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Some fifteen years ago, in a frequently cited article entitled "Analysis Today," Edward T. Cone addressed himself to the questions: "What is analysis, or what ought it to be?" "What are its purposes?" and "To what extent are traditional concepts and methods [of musical analysis] applicable to new music?"[1] Cone's answer to the final question, concerning the analysis of new music, turned out to be largely determined by his answer to the first, concerning what analysis ought to be. Defining analysis as an attempt to explain rather than merely describe music, he states his position as follows: "In order to explain how a given musical event should be heard, one must show why it occurs: what preceding events have made it necessary or appropriate, towards what later events its function is to lead?" Turning then to new music, he says that in those cases where the music reveals what he calls an "organic temporal unity," a unity perceptible "as one moment flows to the next, each contributing both to the forward motion and to the total effect"—or expressed in rhythmic terms, where one is able to hear a "structural downbeat"—then one is able to "proceed with analytic concepts in some way analogous to those of traditional rhythm and meter, phrase and cadence."

In line with his conception of analysis as the elucidation of a sort of teleological organism, Cone concludes that analysis is no longer applicable to certain recent compositions, such as pieces that use chance procedures, those completely predetermined by serial operations, or those

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1. *Musical Quarterly* 46, no. 2 (April 1960): 172–88.

in which improvisation plays a significant role. (One might bring this list up to date by adding such things as, for example, the *Klangfarben* compositions of Ligeti and Penderecki, or the rhythmic phase music of Steve Reich.)

According to Cone, then, there is a great deal of music written today that is simply no longer susceptible to analysis. If this is true, it can mean one of several things. First, it may indicate that, although there are new compositions that one finds interesting and representative of the period in which we live, the music simply does not lend itself to analysis. Thus, even if we enjoy and admire this music, there is not much that we can say about it beyond perhaps a mere description—which I think most of us, along with Cone, would agree does not really constitute an analysis. I have the impression that many proponents of new music hold this view—that is, they feel that new music is understandable only through a sort of mindless apprehension of its sensory surface. But if this is a fair account of the situation surrounding new music, it seems to me to represent a very serious—and also depressing—state of affairs. For what it means, I suspect, is that new music does not lend itself to being thought about in any serious way at all; and if so, then new music is missing a crucial dimension—namely, an accompanying conceptual framework, erected through a body of critical and theoretical discourse, through which its meaning is defined and redefined as our thinking about music evolves. Indeed, this dimension forms—and has always formed—such an integral component of Western art music that its absence would seem to indicate that music, at least as we have known it, is in all likelihood dead.

Another possibility, in some respects similar to the previous one—and equally depressing in implication—is that somehow music has gone awry and is for this reason unanalyzable in Cone's terms. In other words, composition has gotten off the track, and until it gets back on again, the less we say about it—or analyze it—the better off we will be. If the preceding view is accepted by some proponents of new music, I suspect that this one is held by most of its detractors, who seem to feel that, given the extraordinary position into which composition has gotten itself, there is very little to do but maintain a polite silence and hope that sooner or later things will get better.

But there is a third possibility. The problem focused upon by Cone

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may not lie in new music itself, but in our conception of analysis. Indeed, our whole notion of what analysis is, or should be, may require rethinking in the light of what has happened in musical composition over the past quarter century.

Cone himself puts his finger on the problem when, near the end of his article, he points out that: "The good composition will always reveal, on close study, the methods of analysis needed for its own comprehension." This suggests that what analysis is is closely tied to—indeed, to a large extent determined by—the object toward which it is directed. And since analysis today forms a generally accepted area of musical study, about whose subject matter and methodology, at least in broader outlines, there is widespread agreement, it is useful to remember that its assumptions were largely shaped by the music composed during the period in which it developed as a discipline. Moreover, this music, as well as the analytic techniques it fostered, is itself incomprehensible—even inconceivable—outside of the larger cultural context within which they both flourished. My point, then, is that if things are changing—if music and its social role are undergoing transformation—it seems likely that analysis itself must experience some sort of analogous conversion.

With this in mind, perhaps you will permit me to retrace briefly—and in only its roughest outlines—the development of musical analysis over the past several centuries. Analysis as we know it today—as taught in our schools and practiced in our professional journals—is a relatively recent discipline that required for its maturation a cultural orientation placing great stress upon individual works of art, viewed not so much in terms of their function within a larger societal framework but as unique objects of aesthetic experience worthy of serious consideration as more or less independent entities. Although there are earlier indications of the emergence of this view, it did not appear in fully developed form until the eighteenth century; and it is only from this point that we can date the history of musical analysis in the modern sense of the word—as well as such related modern disciplines as musical criticism and aesthetics. Thus although one can point to certain isolated cases from earlier periods—such as Aristoxenus' detailed consideration of the Olympian nome of Athena as reported in Plutarch's *On Music,* the final chapter of Glareanus' *Dodecachordon* (1547), or, especially, Burmeister's *Musica Poetica* (1606), where the term "analysis" actually appears—it is only in the eighteenth century that such activity becomes a constant and irreplaceable feature of musical life and instruction.

One can point to the large number of analytically oriented articles that appeared in the newly surfacing *Musikzeitschriften,* penned by such figures as Mattheson, Marpurg, Forkel and Reichardt, who form part of a line that leads to such nineteenth-century analyst-critics as Hoffmann, Schumann and Berlioz. Similarly, in music theory, the analysis of passages from individual works to illustrate, clarify and justify theoretical

formulations becomes increasingly common and gives rise to a parallel line, again beginning with Mattheson, that extends through Rameau, Riepel, Koch, Momigny and Riemann, to name only a few, to culminate finally in such twentieth-century figures as Schoenberg, Schenker and Ratz.[2]

Characteristic of this entire development is the presence of a circular relationship between the musical compositions and the analyses written about them. For the new discipline of musical analysis was not only made possible by a new attitude about the importance of individual works, it was actually required as a necessary support for that attitude. That is, when the musical work lost its functional role in a broader social context—and here one thinks above all of its increasing separation from the Church—and appeared as an autonomous phenomenon, it required a new kind of validation, one of an essentially internal rather than external nature. The work demanded, above all, acknowledgment of itself as a meaningful, logical and well-ordered musical statement.

It is not surprising, then, that analysis as we know it is largely concerned with pointing out such properties as consistency and well orderedness. The notion of "musical logic"—of music as a kind of perfectly structured language within whose terms meaningful statements can be made on the basis of widely accepted "grammatical" conventions—runs throughout the entire analytical tradition and indeed forms its central thread. The development of music theory during this period can thus be understood as an ongoing attempt to define the "laws" of musical grammar; analysis then attempted to clarify the various and constantly changing ways in which these laws were made manifest in individual compositions.

This close correlation between theory and analysis can hardly be overemphasized. Perhaps the most convincing way in which the individual composition could be justified was to show that it was not, in fact, an isolated statement at all, but rather partook of generally accepted conventions—that it was an instance of a widely understood language. The role of theory, then, was to define the relevant conventions and, at least for many theorists, to show that they were rooted in acoustical laws and thus explicable in more or less rigorous, scientific terms. Individual analyses were thus played off against, and supported by, a larger background of shared musical beliefs and assumptions that were ultimately reducible to explanations of an essentially technical—musico-grammatical—nature.

This brings me back to Mr. Cone, for it is clearly this type of analysis that he has in mind when he speaks of the need to clarify the logical, or as he puts it, "teleological" nature of musical discourse—its "organic

2. For a more detailed discussion of these developments, see Hermann Back, *Methoden der Werkanalyse in Musikgeschichte und Gegenwart* (Wilhelmshaven, 1974).

unity." Cone assumes that most of the music of the twentieth century can be analyzed in a way that is essentially similar to the way earlier music is analyzed, that it is still based upon those principles of musical logic—even if that logic is somewhat modified—with which earlier analysts concerned themselves. Exceptions, such as chance music or totally determined serial music, can be considered as departures—and presumably only temporary ones—from an uninterrupted and ongoing tradition dating back at least to the eighteenth century.

I should perhaps say at this point that I consider Edward Cone, with whom I happened to study, one of our most articulate and enlightening commentators on music today. Moreover, since his article was written in 1960, when the world and its music seemed quite different from the way they do today, one can understand his position. But the problem now is that, from our present perspective, it seems increasingly unlikely that those types of compositions barred by Cone from analytic scrutiny represent momentary departures. Chance and serial music, for example, though they are no longer practiced with the missionary fervor of twenty years ago, have—along with various other new approaches—become part of a larger mainstream carrying us into a new musical period in which our former analytical assumptions seem to have only marginal applicability. It is the music of this period, then, that I would like to focus upon from the point of view of the analyst. In doing so—and I do not pretend that I will be able to undertake more than some basic explorations—I would like to keep in mind Cone's maxim that a good composition will reveal the methods for its own analysis. Thus any answer to the question of what analysis should be must depend upon the work under consideration. And since it is characteristic of recent music that many of its most representative compositions seem to have very little to do with one another, answers may differ markedly from case to case. Nevertheless, I hope to identify at least certain general attributes of a meaningful analytical approach to musical composition today and to indicate that such an approach requires a definite reorientation of traditional thinking about the nature of the discipline.

I shall begin by considering the relationship between musical work and musical system, as it is here that one of the most dramatic changes in recent music has taken place. Once again it is helpful to consider first this relationship in earlier music. In discussing the interaction of theory and analysis with individual compositions of the common practice period, I suggested that these compositions could support such pronounced individual scrutiny only because they partook in a generally accepted musical system with a kind of independent life of its own. Thus the meaning of a work was determined precisely by its relation to an external set of norms, while its individuality was measured by the extent to which it reinterpreted these norms in new and unprecedented ways without completely undermining them. Indeed, it was widely felt that music could

maintain its expressivity only through constant transformation of the surface characteristics of a still operative underlying syntax. (One thinks particularly in this connection of the use of more and more chromaticism, but it is also evident in other developments having to do with such matters as phrase and metric structure, formal organization, the role of timbre, etc.) It was the responsibility of theory and analysis, then, to reveal, on the one hand, the extent and individuality of these departures, and on the other, to show how, on some level, the agreed upon assumptions of musical order and logic remained nevertheless unimpaired.

This dialectic between work and system—between theory and analysis on one side and individual compositions on the other—forms one of the most essential factors in the evolution of musical composition during the eighteenth and nineteenth centuries. It accounts in large measure for the extraordinarily dynamic character of musical developments during this period, a period in which the most important works were, almost without exception, viewed to be those placing the greatest strain upon the accepted conventions. Indeed, the self-destructive nature of common practice tonality, viewed as an historical phenomenon, is one of its most characteristic features; it led of course eventually to a complete tonal breakdown—a breakdown that undermined the very foundation upon which the dialectic that had precipitated it had played itself out.

The need to recapture a lost order—to restore a basis for musical intelligibility in some way comparable to the old one—becomes almost immediately apparent after the collapse. The great bulk of music of the first half of the present century, as well as of the theoretical and analytical literature that accompanied it, is thus understandable as a concerted effort to maintain the old dialectic under what must have seemed insurmountable odds. One thinks of neoclassicism in its various guises, with its attempt to preserve aspects of tonal organization, phrase structure, etc., in some way analogous to those of earlier music. (It is of course just these aspects that Cone focuses upon in his article.) Perhaps most symptomatic of all is the twelve-tone system, which in its earlier stages was clearly thought of —certainly by Schoenberg—as a kind of replacement for tonality, as a new musical system for the next stage of a continuing evolution, with the same requisites of order and logic found in the old one. Thus most of its practitioners believed the new system would eventually attain general acceptance, much as had tonality in an earlier period.

Just how much things have changed is evident in the different view of the twelve-tone system that prevails today. Few composers still maintain that it is anything like the tonal system in regard to either the psychology of composing or that of listening. Nor is there any other compositional system that is viewed as constituting, even potentially, a

common framework of shared conventions. Rather, the tendency is for each work to define, for its own unique purposes, a purely individual system with a validity thereby reduced to defining the characteristics of a single compositional structure.

From the point of view of the analyst this change becomes apparent in the difficulty of distinguishing between composition and compositional system, between what is composed and what is theoretical background, between the compositional process itself and its precompositional planning. In traditional analysis this distinction was fundamental and served to articulate an essential difference between what was unique in a musical work—its creative aspect, if you like—and what was general—the systematic framework within which the creative act was accomplished and through which it derived both meaning and justification. The blurring of this distinction has inevitably altered the nature of the analytic process.

There are, for example, many compositions of the past twenty-five years, including those of both a serial and aleatory persuasion, for which it seems that, once one has described how the piece was made—its rules of procedure, or more generally, the overall system through which it was generated—one has also described the composition itself. That is, the "content" of the composition seems identical to the musical system upon which it is based. The work, as Morton Feldman once said in a somewhat different context, rhapsodizes its own construction, exalts the intricacies of the structure through which it has acquired existence. Instead of revealing such properties as linear continuity, thematic and motivic development, formal cohesion, etc.—properties to a large extent jeopardized by the disappearance of a conventional syntax—the work reflects upon its own constitution. It is not surprising, then, that many composers establish systematic scaffoldings of great complexity on which to build their music, feats of dazzling virtuosity possessing considerable interest in their own right. The formal properties of the work become its true subject matter and thus a topic of primary interest. This explains, I think, why there is a tendency for each new work to have a system uniquely its own. This is perhaps overstated, yet if one thinks of a composer like Stockhausen, or even Ligeti or Xenakis, one sees that it touches upon an important facet of recent compositional thinking. The construction of the system has itself become an essential and inseparable component of the creative act.

For the analyst, this means that an important part of his activity involves the description and elucidation of precompositional planning, as distinct from the composition itself. This has brought about a definite shift of analytic emphasis: from the work to the manner in which it was composed. And since the latter is something the composer is himself probably conscious of and no doubt knows more about than anyone else, the analyst included, a great deal of what appears as analysis today is

undertaken only through the composer's direct aid. (One thinks of the articles that have appeared in *Perspectives of New Music*'s Younger American Composers series.)

This produces a distinct realignment of the traditional view of the relation between analysis and work. Looked at from the composer's point of view, analysis—to the extent that it presents his conscious formulation of the compositional, or precompositional, system for a particular work—represents an integral part of his composition. (This recalls Adorno's remark that the compositions of the Second Viennese School contain their own analyses.) What happens, then, to the so-called intentional fallacy, according to which the composer's attitudes about his own work are considered irrelevant to its analysis? The idea of such a fallacy could only have developed under assumptions concerning the relationship between a work and its interpretation similar to those found in the common practice period—that is, where general conventions prevailed against which the work could be judged and which lent it a sort of absolute objectivity beyond the reach of the personal attitudes even of the composer himself. But the intentional fallacy simply does not hold up—it is no longer a fallacy—when "conventions" are supplied individually for each separate work—which means that they are no longer conventions at all. On the contrary, the composer's intentions become an integral part of his overall conception.

One nevertheless has a sense of disquiet: if all the analyst is doing is reconstructing a compositional method, something that in all likelihood has already been done by the composer, then why should the composer not supply his own analysis and publish it as a necessary appendage to his composition? This, in fact, is what some have done—Messiaen, for example. But where does this leave the analyst? The answer, I think, is that he must go further: he must examine the composer's intentions in relation to their compositional realization, must discuss the implications of the compositional system in regard to the music it generates, consider how the resulting music relates to older music and to other present-day music, examine its perceptual properties and problems, etc. There is really no end to the possibilities that could enable this list to be extended. Speaking generally, however, one can say that the analyst must examine a composition, inclusive of its system, in the broadest possible context.

Let me take as an example Ligeti's justly famous analysis of Boulez's *Structures 1a* for two pianos.[3] Ligeti begins with a detailed and comprehensive description of Boulez's choice of materials, how these are regulated according to series of pitches, relative durations, dynamic levels and articulations, and, finally, how larger operations determine the order in which the series are used and how they are combined.

3. György Ligeti, "Entscheidung und Automatik in der Structure Ia," *Die Reihe* 4 (1958): 38–63. A translation appears in the English version of *Die Reihe* 4 (1960): 36–62.

(Much of this, incidentally, had been described by Boulez himself in a short article which he later—after the appearance of Ligeti's article—chose not to include among his collected earlier writings when these were published in book form.[4] Ligeti has acknowledged his debt to this article, and it is unlikely that he could have written his analysis at all without its help.) But Ligeti proceeds to discuss the compositional implications of Boulez's system—of what he refers to as "the automatically realized structure" that results when the elements and orderings "are thrown as if into a machine." That is, he focuses on the specifically compositional consequences of the system, and especially on how, despite the rigidly determined nature of the compositional processes, the effect is—and must be—one of chance in regard to individual details. He notes that this requires of the listener a shift in perception from the detail to larger, more comprehensive structures that are defined by easily identifiable characteristics of a "statistical" nature, such as overall dynamic level, frequency of attack and number of contrapuntal threads. Ligeti also identifies several "mistakes," or inconsistencies, in Boulez's realization of his system, suggesting that these may be "corrections" made by the composer in order to clarify those aspects of the piece that define it as an audible experience (although he does not rule out the possibility that the composer may simply have "had a bad day" while working on the section of the piece in which these inconsistencies occur). Finally, he indicates the limits of such a compositional approach, in which—as he puts it—the composer "leads himself around on a leash," and discusses the implications of this in terms of Boulez's development toward the more colorful and sensuous world of the *Marteau sans maître,* where such rigidities are at least partially abandoned.

Structures 1a is of course an extreme example—perhaps as extreme as any in the literature—and I have chosen it because it illustrates so graphically, even outrageously, the changing relation of the musical work to its underlying system. But to a large extent the point applies to a wide range of recent compositions by composers of such varying tempers as, say, Milton Babbitt, Peter Maxwell Davies and Steve Reich. Moreover, in examining the various individual musical systems with which composers are presently working, the analyst addresses himself to one of the most important questions in contemporary music: namely, what does the composer do—where and with what does he begin—when there is nothing left that he can take for granted as a conventional framework? Those who deplore Ligeti's kind of analysis as dry and "purely technical," to say nothing of solopsistic (since each work tends to require self-defined formulations), miss an important point: knowledge of a work's individual system is as important for analysis today as knowl-

4. Feldman, Boulez, Cage, Wolff: "4 musicians at work," *Trans/formation* 1/3 (1952): 69.

edge of the tonal system was in the case of earlier music. Again, such knowledge is of course not identical to analysis, but only supplies its necessary base. Unlike tonal analysis, however, the establishment of this base becomes a requisite part of the analytic process itself.

Let me now turn to some less extreme examples of self-imposed systematic constraints used by composers who are not serialists. I can begin with Ligeti himself, who, for the composition of his *Requiem,* devised a set of remarkably rigid "voice-leading rules." Among these are: two step-wise motions in the same direction are not allowed; two steps in opposite direction are allowed, but only if one is a major second and the other minor; a succession of steps and leaps is allowed without limitation if the direction changes, but if not, no more than two successive intervals are allowed.[5] In addition, there are rules of harmonic usage and rhythmic motion. What we have, then, is a sort of revised (and private) *Gradus ad Parnassum,* whose function, analogous to that of Fux's rules, is to control voice leading so as to achieve consistency of motion. In the case of Ligeti, the rules produce a dense, richly detailed polyphonic field, defined by a strictly regulated rhythmic web and equally strict intervallic structure. One hears a kind of cluster, but one in which—unlike those, for example, of Penderecki—the motion of individual voices is in some sense perceptible and serves to bring about extremely gradual, yet ultimately discernible, transformations of a tightly meshed polyphonic net. Thus, although one does not hear the individual voice motions per se, one hears their compositional result. Another example of this kind is the twenty-two voice canon that occurs in Ligeti's *Atmospheres,* used to effect a gradual reduction of the registral ambit from a very wide band to a quite narrow one consisting of only a few tones. The canon is, in this instance, a very efficient technique for creating a particular kind of slow cluster transformation. The fact that its function—and audible result—is completely different from that of traditional canonic practice in no way detracts from its effectiveness in this new context.

My next example is taken from Elliott Carter, in whose recent compositions very large-scale cyclical time-structures are used to govern the larger formal layout. Carter's Concerto for Orchestra, for example, has four separate and independent, though synchronized, textural layers that move simultaneously over different time cycles. Each one of these represents one of the "movements" of the piece, with its own tempo, character, etc. But in the Concerto—as in Carter's later Third String Quartet—these movements run concurrently, fading in and out in relation to one another according to a predetermined and carefully ordered plan of staggered cyclic entries. The plan as such is no doubt inaudible, but as with Ligeti's rules, it enables Carter to control a multileveled

5. The complete set of rules, quoted from Ligeti's sketches for the Dies irae section of the *Requiem,* can be found in Erkki Salmenhaara, *Die Musikalische Material und seine Behandlung bei Ligeti* (Regensburg, 1969), pp. 139–41.

rhythmic structure of extraordinary complexity. And the sonic result is obviously very different from what it would be without this plan. The listener is certainly aware of the varying grades of rhythmic tension that accrue from the coincidence of two or more strands and of the occasional conjunction of all levels at climactic moments. Carter's system—a word, incidentally, he would no doubt abhor—enables him to create varying degrees of regulated rhythmic tension over extended time spans without letting the whole fabric topple into chaos. (I might add, however, that I find the constant threat of disintegration, a threat only barely held within check, one of the most interesting—and exciting—features of Carter's music. Indeed, a precarious mediation between extremes of order and disorder strikes me as a characteristic feature of much recent music.)

A fourth example, the most general and least systematic of those I have chosen, is Berio's *Sequenza III* for solo voice. Here it is not so much a matter of a comprehensive system, or a set of rules, or even an overall formal-temporal plan but only of a general idea that governs the ordering of elements in the composition. In this work there is a tendency for the vocal sounds to become gradually more songlike—more lyrical, if you wish—as the piece progresses. Of the various types of vocal sounds employed—including speech, mouth noises and normal singing—the last of these becomes increasingly prominent until it finally takes over almost entirely in the final segment. At the same time, the text, which is subjected to various kinds of permutations, becomes increasingly unintelligible and ultimately consists only of individual syllables in which vowels—the speech elements closest to pitched sounds—predominate. In other words, the basic idea is that different types of vocal articulation, abruptly juxtaposed in sequential confrontation, gradually "resolve" into a single type—pure, textless singing. Although as far as I know there is no system determining the exact way this happens, the idea gives direction and meaning to the overall course of the piece. (It also illustrates *Sequenza*'s text, by the Swiss poet Markus Kutter, which offers a woman's singing as a kind of truth and an antidote to the banality of ordinary verbal discourse. The work also mirrors the text formally, since the latter already suggests the possibility of permutation through the interchangeability of its syntactic components.)

So far I have emphasized the purely musical, and thus essentially technical, implications of musical systems; but those systems also have a psychological function that is, I suspect, at least of equal importance. This brings me to the question of authenticity in recent music, a pressing one for both composer and analyst. What authenticates a musical composition when the previous validating agent—a shared musical syntax—is no longer available? Clearly if no outside agent exists, one must establish an internal, composition-specific one.

One of the most important of these agents is the musical system

itself; for there is a quality of authority, transcending the particular case, inherent in any system, be it public or private. Thus the system assumes a nontechnical, "extramusical" role for the work, which is legitimized by its adherence to principles that in some way transcend its own boundaries. There is, then, in spite of what was said previously, a sense in which, even for a work like *Structures 1a,* the system and the piece are actually not coextensive. The fact that the system may be private, perhaps even valid for only one work, does not completely undermine its capacity to authenticate. Indeed, even if the system is not revealed by the composer, and no one else is able to discover it, the mere belief in its existence lends the work a certain substantiality that would otherwise be missing. There is thus what might be termed a "psychological" relation between system and work that the analyst must also consider.

An example is provided by the music of Xenakis. The complex mathematical formulae Xenakis uses to generate his compositions not only enable him to achieve certain types of musical effects that might be difficult, if not impossible, to achieve otherwise, they provide a dimension that extends beyond the actual music to the realm of abstract human thought itself. Xenakis is given to emphasizing the status of mathematical equations as "universal laws" and as "treasures of humanity," an emphasis clearly revealing a wish to place the purely technical formulations upon which his music is based in the largest possible context.

Moreover, Xenakis speaks of mathematics not only as a "working tool" but as a "universal language," a phrase that—I think, not coincidentally—recalls those of composers and theorists of the tonal period concerning music as a kind of universal communications system. Nevertheless, it is significant that Xenakis' structural model is actually mathematical rather than linguistic. For, as I argued previously, composers have been forced to relinquish the idea of working within a linguistic framework. And it is not surprising, following the breakdown of a model of musical intelligibility based on conventions that were fundamentally linguistic, or more precisely, syntactic in nature (and it is above all the theorist Heinrich Schenker who has shown the extraordinarily precise sense in which this is true of tonal music), that composers should turn again to more mathematically oriented models, bringing their musical thinking closer, at least in this respect, to that of the Middle Ages and antiquity.

Stockhausen provides an interesting instance in his use of the Fibonacci series—a series that, through its "golden mean" proportions, easily translates its numerical properties into widely applicable spatial-temporal relationships, again of a more or less universal nature. In his *Klavierstück IX,* for example, the overall formal shape of the piece, as well as innumerable matters of detail, is derived from this series. This is the piece that begins with that notorious succession of 227 statements of the same chord; yet one's perception of that chord, as well as under-

standing of the piece in general, is transformed by the realization that the number of repetitions is determined by a decreasing series, derived from and closely related to the Fibonacci series, and relates logically to other appearances of the chord throughout the piece, all of which are controlled by this same series. Although one does not, of course, hear the series as such, its influence on the shape of the piece as a whole is if anything overly obvious.

Of course in discussing the role of mathematics in the music of Xenakis and Stockhausen, I am still talking about musical systems. But the question of authenticity, of the need to define musical meaning in terms surpassing the individual composition, leads us into a much broader area of consideration and to examples that are nonmathematical and less systematic in nature. A fascinating instance of what I have in mind is Messiaen's use of birdsongs. Messiaen has referred to birds as his "mentors" ("*maîtres*") and remarked that they provide him with "a means of working and progressing." Once again it is a matter of the composer having to begin somewhere, yet standing there empty-handed, so to speak, cut off from any externally conferred assumptions. For Messiaen, birds are as useful as mathematics (which he also employs): they provide a source of musical creation for which nature, rather than a humanly constructed system of abstract thought, supplies the basis of justification. Messiaen's method of "transcribing" birdsongs into melodic ideas playable on traditional instruments appears to be largely unsystematic, basically intuitive, and as far as I know no one has ever been able to identify on the basis of the music itself the birds he quotes—including professional ornithologists (as Messiaen himself once pointed out, with no apparent embarrassment, in an interview). Yet knowledge of Messiaen's use of birdsong is of the utmost importance for understanding his music. Not only does it explain much about the way the music sounds—especially the way the melodic components relate to one another, both in an absolute sense and in the specific sequential form in which they appear in a particular composition—but also tells us something about the "meaning" of the music that would otherwise be hidden.

A further illustration is George Crumb's use of symbolic notation in certain scores. There symbols, representing archetypical configurations embedded in human consciousness, establish associations that reverberate well beyond the particular piece. Moreover, they are not simply imposed upon the music but have a direct influence on its structure. Thus circular notations give rise to forms of a cyclic nature, while the various parts that make up other symbols—such as the two straight lines of a cross, to take the simplest example—correspond in length and placement to the analogous formal elements that shape the musical statement. Of course one does not hear a cross, any more than one hears a Fibonacci series, but the symbol's musical implications are perceptible and subject to study. And since the symbols lend those parts of the

composition with which they are associated a special weight, Crumb can use them to support specifically compositional factors. Thus in the two pieces for solo amplified piano entitled *Makrokosmos I* and *II,* each of which consists of twelve pieces divided into three groups of four pieces each, the last piece of each group is notated in symbolic form. Another aspect of symbolic notation is its influence upon the performer. Not only must the symbolic pieces be memorized, since they are otherwise unplayable (which in itself removes them from their surroundings), the way in which they are learned—and thus the performer's entire conception of the music—is necessarily colored by the piece's special presentation.

There are other ways contemporary composers counteract the threat of isolation. The framework of a composition can be enlarged by establishing an explicit link with an older musical tradition through which it acquires a kind of historical resonance that extends beyond its own limited milieu. In Crumb's music, for example, evocations of earlier styles pervade the entire fabric (although actual quotations are rather the exception). Nineteenth-century models are particularly favored, but there are also frequent allusions to more remote sources drawn from medieval and non-Western traditions. Similarly, in Penderecki's vocal compositions, the appearance of chantlike material, conjuring the music of the medieval Church, forms an essential part of the musical substance.

The meaning of musical tradition, however, is thereby fundamentally altered. Instead of being something passed down in a continuous evolution from generation to generation, tradition itself becomes "contextual." Like the musical system, it is defined for each individual composition, which acquires its own unique historical correspondences. Although in Crumb and Penderecki these evocations do not normally determine the formal course of the music, there are many works for which an earlier composition provides the entire structural basis. The first of Lukas Foss' *Baroque Variations* is an example, as is the third movement of Berio's *Sinfonia.* In such cases the borrowed material is chosen arbitrarily, as it were, much as a musical system might be, and supplies an analogous precompositional base from which the composition can be generated.

In the Berio movement, for example, the Scherzo of Mahler's Second Symphony not only furnishes much of the musical material, it also provides a formal frame for the entire piece, a kind of structural container into which fragments of countless other compositions, ranging from Bach to Boulez, can be poured, achieving thereby unexpected transformations and interrelationships. Berio's piece might be taken as an elaborate allegory for the present musical situation: all types of sound objects, including music borrowed from various traditions, are conceived as representing "available material" and thus as being, in a fundamental sense, structurally equivalent to one another.

Attempts to legitimize new music through couplings with traditional material need not be of a specifically musical nature. John Cage, who himself has borrowed from Satie's *Socrate* in his recent composition *Cheap Imitation,* frequently employs the I Ching to arrive at compositional decisions, a procedure that curiously—despite its aleatory nature—removes his decision making from the realm of the arbitrary, the purely personal. The I Ching works acquire status, as it were, through their participation in an age-old divining process sanctified by its important role in a great non-Western culture. Again, universal laws—in this instance of a somewhat mystical or transcendental nature—are evoked to arrive at compositional decisions.

Another "extramusical" frame that has been used is the game—a universal activity for which essentially arbitrary rules are accepted as a necessary condition. Thus Mauricio Kagel's *Match,* a composition for two cellists and percussionist, is organized like a contest, with the cellists representing competitors and the percussionist a referee. The conventions of game behavior are so widely understood that Kagel is even able to introduce moments of humorous conflict by contradicting expectations, as when the cellists ignore the percussionist's rulings. (There is perhaps a distant analogy here with a tonal composer—say Haydn—who plays upon expectations conditioned by the conventions of common practice tonality.) The idea of a contest also serves as a basis for Xenakis' *Strategie,* a composition subtitled "Game for Two Orchestras." Unlike Kagel, Xenakis sets out his rules in advance ("precompositionally") and orders them in a typically complex matrix, with the form of the piece conceived as a series of tactics, or gambits, initiated by each orchestra in response to moves undertaken by the other group. (After the concert, a winner is even announced, followed by the presentation of a prize—"a bouquet of flowers or a cup or a medal.")

One way of putting all this is to say that much of the music written today is in reality program music. It is no longer absolute, as the necessary condition for absolute music—widely understood and generally accepted musical conventions—no longer exists. Thus the composer supplies a program—that is, another kind of framework, quite different from the syntactic one of the common practice period in that it is separable from the actual compositional elements. As in the nineteenth century, if the composer wishes his program to be understood he must supply it along with the composition; but what is new is that the program has become essential, both in a technical and psychological sense. For if previously the purely musical nature of the tonal system afforded even programmatic compositions an exclusively musical comprehensibility (and it is significant in this light that almost all nineteenth-century composers of program music—Wagner, a kind of program music composer, being here perhaps an exception—insisted that their music could, and indeed should, also be understood solely on its own terms), in today's

music the program represents the principal means of escaping from the confines of the isolated work. (The fact, however, that those nineteenth-century works that most severely strained the syntactic conventions were almost always programmatic should, no doubt, be understood as an early symptom of this condition.)

It is little wonder, then, that composers today feel called upon to write at length about their own music. One thinks of Stockhausen's prose writings, which collectively form a sort of running verbal commentary on everything he has produced, or of Messiaen's inclination to supply explanations of his compositional procedures as prefaces to his scores or even as indications within the scores themselves. Whether these commentaries take the form of technical, systematic explanations or assume a more metaphorical character (in Messiaen and Stockhausen, for example, both types occur more or less with equal frequency and are, in fact, often difficult to differentiate), the writings of composers have become a necessary appendage to their music, and it is just here that the analogy with nineteenth-century program music tends to break down.

Indeed, the distinction between musical system and programmatic metaphor is often blurred to the point of inseparability. Thus the program of Crumb's *Black Angels,* a purely instrumental piece for string quartet, determines such specific compositional matters as the number of movements, their symmetrical relationships to one another, the length of phrases and pauses between phrases, the works chosen for quotation, etc. Similarly, in Peter Maxwell Davies' *Antechrist,* the medieval concept of the Antichrist not only affects the choice of pre-compositional material (a thirteenth-century motet, "Deo Confitemini–Domino"), but also, as the composer points out, the compositional processes through which this material is transformed—the way it is "broken up and superimposed on related plainsong fragments, which both musically and with regard to the related implied texts, turns the sense of the motet inside-out." Thus, whereas the analyst of nineteenth-century music can, and usually does, to a large degree ignore programmatic aspects in order to focus on purely musical values, this is no longer possible. Or rather, the distinction is simply no longer clear. Consideration of the program—of the musical system behind a Xenakis work, of Cage's I Ching manipulations, of Kagel's game situation, or whatever—is a necessary part of the analysis. To take only Kagel's game format as a brief example, I would simply note that the entire character of *Match,* as well as its structure, is largely incomprehensible outside of this "extra-musical" context.

This said, however, I should not give the impression that traditional analytic categories are no longer applicable to more recent music. On the contrary, they are still absolutely necessary; for like the composer, the analyst cannot begin completely empty-handed. Nevertheless, to retain their usefulness these categories must now normally be transformed into

more general aesthetic ones. For example, traditional dualities such as tension-relaxation, motion-stasis, buildup-arrival, climax-denouement, etc., can be meaningfully applied to all but a very small portion of the output of the past quarter century or so. Thus the distinction between tightly structured musical units, with a high degree of periodicity and closure, as opposed to more loosely structured, open units—a distinction that forms a cornerstone of classical formal theory—remains valid in countless modern compositions. The chord repetitions in Stockhausen's *Klavierstück IX,* referred to previously, build tightly structured periodic units that are played off against others of a more loosely structured nature. The overall form of the piece is governed by a gradual reduction of the former units—controlled through the decreasing series I mentioned before—coupled with an increasing emphasis on the latter, which eventually take over entirely in an extended final section consisting of freely manipulated textural fields in the piano's highest register, with a rapid turnover of all twelve pitches, always in different order. The beautiful bell-like quality of this section depends very much upon what has gone before—that is, upon its being heard as the culmination of a process underway since the opening of the piece. The *Klavierstück,* then, contains structural analogies to traditional forms of an oppositional nature, such as the sonata or rondo. But here the overall shape, even in its most abstract outlines, does not represent a generalized formal convention, either for the listener or the composer. Indeed, Stockhausen's next piano composition, the *Klavierstück X,* reveals a formal plan that is in some respects its opposite: gradual motion from a state predominantly characterized by structural openness to one that is tightly ordered.

Similarly, in Penderecki's *Klangfarben* compositions, sections characterized by stasis and repose are opposed to sections of more complexity and surface activity, the mediation between and ultimate resolution of the two serving to shape the larger continuity. And in Xenakis one finds progressions from relatively permeable states, in which individual elements possess a high degree of independence and are audible as more or less distinct events, towards others in which the components are absorbed into a thick web, an overall sound field perceivable only as an indissoluble textural aggregate or Gestalt.

Even the concept of tonality remains applicable in much recent music. In Ligeti's *Lontano,* a *Klangfarben* composition not unlike *Atmospheres* in some respects, musical motion is shaped by transitions to and from stable tonal areas—consisting sometimes of only a single note, at others of a complex of several—that serve as structural pillars for the composition. There is thus a distinction between material of an expository, stable character and material whose function is to "modulate" from one area of stability to the next. Although these expositions are no longer thematic, they form points of tonal and formal cohesion, while

the material concerned with the gradual dissolution of one such area and the eventual establishment of a new one, serves a transitional function.

Yet even when tonality is handled in a more traditional manner—in pieces that employ literal quotation, or in those that simply appropriate conventions from the common practice period without literally quoting, as in George Rochberg's Third String Quartet—its meaning is totally transformed. One cannot analyze the third movement of Rochberg's quartet simply as if it were a set of variations by Beethoven, despite the fact that to some extent that is what it sounds like. If one does, one misses what seems to me the real significance of the music, which is precisely the way it does *not* sound like Beethoven; and this is something that cannot be explained exclusively in terms of what appears in the score. For part of the reason—though only part—it does not sound like Beethoven stems from the fact that we know the quartet was written in the 1970s. The way we hear the composition—and thus understand it—is inevitably conditioned by this fact. Tonality simply cannot mean today what it did 150 years ago; it has a totally different relationship not only to the composer and listener but to the entire musical culture within whose context the piece exists and is experienced.

This brings me back to the question of context, a point I touched upon briefly before and that can now serve as a kind of summary for my remarks. For I suspect that our notion of what constitutes the proper context for the analytic consideration of a musical work requires, among all other matters, the greatest reorientation in the face of recent music. Of course, analysis has always been "contextual" in the sense that it has attempted to go beyond the particular piece, to relate it to a larger artistic environment. In traditional analysis, however, at least that of a technical nature, the environment has been understood primarily in musical terms. Compositions are analyzed in relation to conventional tonal language, or to other works of the same genre or those with a similar formal structure. Already in the case of earlier twentieth-century music, however, one must modify the notion of context, as this music is contextual in a decidedly different sense from that of tonal music. Here referential norms, at least those relating to pitch, are established uniquely for each composition—that is, by reference to, and within the confines of, the work's own internal context. This shift suggests that the problem of context has always been a pressing one for twentieth-century music. (Actually, the problem is already noticeable in earlier music, as I have myself tried to show in a study of the use of dissonant harmonic structures as referential norms in certain nineteenth-century compositions—structures that, viewed purely within the context of the tonal system, should have no independent value whatever.)[6]

6. "Dissonant Prolongations: Theoretical and Compositional Precedents," *Journal of Music Theory* 20, no. 1 (Spring 1976): 49–91.

But it is a striking feature of the contextual systems of most compositions predating the last quarter century that they are contrived to allow for the preservation of traditional notions of musical continuity—of linear progression, phrase structure, cadential arrivals and the like. Although these things can no longer be quite what they used to be, they nevertheless remain closely analogous (which is of course just the point Edward Cone makes in the article I cited earlier). And when theorists of this music fail to take such matters into consideration (as unfortunately frequently happens), their analyses seem curiously distorted.

Thus for this music, even though the structural context has narrowed, it is still possible to take an analytic approach that is, at least in its broader features, similar to that of traditional analysis. In the case of new music, however, where the specifically musical context threatens to shrink to the vanishing point, a widening of context, paradoxically, is required in the analyst's concerns. As each work tends to establish its own comprehensive contextual system—its own personal tradition, as it were, which it then irrevocably destroys—the relevance of context in the earlier sense becomes increasingly tenuous. Despite—or rather because of—the work's isolation, it is less and less possible, or meaningful, to consider it as an autonomous object analyzable solely in its own terms. One must take other factors into consideration and show how these relate to the work and how the work relates to them.

Thus a pressing responsibility of present-day analysis is to indicate how new music reflects present-day actuality. It is notable that today's composers more and more think of their own work in these terms—that is, not so much as solutions to technical, or even technical-expressive, problems but as responses to the conditions of modern life. The musical work seems to be in the process of being transformed from an object intended primarily for aesthetic appreciation to a kind of document, a position statement concerning contemporary existence. One sees this throughout virtually the entire spectrum of contemporary compositional activity. It is most apparent in works of composers like Frederic Rzewski and Christian Wolff, where the performance situation itself becomes a kind of laboratory for the cultivation of political awareness. But it is also detectable in even so traditional a work as Henze's Second Piano Concerto, a piece composed in 1967 that still reflects traditional concepts of pitch structure—both tonal and twelve-tone—and formal process, but about which the composer has remarked: "It is the work of someone who speaks of his discontentedness, his impotence, his wishes, within the conventions of so-called bourgeois custom, even within the terms and parameters of such norms, who observes all the possibilities and taboos and is only thereby able to make evident the progressive wretchedness and loss of freedom. In this piece there is no exit, and thus the form corresponds exactly to the content. It is a report of slavery and thus possesses an element of consciousness." To ignore these remarks is to

rob the work of one of its dimensions, and part of the analyst's job should be to consider how well the concerto reflects and makes musically valid the composer's stated intentions.

In his book on the sociology of music, Theodor W. Adorno states that the true goal of this discipline should be "the social deciphering of musical phenomena themselves, the clarification of their essential relationship to actual society, of their inner social content and their function."[7] Although there are facets of Adorno's program with which one can take issue, above all his apparent identification of music sociology with "social criticism accomplished through the criticism of art," it seems to me that he gives us a glimpse of a way out of what he refers to as the "inane isolation" of Western music. What is especially appealing about Adorno, at least for the analyst, is that he is concerned with the identification and interpretation of specifically musical processes, processes of a technical nature that are still susceptible to analysis in a more traditional sense. Mere identification and purely musical analysis are not enough, however, as he persistently points out, but should facilitate the consideration of the art work in the complex and evolving environment within which it exists.

It is no coincidence, I think, just at the moment when the musical work has retreated into itself, reaching a condition of solipsistic self-concern that threatens to reduce it to a state of total inaudibility, that we seem to be coming full circle, back to a point where musical meaning can be defined only by going beyond the individual musical object. To take one more extreme example, in John Cage's notorious piece, *4'33"*, in which the performer or performers are given a temporally defined span of silence during which no musical activity whatsoever takes place—that is, in which compositional inaudibility becomes an explicit reality—there is obviously nothing at all to say about the musical work itself, since there is absolutely nothing at all there. Here, obviously, significance and meaning can be considered only by passing beyond the work to consider its "comment" on larger musical and social conditions and its reflection of a tendency away from a conception of music as a structure of interrelated pitch and time events to one involving people placed in relation to one another and to the environment in which they find themselves.

The use of aleatory procedures in much new music, a subject I have avoided until now, provides another example. On the one hand, such processes can often be viewed in terms of their purely musical consequences—for example, as providing an efficient means for producing certain kinds of complex musical textures that would be difficult to achieve otherwise. These events can then be considered in regard to their own inherent musical interest, their relationships to other events in

7. Theodor W. Adorno, *Einleitung in die Musiksoziologie* (Frankfurt am Main, 1962), p. 208. This important work has recently appeared in English as *Introduction to the Sociology of Music,* trans. E. B. Ashton (New York, 1976).

the piece, etc. This is an approach that one might take, say, to a composition like Lutosławski's String Quartet. But aleatory procedures can also be thought of as a response to the tendency of Western music over the past few centuries to become an increasingly fixed commodity, communicable only through an ever more precisely articulated notational system. That the relationship of performer to composition has been greatly affected by this is obvious; and much aleatory music clearly reflects an interest in reestablishing a more process-oriented performance situation, as opposed to one in which a precisely defined result is reproduced as faithfully as possible.

Economics is often described as the dismal science, but the designation applies equally, I suspect, at least in the minds of many musicians, to the field of musical analysis. But if analysis is "dismal," it is so only because it is too limited and narrow in scope. There is certainly nothing inherently dismal about it; indeed, to be human is to be analytical, for I take it that part of what we mean by living a full life is being cognizant, as far as this is possible, of the nature and implications of our actions. Recent music may well have a lesson to teach in this regard: that the focus of the analyst's inquiries must exceed the parochial and ultimately encompass the entire range of human activity.