone who can read conventional notation and is willing to practice.

The time has not yet come, of course, for abandonment of our conventional notation. It has come, laver , for development of the graph. Structure and function are equally important methodological concepts. Prescriptive and descriptive uses of music writing are equally necessary and not necessarily incompatible. Musics surely differ from one another in their adaptability to one or the other kind of music writing. But surely, also, we may hope they resemble one another in this respect. The important thing for study is to know objectively wherein they differ and resemble regardless of their being written one way or another. Furthermore, as a means of communication among people, music must be expected to have its subjective aspects. The least we should expect of the scholar is that he will not be a party to the passing off of his own subjectivity as someone else's or that he will fail to report objectively upon the subjectivity of that someone else. My recommendation for the foreseeable future, then, is to employ the notation and the graph concurrently.

Correlation of the graph and the notation depends in great measure upon recognition of their relative capacities and limitations. Both are based upon the conventions of identifying elapse of time with left to right on the page and height in pitch with height upon it. They differ in that spacing is irregular in the notation but uniform in the graph. The comparative efficiency of the two methods of writing in handling the six principal functions of the single melody may be summarized as follows:

TONAL FUNCTIONS

1. Pitch is only roughly indicated, that is, within a half tone by the notation. The attempt to increase accuracy by superscription of additional symbols such as cents numerals, arrows, plus and minus signs, modifications of accidentals, and so forth, found in many ethnomusicological works is severely limited by the decrease in legibility. My present fundamental frequency analyzer, Melograph Model B, which is a mere Model Tin the way of graphing devices, has a top discrimination of about 1/10 tone.[4]

2. Amplitude (dynamics) is only roughly indicated by the notation. My present amplitude graphs show changes in dynamics far beyond what the ear can detect.

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[2] E. von Hombostel, wFuegian Songs," in Amt'Tit:an Anthropologist, XXXVIII (.July-September 1936), 357n.
[3] Bela Bartok and Albert B. Lord, Serbo-Croatian Folk Songs (New York: Columbia University Press, 1951), p. 3.
[4] Charles Seeger, "Toward a Universal music Sound-Writing for Musicology." in Journal of tile International Folk Music Council, IX (1957), 63.

3. Tone-quality (tonal density) cannot be shown at present by either method of writing except laboriously by instruments in or as the Sonagraph. Ample acoustic research has been completed and engineering applications are already in use permitting rough but meaningful graphs of tone quality. A practical device is still to be manufactured.

RHYTHMIC FUNCTIONS

4. Tempo or speed of event is only roughly indicated in the notation, even with the aid of the metronome. It is very accurately indicated upon the chart in both frequency and amplitude graphs by the analyzer I am using. The margin of error seems to be about 1/100 second.

5. Proportion is easy to read in the notation as prescription, but not always easy to read as a description in the graph.

6. When fed into a properly programmed computer, it can be easily read with perfect accuracy. Rhythmic density (number of events per unit of time) can be shown well by the graph produced by the analysis fed into a computer.

On the whole, the student will find the pitch and the beat more accurately shown in the graph than in the notation, but less independently delimited. As conceptions of verbal thinking, he will find both becoming less rigid and absolute. Also, he will find the gross formal aspects of melody more readily perceivable in the graph. But he will have some difficulty in fitting conventional terminology with what he sees in the graph. The problem is most clearly presented in all its complexity in the sung melody. For it is there that the tonal factor of vibrato meets the rhythmic factor of rubato head-on, in the most diverse and subtle manners.

First, let us consider the sung melody as a chain. From this viewpoint, vibrato and rubato are separate, unrelated factors.

Surely, all students of Occidental music know that the actual variance of the vibrato is an alternation of adjacent pitch frequencies and/or amplitudes customarily perceived, that is, musically thought of, by us as one salient pitch and/or loudness about the mean of the variance.[5] (Variance of tone quality in the vibrato is secondary and need not detain us for the moment.) It is this mean, not the actual, variance that we identify as a "note" and relate to a norm of our music theory such as a degree of a scale and, so, as a link in the chain. There are three main types of vibrato: (1) of pitch without loudness, (2) of loudness without pitch, (3) of both pitch and loudness.

Surely also, all students of this music know that the actual variance of the rubato is an alternation of anticipation and delay (or delay and anticipation) of successive beats customarily perceived by us as one salient deviation from the mean of the variance, or tempo.

Operation of the vibrato is mostly below the threshold of deliberate control. That is, it is largely autonomic, customarily thought of as a characteristic of voice production, as, for example. of the single note or link in the chain. It can be modified-even acquired-by conscious effort, but not so much in terms of its actual as of its mean variance. Once acquired, it is set in its pattern and persists throughout the process of rendition. regardless of changes of overall pitch and loudness.

[5] Carl E. Seashore, ed., The Vibrato (Iowa City: University of Iowa Press, 1932), p.369.

Operation of the rubato, in contrast, is mostly above the threshold of deliberate control. It is thought of as a characteristic of the sequence of notes or links in the chain. While factors of which we are largely unconscious are constantly deflecting it in minute ways, our deliberate control of it is mainly in terms of its actual variance with respect to whole beats and, in slow tempos, of divisions of beats. As to its mean variance, the Grand Tradition, as I received it from my most admired teachers, requires that it be (1) continuous in all but very strict tempos and (2) compensatory, for "the music should come out with the metronome at the end"-a quaint, but tenaciously held bit of musical folklore. The notation does not even attempt to show this; but the graph can submit it to an acid test. It can also show any unevenness in vibrato or rubato which is musically significant.

Now, the attack upon the next succeeding note in any melodic process, the more so if it is accented, long held, dissonant, or unusual in some respect, is very much a matter of deliberate attention and control on the part of the executant. But according to the acousticians, we customarily vastly underestimate (1) the extent of the actual variance of the vibrato, which may be commonly 40-200 cents, that is, from one-fifth to a whole tone; (2) its rate, which may be 4- 10 per second; and (3) its irregularity in both respects. Such variances might be expected to modify the expectations of the singer, semi-automatic as they are, and occupied as he may be with the mean variance of the tone he is producing with the intention of arriving within the mean variance of beat required in the- rendition of the melody he is carrying. Seashore and others have pointed out that singers--even the best-habitually overshoot or undershoot both upward and downward melodic progression. The fundamental frequency analyzer that I have been using shows this also. I would like, therefore, to advance the hypothesis that when the phase of the actual vibrato is in the direction of the melodic progression the establishment of the mean variance of the new note upon the beat expected is more likely to occur, whereas if it is contrary, the new note may not be established until after the beat, a slide being interposed. If the slide, which is typical of legato singing, is fairly slow or covers a wide interval, the graph may show little jagged points where the continuation of the vibrato may have forced an interruption of the progression. Overshooting and undershooting may also involve or be involved in difference in phase and progression. Thus, rubato may be influenced by vibrato. Schemauc diagram of vibrato and upward melodic progression, in phase (left) and out of phase (right)

Conversely, if the attack upon a higher or lower note is anticipated or delayed by rubato, a vibrato that might have facilitated a decisive attack may be upset. A slide or overshooting or undershooting may result. Thus, vibrato may be influenced by rubato.

It is only in the attack or release of substantial notes {links in the chain) that vibrato and rubato may meet head-on. A very common complication seems to result within the beat when the rate of actual variance of the vibrato and a division of the beat by articulated notes are within the 4-10 alternations per second of the vibrato and the 2-16 {approximately) of the beat division. For example, a vibrato of five actual variances per second will produce a very different rendition of a group of four sixteenth notes at a quarter = 60 from that of a vibrato of seven per second.

Next let us consider the melody as a stream broken only by the necessity to take breath as at the end of a phrase, or by the briefer closures of the vocal apparatus in en unciation of certain consonants, or the making of exceptional effects such as staccato. pauses. and so forth. From this viewpoint, vibrato and rubato are closely related factors in a continuum. For here, melody is not viewed as a jagged rising and falling but as a sinuous flowing along a course. [n what may be the vast majority of cases the glide between levels their overshooting and undershooting, and the various inflections given them are not exceptions to theoretical norms but integral characteristics of the stream, intentional and cultivated. Except in the most strict tempo giusto and marcato, which

are rare in singing, the manner of proceeding between levels and of modifying the levels themselves are, then, often quite as important data for the student as are the levels themselves.

In instrumental performance, the collision (in the chain) or interplay (in the stream) of vibrato and rubato is modified or even broken variously by movements of fingers, changes in bowing or embouchure, and so forth, peculiar to each technique. Approximation of many of the devices of singing style above mentioned can, however. be noted in instrumental playing-as on the vina and sitar, the ch'in and koto. And even in our own banjo and guitar playing-where slide-fretting, pressing down on strings, "hammering down" and pulling them sidewise are common, as are tightening, relaxing, and shaping the embouchure on the trumpet, clarinet, and other wind instruments. The almost infinite variety of this interplay between and within beats defines more closely the fault so often found with the unskilled performer: that he rendered the notes correctly but left out what should have come between them, which is to say, he did not connect them in accordance with the appropriate aural tradition. Each of the many music traditions in the world probably has its own distinctive ways of connecting or putting in what should come between the notes. Conventional notation can give no more than a general direction as to what these ways are, as, for example, by the words and signs of portamento. legato, detache, staccato. spiccato, crescendo. diminuendo. accelerando, rallentando. and others. In the graph they are all there for anyone to see in clear detail. If it causes us some trouble to find out just what the notational equivalents are, we must not complain that the performer did not render notes. Rather. we should be glad that instead of rendering notes he rendered music. and that we may set ourselves with greater assurance to the task of finding out what he did sing or play, without preconceptions that he meant to, or should have sung notes.

At this point it is necessary to say a word of warning about the fetish of extreme accuracy in the writing of music. Physics can determine and engineering can reproduce incredibly small differences of sound and time. Psychology (and rare musical experience) can prove that human beings – not necessarily with talent or training in music-can perceive differences beyond 1/lOO of a tone or of a second.[6] But the great music traditions, their practice by those who have carried them. arid the phenomenological and axiological norms[7] incorporated in them were not determined by the exceptional human being. He contributes to them. I we may never cease the controversy over how much. The same is true of our notation, which is, par excellence, a matter of norms determined by the vast aggregate of practice and codified by generations of workers. The graph, however, shows individual performance. Each graph, whether of the exceptional performer or the merest tyro, is unique. Norms can be arrived at by comparative studies of large numbers of graphs. But these norms may differ in many important respects from the norms embodied in the notation. Or they may confirm them. In any event, where the individual notation may give too much norm and too litde detail, the individual graph may easily give too little norm and too much detail. It is well, therefore, especially in these pioneer stages of the development of the graph, not to look for too much detail or, better, detail too far beyond the norms of general practice, except for most carefully considered ends. For the present, I am inclined to set 1110 of a tone (20 cents) and 1110 of a

[6] See, for example, one of the most valiant attempts at descriptive accuracy using conventional notation (Bartok-Lord, Serbo-Croatian Folk songs), in many of whose transcriptions there are passages in which it is difficult or impossible to decide to what extent the notes represent (1) unequal articulated divisions of a beat sung in strict time, (2) equal articulated divisions sung with rubato, (3) either of these with written out or partly written out vibrato, (4) an uneven vibrato, or (5) a vibrato that a less sensitive ear would hear as a single tone, i.e., whose mean, instead of actual variance would be the musical fact.

[7] The elasticity with which our notational norms are actually made to sound by competent professionals has recently been measured with great accuracy by Charles R. Shackford in .'Intonation in Enscmble in String Performance-An Objective Study" (Ph.D. diss., Harvard University, 1954).

second as fair margins of accuracy for general musi~gical use. Detailed study may ge beyond these at the discretion of the student.

As a strictly musicological tool the graphing apparatus brings to our existing notational techniques the needed complement to show 'what happens between the notes" and what any departures from their theoretical norms really are in terms of musicological thinking. For lexicographical and many classificatory uses, the pitch-time graph will probably be the most useful. Used side by side with the amplitude-time graph. a beginning can be made in the all important exact study of performance style, especially of singing style, without which the infant discipline of comparative melodic research cannot hope to do more than half a job. But as yet, this can be only a beginning. For its full study graphing of tone quality and visible speech, both now in advanced stages of development, will be necessary.

We are, then, at last nearing the time when scientific definition of the world's musics and comparative studies of them can and should begin in earnest. Extrinsic contributions in terms of culture history, of geographic extent, and of social depth are being made by anthropology, sociology, psychology, physiology, physics, and other nonmusical or extramusical disciplines. Musicology is hardly ready to attack the necessary definition and comparative study in intrinsic terms. We have not more than coined a word when we speak of the concept music or even a music. We do not even know whether our basic categories of music 'idiom"-fine. folk, popular, and primitive (better, tribal) arts of music-hold everywhere outside of the Occidental culture community or even in it.

The volume of data now already at hand shows that in the near future we shall be compelled to adopt statistical techniques such as those being developed by anthropology.[8] These will increasingly employ the kind of thinking and operating that depends upon precise visual representation of the most detailed observation as well as of the most generalized synopsis or synthesis. Musicologists will have to learn to read the graphs of nonmusical sciences. And it is not impossible that nonmusical scientists might learn to read the music graph more readily than the conventional Occidental notation.

As a descriptive science, musicology is going to have to develop a descriptive music writing that can be written and read with maximum objectivity. The graphing devices and techniques above referred to, show the way toward such an end. But it must be remembered that technological aids of this sort report only upon the physical stimulus to the outer ear. At present, too, it is possible to put into visual form only fractioned aspects of this, such as pitch and time, amplitude and time, and so on. One can conceive, though scarcely imagine. an automatic music writing that would comprehend the total physical stimulus in a single, continuous process of writing or reading. But even if this present impossibility were to be realized we would still have to take pains lest the visual representation of the stimulus were mistaken for the full sensory and perceptual reaction of a person conditioned by the particular music-cultural tradition of which the stimulus were a product. For perception does not accept sensation without dlange. Put bluntly, “we do not hear what we think we hear." Just what is the nature of the change is one of the things we most want to know. For culturally unconditioned listening to music, unless by "wolfboys," congenital idiots, or the like, is not known to us. If the stimulus is a product of the particular music tradition that we carry .we perceive it as such. If it is a product of a tradition we do not carry. we perceive it as we would a product of the one we do carry making such changes as we are accustomed to. Therefore, automatic music writing by such aids as those referred to must no more be taken for what we think we hear than most conventional notation. But even in its present pioneer stage of development, such writing

[8] Linton G. Freeman and Alan P. Merriam, Statistical Classification in Anthropology: An Application to Ethnomusicology," in American Anthropologist, LVIII (June 1956), 464-472.

must be accepted by us as afar truer visual portrayal of what we actually hear than is the notation. By comparing the two, we may achieve several useful ends: (1) we may learn more about the divergence of conception and perception .in our own music; (2) we may take steps toward the discovery of how a music other than our own sounds to those who carry its tradition; (3) we may begin to correct our misperception of other musics than our own by cultivating our capacity for a universal musicality-surely. one would think, a prerequisite for musicological work. The automatic graph can serve as a bridge between musics-a common denominator, as it were, in support of such musicality. The physical stimulus constituted by a product of any music tradition is identical to those who carry the tradition and to those who carry another. It is the conceptions and perceptions of it by the respective carriers which may be different. There may be a clue here to the problem of what music communicates and perhaps an indispensable guide to the effort to develop a worldwide philosophy of music upon both rational and mystical bases-not on either one or the other.