

Science and Twentieth Century Music

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THE world of music in our time presents the appearance of one of those models of the universe which depict the galaxies rushing away from each other at ever increasing speeds. We seem to be rapidly approaching the point, culturally speaking, when further communication will be impossible. Tracing back the present features of music to their origin a critical time is reached around the turn of the century, when the difference between popular and serious music was one of degree rather than kind. What now is there in common between, say, Pierre Boulez and Elvis Presley; even interpolating a figure from modern jazz like Miles Davis provides a poor common denominator. One thing the different worlds have in common is precisely that which has caused them to diverge – the influence of the enormous scientific advances of the last half century. This influence is obvious in a superficial way – we listen to so much artificially reproduced music – but I am concerned with its more profound and less obvious aspects.

Between the wars it was still necessary to have talent to write a popular song. Men like George Gershwin and Cole Porter wrote songs that in their own way were unsurpassable. Arnold Schönberg, a friend of Gershwin, once wrote in connection with him:

An artist is like an apple tree. When the time comes, whether it wants to or not, it bursts into bloom and starts to produce apples. And as an apple tree neither knows nor asks about the value experts of the market will attribute to its product, so a real composer does not ask whether his products will please the experts of the serious arts.

Provided that he stuck to the simple small-scale formula of the popular song Gershwin wrote miniature masterpieces. They have survived; being used still as a harmonic basis for the improvisations of jazz musicians.

Since the last war the application of science to all branches of commerce has brought about the full industrialization of popular music. There has been an appalling decline in musical standards compensated for by the increase of 'exploitation' and psychological sales techniques. America, with her superior skill in mass-production and advertising, has become the dominant voice and the western world conforms; the same songs, with a few local exceptions, are to be heard everywhere. Concentrating their artillery of 'exploitation' men, 'song-pluggers', 'payola' racketeers and tame disc-jockeys, upon the *nouveau riche* teenager, the popular song moguls have bypassed a whole generation and swamped the market with a music which has driven the professionals to cynicism and despair. Genuine absence of talent – as opposed to its contrived absence – has been at a premium. The performer, a symbolic figure plucked from the audience, has relied upon his personality and his gimmicks, not his ability to sing. The songs are to give him something to do with his voice, just as the inevitable guitar gives him something to do with his hands. The whole procedure is the same as that for any other consumer product. And just as one detergent, despite all the ballyhoo, differs little from the rest, so is there little to choose between the songs and singers.

The penultimate stage in the industrialization of music has been reached in the twilight world of Muzak. Apparently it is no longer necessary for Big Brother to watch us; Muzak Service (Planned Music Ltd) will provide music which subliminally conditions us to work hard, and – like the television sets in 1984 – we cannot switch off unless we are lucky enough to be executives. This child seems to have been sired by 'Music While You Work' out of *musique d'ameublement* with motivational research assisting at the birth; needless to say, it was conceived out of wedlock. Erik Satie's *musique d'ameublement* – music to be played without being listened to – was a dismal failure; people *would* keep listening (it was performed between acts of a play by Max Jacob produced in 1920 in a Paris art gallery) despite the composer's furious efforts to get everyone talking. The intention of 'Music While You Work' is to distract factory workers from the monotony of their jobs. Satie and the B B C have been human in their endeavours; Muzak has all the deadliness of science behind it. It is calculated to the last note; nothing must be obtrusive. Everything that makes music *music* must be removed until we are left with the *reductio ad absurdum* of what

the word stands for. We are not meant to whistle this 'music'. We are not even meant to hear it. It goes straight to the subconscious mind where it acts – so its perpetrators allege – like a combined tranquilizer and stimulant. Muzak may make office slaves work harder, but it is a gross debasement of the purpose of music. I have referred to it as the penultimate stage in the industrialization of music; the final stage would be the complete removal of man from the assembly belt. Music, conceived by an electronic computer, would be executed by a battery of sine-wave generators and tape-recorders which would produce a final tape of artificial music. Admittedly, the computer would have to be *programmed* by a human being; but one fairly simple *programme* will suffice for an unlimited supply of music, the computer selects elements at random and discards those which contravene the rules of its *programme*. This ultimate position may have been reached, for already computers have been used to produce simple songs and poems.

Although it is difficult to define exactly what we mean by art, it seems obvious that it is not to be produced by an electronic computer. One cannot *programme* a computer to reproduce the qualities that go to make up a work of art. Between the works of the *avant garde* of serious music and those of current popular music there is this similarity – they both approach music written by a computer. While one is devoid of content in a simple way, the other is devoid of content in a complicated way, a negligible difference to the voracity of an electronic computer. The human element in the performance of popular songs could not be done away with, but electrophonic music has already threatened the performer of serious music. Stravinsky has said that he could envisage the day when the public, issued with the necessary tables, etc., would write its own serial music. One frightening possibility would be the issue of a machine combining the functions of composer and performer, with a few simple controls to govern the variety and duration of the music.

These ideas have become musically feasible with the growth of serial techniques in composition, originally pioneered by Arnold Schönberg. Having arranged the twelve notes of the chromatic scale in a basic order – essentially an inspirational process for Schönberg – he used this series to produce the whole work. Both the melodies and underlying harmonies are derived from the series, thus achieving 'the unity of musical space' without resorting to tonality. The absence of tonality is ensured,

in theory, by prohibiting the return of any one note until the remaining eleven have been played. But Schönberg, having brought an intellectual discipline to music outside tonality, did not allow his theories to shackle his imagination. He used traditional forms and he becomes a traditional composer once one is accustomed to atonality, its harsh dissonances having ameliorated into a world beyond the concept of dissonance or consonance.

Anton Webern proceeded on a radical new line. Obsessed with the microscopic aspect of sound as opposed to its macroscopic structure, he gradually compressed and broke up anything approaching a melody into short, disjointed fragments of a few notes; ultimately the function of a motif was transferred to a single note. He adopted Schönberg's serial technique to organize this athenatic music, extending serialism in his *Variations for Orchestra* to order the rhythms, or, more accurately, the duration of the notes.

From Webern it was a short step to the serialization of the dynamics, the attack of the notes, the instrumentation and even the octave in which the notes were to sound. Eventually all the musical elements were ordered in series carefully arranged to avoid mutual contradictions. Composers experimented with statistical and permutational methods of assembling their music from the various series; these being based on common numerical proportions from which the form of the work might be derived. There was a shift of the creative interest from the music itself to the method of its composition – a shift away from art in the direction of science – made possible by the unique music of Anton Webern, but nevertheless a movement which no one would have deprecated more than he.

Once the pre-compositional work has been done, the final composition is arrived at with little more than a musical turning of the handle. Total organization is a technical cul-de-sac and not a little boring for the composer. Karlheinz Stockhausen, the most radical of the neo-Webernite composers, sought various ways out of the dilemma. He wrote rhythms so complicated that they defied accurate performance and capitalized on the resulting error. Taking a leaf out of Heisenberg's indeterminacy theory, a note was no longer said to be of a definite duration but to exist in a *field* determined by the possible error of the performer. This element was immediately serialized. But Stockhausen began to unlace from his strictly serial orthodoxy by

incorporating some of the ideas of the American composer John Cage. Using random methods of composition Cage had left more and more of his music to chance and the whim of the performer. Stockhausen wrote his *Piano Piece XI* in fragments – of varying size – which were printed on one enormous single sheet of music. The performer chooses, on the spur of the moment, the order in which he plays them and the performance ends when any fragment is about to be played for the third time. Paradoxically a theory of composition which started out with the aim of securing complete control over all musical elements has arrived at its antithesis.

It should be obvious how much the musical theories of total serialization, indeterminacy, and chance, are indebted to the scientific philosophy of our century. Composers have always insisted that these theories grew out of their work and were not mere intellectualizations *a priori*; but clearly these methods belong more to the intellect than to practical musical experience. It is symptomatic of our age that so many *composers* need theories and attend to them as much as to their music.

Some explicit theory of composition became inevitable once tonality had collapsed, for the field of atonality is so free – no melodic or harmonic sequence being forbidden – that the composer, like Buridan's ass, may well be paralysed. The loss of absolute freedom is a stimulus and serialism is one solution to the tactical and strategical problems of composition; but, being the product of the intellect, it is empty of any formal justification for the ear. Our ears are conditioned to tonality and tonal forms and it is difficult, if not impossible, to switch off this conditioning. The works of the *avant garde* are perceived as a succession of random notes on to which a certain veneer of expression may have been overlaid. It is no longer a help to our aural appreciation of a work to be acquainted with the method of its construction. We do not hear the series in operation and we are not meant to – is there not an echo of Muzak in all this? Nothing has compensated for the loss of the consonance-dissonance relationship or the formal structures of tonality, both of which could be apprehended through listening. Instead, the composer manipulates devices outside the music. The situation seems analagous to that which we find in present-day physics, when no matter how well we know the equations and formulae they do not help us to formulate a picture of sub-atomic events. The equations build up a logical structure of their own and

presumably this mirrors that of reality, but the structure of reality remains strictly unimaginable.

The serial approach has resulted in a music which is essentially static, a music which exists only in the present tense without regard to what has gone before or what is to come. This has created new problems for the listener which may prove to be insoluble. Fundamentally a good composer will survive, whatever current mode of expression he happens to use; but the present theories of the *avant garde* point directly to further assimilation of music by science. Both serial and indeterminate methods of composition could be performed by an electronic computer, which could produce score after score of music indistinguishable from that of the *avant garde*.

The advent of electronic music and *musique concrète* reflects both a further influence of technology upon music and a further encroachment of the scientific attitude upon the artist's mind. *Musique concrète* uses ordinary sounds – the clatter of dustbin lids or notes from a musical instrument – and then distorts them by manipulations on tape recorders and skilful editing. Electronic music has taken the more logical step of using electronic apparatus to generate its sounds. Both techniques have added enormously to the actual vocabulary of sounds that can be produced, and the intermediary rôle of the performer has been circumvented, since the finished work resides on magnetic tape to be played on a tape recorder. But, similar to the destruction of tonality, these artificial extensions to musical possibility have given the composer too much freedom. The electronic studio, in theory, can produce any possible sound; and for the first time the composer has absolute control over each stage in the formation of a sound.

So far *musique concrète* has largely been used in a literary or programmatic way, as for example Pierre Schaeffer's *Symphonie pour un homme seul* which conjures up the aural world of a lonely man. When used in this way *musique concrète* is musically on the same level as background music to films or radio plays, and probably its best use has been as an inherent part of a radio production, for it can combine, in a most effective balance, ordinary and fantastic sounds. There is not a great technical division between these two types of artificial music and many composers, outside the orthodox cliques, have used both to derive their material. The difference becomes apparent in the uses to which the derived sounds are put.

Electronic music has been dominated by Stockhausen and the Darmstadt school, which has meant that most of the composers working in the medium have adopted serial methods with all their formal difficulties. It was fortuitous for Stockhausen that electronic music made its appearance at about the time when he began to write very complex rhythms – derived from a strictly serial approach – and enabled them to be executed precisely. Serialism has been extended to cover the many new elements encountered in electronic music, such as the number and frequency of overtones used to build up the particular timbre of a sound. One novel use of the series was made by Stockhausen in his *Gesang der Jünglinge* in which he introduced natural sounds into an electronic composition. The basis of the work is a simple sentence spoken by a German schoolboy. Throughout the work we hear this sentence but obscured to a varying degree – in accordance with a serial procedure, only at the end of the work are we able to hear exactly what is being said. This is a serial device which we can hear in operation and knowing what is being done improves our appreciation of the work. Unfortunately an idea of this sort is hardly sufficient to produce more than one work and Stockhausen bases most of his work on a serialization outside our auditory perception.

Once one has got over the initial shock of the strange and beautiful sounds which can be made in the electronic studio, their actual assemblages into music often bear the imprint of random manipulation both in form and device. The better works have been those put together by the composer's ear rather than his pre-compositional intellect, for example Krenek's *Oratorio for Pentecost*, though this work is not pure in the sense that it largely employs the human voice. The full realization of electronic music will depend upon a better formal solution of non-tonal music than serialization – more likely to be found in ordinary music – and the possibility for more composers to gain the necessary experience with the electronic media. It would be wrong to assume that this artificial music automatically spells the death of our human performers; the greater danger is that the present techniques of composition, carried over from instrumental music, permit the substitution of the composer by the computer.

Until the theoretical difficulties have been sorted out and composers need no longer concern themselves excessively with

vocabulary and syntax, the *avant garde* will remain aloof from the audience, writing – whatever the formula – music which sounds arbitrary. Creators have always had a struggle to gain some reaction from the public but never before has the forefront of musical thought been so far from the general music lover. The early impact of Stravinsky and Schönberg occasioned riots; our contemporary music is a cult greeted by the polite applause of its initiates. The larger audience is seldom reached and, if it is, regards the new works with apathy.

Standing outside both the *avant garde* of serious music and the industry of popular music is the world of jazz. It would be impossible in an article of this length to conduct a survey of jazz, for although it has developed since its inception each stage has claimed its adherents and they continue to flourish side by side. On a lesser plane, it is as though Bach, Mozart and Beethoven, were still alive and writing music in our own age. It is strange that a music which seems synonomous with the twentieth century bears least of all the influence of science. Jazz is a spontaneous music and its only debt to science is for the gramophone record, without which it could never have approached its present popularity. What has made and kept jazz such an original type of expression has been the isolation of its performers from the rest of the musical world. It has drawn much of its material from popular music, but the method – more important in jazz than the material – has remained its own: improvisation, traditionally around the melody and more recently upon the underlying harmonies, of a basic theme, and the cultivation of *swing* – a purely musical phenomenon common to the best jazz of all periods and not unique to the so-called Swing music of the 'thirties. *Swing* seems to be generated by the contrast of the metronomic four beats to the bar, laid down by the rhythm section, with the phrasing of the soloist who places some notes exactly on, and others slightly before or after, the beat and its simple subdivisions. It is further aided by emphasizing the weak beats in the bar – the drummer always accents the second and fourth – and especially in modern jazz by emphasizing the weaker parts of the beat itself. But this attempt to describe the technicalities of *swing* cannot express the aesthetic side of its experience. When jazz *swings*, the sensation is of complete freedom from the rhythmic framework; the music becomes full of a savage and exultant *joie de vivre*. Suddenly one rediscovers that music was originally made for dancing.

Recently Michael Tippett wrote in *Moving into Aquarius*: 'Because jazz is a musical vernacular, it has attracted many serious composers, thinking to find in it a way through to the big public – or just a means to refresh serious music by the primitive.' This is a good example of the sort of misunderstandings that serious composers still have about jazz. Although jazz and popular music have played musical hide-and-seek over the years – it is difficult to imagine what form popular music would have taken without the inventive stimulus of jazz – the increasing complexity of jazz over the last twenty years has driven it outside the pale of mass popularity once and for all. Nowadays it has a small but fanatical following, excluding the commercial exploitation of its older forms. Jazz is no longer a primitive music except in its formal structure. Its rhythmic complexity is borne out by the fact that, having notated it correctly (and this is all but impossible), non-jazz musicians cannot begin to perform it with *swing*. The harmonies are little more than Ravel's *Valses nobles et sentimentales*, but are these primitive? Already tentative use of atonality has been made, notably by Lennie Tristano; and Miles Davis's introduction of improvisations based upon scales instead of harmonies could advance jazz further in this direction. If jazz appears old-fashioned when compared with the *avant garde* it should be remembered that it has been little influenced by serious Western music – as witness Duke Ellington's judicial enquiry 'Who is Delius?' and Dizzy Gillespie's remark that the only Schönberg he knew ran a delicatessen. What traffic there has been between these two worlds has been evidently the other way. Due to the inimitable language of the jazz musician, most of the resulting works have merely aped the superficial sound of jazz. Stravinsky took a more sensible line in his *Ebony Concerto* for Woody Herman's big band, availing himself of its technical mastery and unique timbre yet, by writing a non-jazz work, avoiding all stylistic difficulties.

A true interchange of ideas between jazz and serious music would be of musical benefit to both. Jazz is essentially a performer's music and its spirit of improvisation, so long dead in Western music, would be of value to the serious musician. It is an old joke, unfortunately true, that many classical pianists are automatons of the conditioned reflex unable to play a note outside their repertoire. (It is interesting to note that Friedrich Gulda, one of the few pianists at home in both worlds, has said

that he enjoys playing jazz more than any other music.) The unpretentious and yet stimulating demands of improvisation provide an unique opportunity for the performer to return to the roots of musical creation. The American composer Hal Overton has attempted to base the group improvisations of a chamber ensemble upon the broad lines of contemporary music, but for most serious musicians this would create great difficulties. Meanwhile, jazz offers a well-mapped territory for further exploration by the serious musician.

Similarly, writing and thinking about music is rare amongst jazz musicians, except in relation to their improvisations; and this has resulted in much that is commonplace and tasteless, as, for example, the accepted harmonic conventions. André Hodeir is one of the few books on the subject which is not just an expanded discography, *Jazz: Its Evolution and Essence* writes: 'Jazz musicians, with a few rare exceptions, do not have strict enough standards of harmonic beauty to know how to avoid certain chords or progressions.' The accent on improvisation has also made jazz a music conceived instrumentally; not only the choice of keys, but often the actual phrases are determined by what falls nicely under the fingers. This has given jazz players enormous technique – Artur Schnabel once said: 'They never make mistakes, but we do' – compensated for by a lack of musical ideas. A study, backed up with actual performance, of the fruits of European musical tradition, would, if not providing a ready-made solution, make jazz musicians at least aware of some of their short-comings.

It is encouraging that the most recent efforts to unite jazz with serious music have involved both an orchestra and a composer from both schools. Johnny Dankworth and Matyas Seiber have in their *Concerto for Jazzband and Symphony Orchestra* produced the most creditable attempt so far. But a programme with a chamber ensemble and a small jazz group playing music from their respective fields and special works combining both groups, and attempting mutual improvisation, would provide a better basis for exchanging ideas.

There has not been an analysis of either the influence of individual scientific theories upon particular schools of musical thought, or the correspondence between them as products of the same era. It is a game which has attracted critics from Wyndham Lewis (*Time and Western man*) to John Berger; to those who would pursue it, I offer the comparison of Relativity

– synthesis of space and time into one continuum – with Stockhausen's serial theory – synthesis of pitch and duration into one continuum. What I have tried to show is the influence of the scientific attitude, which underlies the particular theories, upon contemporary music as a whole.

The philosophy of science has classed religion, ethics, metaphysics and art as meaningless; and there has been a decline in their meaning for humanity. Yet it would be tragic if science gained absolute hegemony in the realm of ideas, for it cannot provide an adequate or permissible substitute for those things which lie by definition outside its scope. The industrialization of popular music, the innumerable *theories* of composition, the decay of the audience for new music and the possible extinction of the human performer, point towards music as an applied science. If music is to survive this threat, composers must divert more of their energy from the problems of technique to those of communication. Meanwhile, one language at least, that of jazz, stands unscathed by the scientific attitude or commercial interests and could be used to speak without compromise to a wider audience.

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