

Technology and the Composer¹

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Invention in music is often subject to prohibitions and taboos which it would be dangerous to transgress. Invention must remain the private, exclusive property of genius, or at least of talent. Indeed it is hard to find any purely rational explanation for it; by summoning up unpredictable results out of nothing it escapes analysis. But is this “nothing” really the total void appropriate to miracle-workers? And does the unpredictable come to exist in a totally unpredicted context? Invention cannot exist in the abstract, it originates in contact with music of the past, be it only the recent past; it exists through reflection on its direct or indirect antecedents. Such reflection concentrates naturally on the spiritual approach, the mental mechanisms and the intellectual development displayed by the work it takes as models, but it concentrates also on the sound material itself, without whose support music cannot exist; musical material has evolved over the centuries, providing for each age a typical sound profile that is continually renewed—slowly perhaps, but inevitably.

Yet invention is today faced with a number of problems. Particularly concerned with the relation between the *conception* (we might even say the vision) of the composer and the *realization* in sound of his ideas. For some time now, the composer’s mental approach (his “wild” invention) has been free to follow very different paths from those that the medium, the sound material, can offer him. This divergence has caused blockages dangerous enough for invention to lose all its spontaneity; when either the material or the idea develops independently, unconcerned whether or not they coincide, a serious imbalance develops, to the detriment of the work, which is tugged this way and that between false priorities. Underlying these blockages there are undoubtedly causes that are beyond the composer’s power and over which he has little control, but of which he is—or should be—aware if he is to try to overcome them.

We think at once of blockages of a social kind. Since at least the beginning of this century, our culture has been orientated towards historicism and conservation. As though by a defensive reflex, the greater and more powerful our technological progress, the more timidly has our culture retracted to what it sees as

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the immutable and imperishable values of the past. And since a larger—though still limited—section of society has easier access to musical culture, having more leisure and spending power, and since modes of transmission have increased enormously and at the same time are cheaper, the consumption of music has considerably increased. This leads to a growing boredom with pieces that are frequently heard and repeated, and to search for an alternative repertory—one within the same radius of action as the well-known works and providing a series of substitutes for them. Only too rarely does it lead to a genuine broadening of the repertory by giving fresh life to works that have become the exclusive property of libraries. The search for historical peculiarities of interpretation also serves to divert energies that are all too likely to be swallowed up by it. Thus the “museum” has become the centre of musical life, together with the almost obsessive preoccupation with reproducing as faithfully as possible all the conditions of the past. This exclusive historicism is a revealing symptom of the dangers a culture runs when it confesses its own poverty so openly: it is engaged not in making models, nor in destroying them in order to create fresh ones, but in reconstructing them and venerating them like totems, as symbols of a golden age that has been totally abolished.

Among other consequences, a historicizing culture has almost completely blocked the evolution of musical instruments, which have come to a disastrous halt for both social and economic reasons. The great channels of musical consumption which exploit, almost exclusively, the works of the past consequently use the means of transmission appropriate to the past, when they were at their most effective. It is hardly necessary to add that this state of affairs is faithfully reflected in education, where the models selected for teaching are drawn from an extremely circumscribed period in the history of music, and consequently limit—from the outset—the techniques and sound material at the musician’s disposal; even more disastrously, they give him a restricted outlook whereby his education becomes a definitive, absolute possession. The makers of musical instruments, having no vocation for economic suicide, meet the narrow demands made on them; they are interested only in fiddling about with established models and so lose all chance of inventing or transforming. Wherever there is an active market, in which economic demand has free play—in a field like pop music where there are no historical constraints—they become interested, like their colleagues who design cars or household appliances, in developing prototypes, which they then transform, often in quite minimal ways, in order to find new markets or unexploited outlets. Compared with these highly prosperous economic circuits, those of so-called seri-

ous music are obviously impoverished, their hopes of profit are decidedly slender and any interest in improving them is very limited. Thus two factors combine to paralyse the material evolution of the contemporary musical world, causing it to stagnate within territory conquered and explored by other musical periods for their own and not necessarily our needs—the minimal extension of contemporary resources is thus restricted to details. Our civilization sees itself too smugly in the mirror of history; it is no longer creating the needs that would make renewal an economic necessity.

In another sector of musical life that has little or no communication with the “historical” sect, the musical material itself has led a life of its own for the past thirty years or so, more or less independent from invention: out of revenge for its neglect and stagnation, it has formed itself into a surplus, and one wonders at times how it can be utilized. Its urgency expresses itself even before it is integrated into a theme, or into a true musical invention. The fact is that these technological researches have often been carried out by the scientifically minded, who are admittedly interested in music but who stand outside the conventional circuit of musical education and culture. There is a very obvious conjunction here between the economic processes of a society that perpetually demands that the technology depending on it should evolve, and that devotes itself notoriously to the aims of storage and conservation, and the fall-out from technology, which is capable of being used for sometimes surprising ends, very different and remote from the original research. The economic processes have been set to produce their maximum yield where the reproduction of existing music, accepted as part of our famous cultural heritage, is concerned; they have reduced the tendency to monopoly and the rigid supremacy of this heritage by a more and more refined and accessible technology.

Techniques of recording, backing, transmission, reproduction—microphones, loudspeakers, amplifying equipment, magnetic tape—have been developed to the point where they have betrayed their primary objective, which was faithful reproduction. More and more the so-called techniques of reproduction are acquiring an irrepressible tendency to become autonomous and to impress their own image of existing music, and less and less concerned to reproduce as faithfully as possible the conditions of direct audition; it is easy to justify the refusal to be faithful to an unrecorded reality by arguing that *trompe-l'oeil* reproduction, as it were, has little meaning given that the conditions of listening and its objectives are of a different order, that consequently they demand different criteria of perception. This, transposed into musical terms, is the familiar controversy about books and films

on art: why give a false notion of a painting in relation to the original by paying exaggerated attention to detail, by controlling the lighting in an unusual way, or by introducing movement into a static world? Whatever we make of this powerful tendency towards technological autonomy in the world of sound reproduction, and whatever its motives or its justifications, one sees how rapidly the resources involved are changing, subject as they are to an inexorable law of movement and evolution under the ceaseless pressure of the market.

Aware of these forms of progress and investigation, and faced at the same time by stagnation in the world of musical instruments, the adventurous musical spirits have thought of turning the situation to their own advantage. Through an intuition that is both sure and unsure—sure of its direction, but unsure of its outcome—they have assumed that modern technology might be used in the search for a new instrumentation. The direction and significance of this exploration did not emerge until long after the need for it arose: irrational necessity preceded aesthetic reflection, the latter even being thought superfluous and likely to hamper any free development. The methods adopted were the outcome either of a genuine change of function, or of an adaptation, or of a distortion of function. Oscillators, amplifiers, and computers were not invented in order to create music; however, and particularly in the case of the computer, their functions are so easily generalized, so eminently transformable, that there has been a wish to devise different objectives from the direct one: accidental conjunction will create a mutation. The new sound material has come upon unsuspected possibilities, by no means purely by chance but at least by guided extrapolation, and has tended to proliferate on its own; so rich in possibilities is it that sometimes mental categories have yet to be created in order to use them. To musicians accustomed to a precise demarcation, a controlled hierarchy and the codes of a convention consolidated over the centuries, the new material has proposed a mass of unclassified solutions, and offered us every kind of structure without any perspective, so affording us a glimpse of its immense potential without guidance as to which methods we should follow.

So we stand at the crossroads of two somewhat divergent paths: on the one hand, a conservative historicism, which, if it does not altogether block invention, clearly diminishes it by providing none of the new material it needs for expression, or indeed for regeneration. Instead, it creates bottlenecks, and impedes the circuit running from composer to interpreter, or, more generally, that from idea to material, from functioning productively; for all practical purposes, it divides the reciprocal action of these two poles of creation. On the other hand, we have a progressive technology whose force of expression and development are sidetracked into a

proliferation of material means which may or may not be in accord with genuine musical thought—for this tends by nature to be independent, to the detriment of the overall cohesion of the sound world. (Having said which, one should note that long before contemporary technology, the history of musical instruments was littered with corpses: superfluous or over-complicated inventions, incapable of being integrated into the context demanded by the musical ideas of the age that produced them; because there was no balance between originality and necessity they fell into disuse.)

Thus inventors, engineers and technicians have gone in search of new processes according to their personal preferences, choosing this one or that purely by whim, and for fortuitous rather than for musically determined reasons—unless their reasons stemmed from their more exclusively scientific preoccupations. But musicians, on the whole, have felt repelled by the technical and the scientific, their education and culture having in no way given them the agility or even the readiness to tackle problems of this kind. Their most immediate and summary reaction, therefore, is to choose from the samples available, or to make do at a level easily accessible to manipulation. Few have the courage or the means directly to confront the arid, arduous problems, often lacking any easy solution, posed by contemporary technology and its rapid development. Rather than ask themselves the double question, both functional and fundamental, whether the material is adequate to the idea and the idea compatible with the material, they give way to the dangerous temptation of a superficial, simple question: does the material satisfy my immediate needs? Such a hasty choice, detached from all but the most servile functions, certainly cannot lead far, for it excludes all genuine dialectic and assumes that invention can divorce itself from the material, that intellectual schemas can exist without the support of sound. This does not even apply to the music of the past, which was not, properly speaking, written for specified instruments, for its writing assumes absolutely the notion of the instrument, even of the monodic instrument within a fixed and limited register. If invention is uninterested in the essential function of the musical material, if it restricts itself to criteria of temporary interest, of fortuitous and fleeting coincidences, it cannot exist or progress organically; it utilizes immediate discoveries, uses them up, in the literal sense of the term, exhausting them without really having explored or exploited them. Invention thereby condemns itself to die like the seasons.

Collaboration between scientists and musicians—to stick to those two generic terms which naturally include a large number of more specialized categories—is therefore a necessity that, seen from outside, does not appear to be inevitable. An

immediate reaction might be that musical invention can have no need of a corresponding technology; many representatives of the scientific world see nothing wrong with this and justify their apprehensions by the fact that artist creation is specifically the domain of intuition, of the irrational. They doubt whether this utopian marriage of fire and water would be likely to produce anything valid. If mystery is involved, it should remain a mystery: any investigation, any search for a meeting point is easily taken to be sacrilege. Uncertain just what it is that musicians are demanding from them, and what possible terrain there might be for joint efforts, many scientists opt out in advance, seeing only the absurdity of the situation: that is, a mage² reduced to begging for help from a plumber! If, in addition, the mage imagines that the plumber's services are all that he needs, then confusion is total. It is easy to see how hard it will be ever to establish a common language for both technological and musical invention.

In the end, musical invention will have somehow to learn the language of technology, and even to appropriate it. The full arsenal of technology will elude the musician, admittedly; it exceeds, often by a big margin, his ability to specialize; yet he is in a position to assimilate its fundamental procedures, to see how it functions and according to which conceptual schemes—how far, in fact, it might or might not coincide with the workings of musical creation and how it could reinforce them. Invention should not be satisfied with a raw material come upon by chance, even it can profit from such accidents and, in exceptional circumstances, enlarge on them. To return to the famous comparison, the umbrella and the sewing machine cannot create the event by themselves—it needs the dissecting table too. In other words, musical invention must bring about the creation of the musical material it needs; by its efforts, it will provide the necessary impulse for technology to respond functionally to its desires and imagination. This process will need to be flexible enough to avoid the extreme rigidity and impoverishment of an excessive determinism and to encompass the accidental or unforeseen, which it must be ready later to integrate into a larger and richer conception. The long-term preparation of research and the instantaneous discovery must not be mutually exclusive, they must affirm the reciprocity of their respective spheres of action.

One can draw a parallel with the familiar world of musical instruments. When a composer learns orchestration, he is not asked to have either a practical, a technical or a scientific knowledge of all the instruments currently at our disposal. In other words, he is not expected to learn to play every one of these instruments,

²mage: magician

even if out of personal curiosity he may familiarize himself with one or other of them and even become a virtuoso. Furthermore, he is not expected to learn how the instruments were made, how they reached their present stage of development, by what means and along which path their history has evolved so that certain of their specific possibilities were stressed to the neglect of others; here too the composer can study and reflect on whichever aspect is particularly important to him—it remains his personal choice. Still less is the composer expected to learn the acoustic structure of the sounds produced by a particular family of instruments; his curiosity or his general, extra-musical education may lead him to concern himself with these problems in so far as scientific analysis can confirm his impressions as a musician. He may have none of this literal knowledge, yet nothing in the functioning of an instrument, either practical, technical or scientific, should be beyond his understanding. His apprenticeship is in a sense not a real but a virtual one. He will know what is possible with an instrument, what it would be absurd to demand of it, what is simple and what is out of the question, its lightness or its heaviness, its ease of articulation or difficulty in sound production in various registers, the quality of the timbre, all the modifications that can be made either through technique itself or with the aid of such devices as the mute, the weight of each instrument, its relationship with the others; all these are things that he will verify in practice, his imagination abandoning itself to the delights of extrapolation. The gift lies in the grafting of intuition on to the data he has acquired. A virtual knowledge of the entire instrumental field will enable him to integrate into his musical invention, even before he actually composes, its vast hidden resources; that knowledge forms a part of his invention.

Thus a virtual understanding of contemporary technology ought to form part of the musician's invention; otherwise, scientists, technicians and musicians will rub shoulders and even help one another, but their activities will be only marginal one to the other. Our grand design today, therefore, is to prepare the way for their integration and, through an increasingly pertinent dialogue, to reach a common language that would take account of the imperatives of musical invention and the priorities of technology. This dialogue will be based as much on the sound material as on concepts.

Where the material is concerned, such a dialogue seems possible here and now: it offers an immediate interest and is far from presenting any insurmountable difficulties. From our education within a traditional culture we have learned and experienced how instrumental models function and what they are capable of. But in the field of electronics and computers—the instrument that would be directly

involved—models do not exist, or only sporadically, and largely thanks to our imagination. Lacking sound schemes to follow, the new field seems exaggeratedly vast, chaotic, and if not inorganic at least unorganized. The quite natural temptation is to approach this new field with our tried and tested methods and to apply the grid of familiar categories to an unexplored domain—categories that would seem to make the task easier and to which, for that reason, we would like to resort unthinkingly. The existing categories could, it is true, be helpful at first in mapping out virgin territory and enabling us, by reconstitution and synthesis, better to know the natural world, which we think we know so well and which, the nearer we get to it, seems to elude the precision of our investigation. It is not only the question ‘what is a sound made of?’ that we have to answer, but the much harder one of “How do we perceive this sound in relation to its constituent elements?” So by juxtaposing what is known with what is not known, and what is possible with what will be possible, we shall establish a geography of the sound universe, so establishing the continuity of continents where up until now many unknown territories have been discerned.

It goes without saying that the reasoned extension of the material will inspire new modes of thought; between thought and material a very complex game of mirrors is set up, by which images are relayed continuously from one to the other. A forceful, demanding idea tends to create its own material, and in the same way new material inevitably involves a recasting of the idea. We might compare this with architecture, where structural limitations have been radically changed by the use of new materials such as concrete, glass, and steel. Stylistic change did not happen overnight; there were frequent hesitations and references back to the past—to ennoble, as it were, these architectural upstarts. New possibilities triumphed over imitation and transformed architectural invention and concepts from top to bottom. These concepts had to rely much more than before on technology, with technical calculations intervening even in aesthetic choices, and engineers and architects were obliged to find a common language—which we are now about to set off to look for in the world of music.

If the choice of material proves to be the chief determinant in the development of creative ideas, this is not to say that ideas should be left to proceed on their own, nor that a change of material will automatically entail a revision of concepts relating to musical invention. Undoubtedly, as in the case of architecture, there will be caprices and hesitations, and an irrepressible desire to apply old concepts to the new material, in order to achieve—perhaps *ad absurdo?*—a kind of verification. But if we wish to pass beyond these immediate temptations, we shall have

to strive to think in new categories, to change not only the methods but the very aim of creation. It is surprising that in the musical developments of the past sixty years many stylistic attitudes have been negative, their chief aim, need or necessity being to avoid referring back—if there has been such reference it has been produced in a raw unassimilated state, like a collage or parody, or even a mockery. In trying to destroy or amalgamate, reference in fact betrays the inability to absorb, it betrays the weakness of a stylistic conception unable to phagocytose³ what it takes hold of. But if one insists on stylistic integrity as a prime criterion, and if the material, through previous use, is rich in connotations, if it stimulates involuntary associations and risks diverting expression into unwanted directions, one is led in practice into playing, if not absolutely against the material, then at least to the limit of its possibilities. Coincidence no longer exists, or can exist only in the choice of a specialized area—in the rejection, that is, of many other areas that would impose references that were eccentric and too powerful. It would seem that this excessively cautious attitude could not persist in the face of new material from which connotations have been excluded: the relationship between idea and material becomes eminently positive and stylistic integrity is no longer at risk.

Creative thought, consequently, is in a position to examine its own way of working, its own mechanisms. Whether in the evolution of formal structures, in the utilization of determinism, or in the manipulation of chance, and whether the plan of assembly be based on cohesion or fragmentariness, the field is vast and open to invention. At its limits, one can imagine possible works where material and idea are brought to coincide by the final, instantaneous operation that gives them a true, provisional existence—that operation being the activity of the composer, of an interpreter, or of the audience itself. Certainly, the finite categories within which we are still accustomed to evolve will offer less interest when this dizzying prospect opens up: of a stored-up potential creating instant originality.

Before we reach that point, the effort will either be collective or it will not be at all. No individual, however gifted, could produce a solution to all the problems posed by the present evolution of musical expression.

Research/invention, individual/collective, the multiple resources of this double dialectic are capable of engendering infinite possibilities. That invention is marked more particularly by the imprint of an individual goes without saying; we must

³*phagocytosis*: The destruction and absorption of bacteria or micro-organisms by phagocytes.
phagocytes: A leucocyte that engulfs and digests bacteria and other foreign material in the blood and tissues of the body.

still prevent this involving us in humdrum, particular solutions that somehow remain the composer's personal property. What is absolutely necessary is that we should move towards global, generalizable solutions. In material as in method, a constant flow must be established between modes of thought and types of action, a continual exchange between giving and receiving. Future experiments, in all probability, will be set up in accordance with this permanent dialogue. Will there be many of us to undertake it?