**[36]** II. *THEORIES FOR A MORE GENERAL MUSIC*

A. *The three dualisms of music*

> The term "natural" used in the course of this chapter may take some people aback, as if it came from a naive "Rousseauism". We would ask the reader to avoid prejudgement and to read what follows with an open mind.
>
> Of course, for Pierre Schaeffer, music is never wholly "natural"; it is fundamentally dual, i.e. divided, split and first and foremost *triply* dual through the 3 pairs Natural/Cultural, Making/Hearing, Abstract/Concrete.

## » 13. NATURAL/CULTURAL

1) *Natural/Cultural* is the first dualism in music, the most decisive, most heavy with consequence.

*Natural* - is what is common to all people, arising from universal psychological and physiological factors.

*Cultural* - is what is peculiar to each culture, in terms of particular codes and conditionings.

The natural-cultural alternative is one of the fundamental problems of music; the answer which P.S. gives to this problem is contained in these words: music is basically natural *and* cultural; this is not ducking the question, but, on the contrary a very clear reply - from which it follows that there is a minimum of natural laws which every musical system must respect in order to be viable (i.e. perceptible).

2) Traditional music, for example is built on data that are *partly natural* (the perception of intervals and principal harmonic degrees, consonant relationships) and *partly cultural* (choice of scales and tonics in common calibrations, harmonic functions etc.), whose coming together forms *structures of reference* which vary according to different cultures.

**[37]** Disregarding the *fundamental dualism* of music often causes confusion between "*two types of problem which are very different, depending on whether they employ natural or conventional* (i.e. cultural) *referential structures*" (610).

It is, therefore, important in musical research to unravel this confusion, and to seek the *natural* laws which determine the identification and choice of certain musical values (such as pitch) rather than others.

*A current ambiguity*

As far as "*contemporary musical thought*" is concerned, says P.S. "*music is supposedly an expressly cultural language, which has meaning only through usage (…). But on the other hand people also cite acoustics, physiology, parameter, the variations in the ears' response: i.e. they postulate a natural base for music in organizational (mathematical) formulae, or the properties of sound. So we come back to the central problem of the essence of music: natural or cultural? (…) The serious matter here is that most composers do not even seem to be aware of the problem and dwell in ambiguity. Yet they do not hesitate, when it suits them, to go without warning from one side to the other*" (603).

In modern musics this uncertainty is expressed in "*ambiguity and inconsistency between using and simultaneously rejecting the harmonic register*" (611) in so far as they use its elements but want to get rid of its tonal references, "*which, in our view, are natural*" (610).

The "*changing of cultural reference at a very high level of development or crystallization*" (610) is thus made in a state of confusion, where the system vaunted as new remains, despite itself, because of the materials it retains from the old system, attached to the fundamentals of a system from which it seeks to sever itself. "*So, even if they decide to get rid of a conventional structure such as tonality, they in fact continue to use the scales it implied*" (612).

NATURAL/CULTURAL: 10-11, 23, 603, 605-607, 610-612.

**» 14. MAKING/HEARING**

1) In the beginning was *Making*, in music as elsewhere. But "*music is made to be heard*".

So it comes equally from MAKING and HEARING, as much from a pole of fabrication as a pole of reception.

It is the constant aim of the T.O.M. to reconnect these in order to reestablish the thread which has often been broken in the development of contemporary music.

The first "Book" of the Traité is entitled MAKING MUSIC and places the origins of music in the field of the instinctive activity of "homo faber", making music with his voice or on an instrument. In response, the second book, HEARING, seeks to establish the laws of Listening.

2) Traditional Western music guarantees a satisfying balance between the two poles, but in contemporary music "*there is a considerable gap between making and hearing*" (492). There is often little in common between the detailed performance instructions on the score, **[38]** what the composer intends and, on the other hand, the heard result. At the same time "*the*

*musician's, and hence music's, limitations have long been* (…) *in the field of musical* making: *the limitations of lutherie, and of virtuosity. By getting rid of or getting round these limitations, present-day techniques have unmasked the limitations of hearing*" (203).

Making has, therefore, renewed hearing. But faced with the number of musics which are made without being "heard" (in the sense of being perceived in their logic) P.S. reckons it is time to learn all over again how *to hear what we make*.

After a stage of technical innovation, regulated by the law of *Making,* he would like a more informed, rigorous, attentive listening to inspire new musical creation and regulate making.

"*Among so many volumes dedicated to instrumental or compositional techniques, can we find even a few articles on the art of hearing and the analysis of what is heard?*" (86).

3) The activity which consists in using notions and signs to *make* music can be called: *Prose composition*; the activity which consists in analysing what is *heard* can be called: *Translation* (see **37**).

a) His desire not to sever the links between "making" and "hearing" leads P.S. to give some space in the T.O.M. to an analysis of the "instrumental fact", and even a description of some studio techniques. He also emphasizes how, in the act of hearing itself, the ear, in order to appreciate the sound, is spontaneously sensitive to the manner in which *it hears it to be made* – not so much in the sense of identifying its source as in identifying the energetic process which gives rise to the sound object. This is why he creates the notion of *facture* (a word derived from to "make", to "do") to describe the way the ear perceives different types of sustainment of sound (see **62**); it is also why, when he is classifying the types of *allure*, he is not afraid to refer to the way the human ear distinguishes different types of *sound agents*, which it recognizes by the "allure" of the sound (see **98**).

b) *Making/Hearing and the four sector.*

In the division of the 4 listening modes into 4 quadrants, sector I (Listening) is clearly situated on the source side (seeking the cause, the agent of the sound) – and so on the side referring to Making; while sector II "Perceiving" is more on the receptive, Hearing side.

c) *One to get ready, two to play.*

The essential dichotomy between Making and Hearing is linked for P.S to the memory of his father, a violin-teacher. He had a rule that he gave to all his students: *One* to get ready (placing the bow, positioning the fingers); *Two*, to play. And he would even reprimand a pupil for an accurate note, if it were played by chance and was not intentional; whereas he might compliment him for a good position, even if it didn't yet give an accurate note. So, the author

says, "*my father seemed to instil in the young musician a dissociation of making and hearing into two separate events*" (342).

MAKING/HEARING: 11, *34*, 37, *39-99* (Book I), *101-156* (Book II), 203-204, 341-343, 356-357, 413, 492, 612.

**[39] » 15. ABSTRACT/CONCRETE**

1) *The two isotopes of reality.*

In its use of the pair Abstract/Concrete, the T.O.M. refers to the definition in the *Vocabulary of Philosophy* by Lalande: "*Abstract: every notion of quality or relationship considered in a more or less general manner without reference to any of its representations. In contrast, the complete representation as it is or could be is called concrete.*" Abstract and Concrete are "*two isotopes of reality*" (24), two faces of every perception, interdependent and complementary, which must be reconciled and balanced in music, against the excess of *concrete* (in "savage" musique concrète) or the excess of *abstract* (in serial and other types of "a priori" musics).

2) *Musique concrète.*

When in 1948 Pierre Schaeffer gave the name *Concrète* to the music he invented, he wanted to emphasise that this new music came from *concrete sound material*, sound heard for the purpose of trying to abstract musical values from it. And this is the opposite of classical music, which starts from an abstract concept and notation and leads to a concrete performance. P.S. wanted to react against the "excess of abstraction" of the period, but he did not shy away from "*reclaiming*" the musical abstract (24). A reclaiming which, for him, had necessarily to pass through a *return to the concrete.*

3) *Abstract/ Concrete and the four listening modes.*

The basic table of the 4 listening modes is made by crossing horizontally and vertically the 2 fundamental sets of opposites which are found in every perceptual activity: Objective/Subjective and Abstract/Concrete. At the beginning of the T.O.M., sectors 1 and 2 of the table (on the right) are placed under Concrete, and sectors 3 and 4 (on the left) under Abstract. After an important crux in the argument of the T.O.M. (316), sector 1 (reference to the Source) changes from Concrete to Abstract as well, and only sector 2 (Perception, raw perception) still comes under Concrete.

4) The *Sound Object*, the correlate of *Reduced Listening*, is defined as the synthesis of an *abstract* and a *concrete* purpose which refer *back* to it (the object), instead of its being used to arrive at an (abstract) meaning or a (concrete) source (154).

5) From the first, the *instrumental beginnings* of all music display this dialectic of abstract and concrete in the musical phenomenon: the instrument allows us to hear abstract structures of values (directed towards the hearing of *meaning*) through its concrete potential for play (directed towards the hearing of *signs*), and improvements made to instruments are usually in an attempt to balance these two aspects (see **INSTRUMENT**, **21**).

6) In musical research also, the concrete *characteristics* of sound are used to try and discover the "pertinent traits" which emerge as abstract musical material, "*values*", once objects are placed in a structure in accordance with the rule of *permanence of (concrete) characteristics / variation of (abstract) values* (see **28**).

7) The dualism Abstract/ Concrete belongs therefore in the T.O.M. to **[40]** a particular network of dualisms which combine together in two parallel stages to formulate the law PCV2 (Permanence/Variation, Value/Characteristic, Timbre/Pitch, Sonorous/Musical) (**27**, **28**, **29**).

*Historical review: the "concrete reaction".*

The term "musique concrète", which today is more usually called "electroacoustic music", has been the source of many ambiguities. It must be resituated in the context of the end of the 1950s when it was suggested, not without some intention to provoke, by Pierre Schaeffer. It was the grand period of "a priori" serial music, based only on abstraction with, from the beginning of the 1950s onwards, the arrival of electronic musics from Cologne (Stockhausen, Eimert), which were thought out on paper and composed according to principles taken from physics or mathematics, involving an explicit reduction of musical notions to physical parameters. All these musics called for a "*total ascendancy of abstract intelligence (…) over sound material*" (20).

In the face of traditional practice, and above all these "scientist" procedures, claiming a *concrete* practice of music was tantamount to reacting against them:

"*When in 1948 I suggested the term "musique concrète", I meant, with this adjective, to signal a u-turn in the practice of music. Instead of notating musical ideas in the symbols of traditional music theory, and entrusting their realization to known musical instruments, I wanted to gather concrete sound material, wherever it came from, and extract from it the sonorous musical values which it potentially contained*" (23).

Some composers (Boulez, Stockhausen, Pousseur, etc.) have criticized concrete procedures for their "empiricism" and "anarchy". But for P.S. the *concrete* was never an end in itself:

"*For us, long convinced that these two aspects* [concrete and abstract] *are the isotopes of reality, the choice of one of these adjectives was only intended to signal a new approach to music, and it must also be admitted, a desire to challenge the bias towards abstraction which had taken over contemporary music*" (24).

If some of the first concrete works (amongst them the *Symphonie pour un homme seul*, 1949-50, composed with Pierre Henry) played a great deal on the "double meaning" of concrete sounds and the "reference to the exterior world", P.S. quickly distanced himself from this youthful expressionism, and his resumption of the Groupe de Musique concrète in 1957 after an absence of 4 years coincided with a rejection of the expression "Musique concrète" as too ambiguous, and his preference for the term "experimental music". His project was indeed to "*pursue musical research based on the concrete*", but only "*in order to reclaim the indispensable musical abstract*" (24).

ABSTRACT/CONCRETE: *23-24*, 28, 46-47, 55-56, 59-61, 66, 113, 116, *119-120*, 144, 154 (BIFINTEC), 155, 307, 308, *316-318*, 320, 324, 338, 367, *369* (PROGREMU).

### B. *A new look at tradition*

> Nothing being more foreign to Pierre Schaeffer's cast of mind than the doctrine of the "tabula rasa", the "elimination of heritage" - he **[41]** concentrated on tradition, seeking to grasp it with a new ear. The pair musical/musicianly represents this new dualism, this two-fold concern for tradition and research.
> The traditional concepts of note, calibration, timbre, pitch, etc. are, therefore, re-examined from top to toe.

## » 16. MUSICAL/MUSICIANLY

The pair musical/musicianly (where the adjective musical assumes another meaning than in the pair musical/sonorous) describes two simultaneously opposed and complementary types of listening intentions (under hearing) or two ways of inventing sound (under making).

Generally speaking *musical* listening or invention refers back to traditional heritage, to established and accepted structures and values, which it attempts to rediscover or recreate; whilst *musicianly* hearing or invention seeks rather to locate interesting new phenomena or to innovate in the facture of sound objects. The musical attitude rests on old values; the musicianly attitude actively seeks new ones.

By going backwards and forwards, by successive approximations between these two approaches, it might be possible to discover and establish values for a new music.

a) *Musical and musicianly Listening/Invention.*

If we compare a violinist playing a Stradivarius and a "child with grass" "*who has picked a suitable blade of grass, held it between his palms and now blows into it"* (339), you could say that the child, more than the violinist, inclines us to musicianly listening, by detaching us from classical musical reference: "…*we no longer want to hear the over-musical sound quality of the Stradivarius, we want to practise musicianly listening to the most crude of objects, and we discover this mode of listening by doing it*" (339).

The person who listens to the child with grass "…*will be obliged to suffer a collection of objects devoid of musical meaning and he will hear them all the better: one hoarser, another more strident; some short, some interminable; some bugle-like, others rasping. The best of it is that he will do the finest possible musicianly listening*." (340).

So musicianly listening starts with an attitude of identification: "*first listening to factures, the attitude of homo faber whom we become in thought*" (344). It thus leads naturally to musicianly invention. But it also involves listening "*to the effects, the overall content of the sound. In fact, it is the first attempt at reduced listening to sound at this stage, but already directed towards discovering criteria for identification*" (344). In this sense, musicianly listening is what directs the choice of criteria for typological identification, the first stage of a programme of musical research.

*Musicianly listening* appears naturally at the forefront of a new approach in music when it is open, without exception, to the "*universal symphony*" (332), the "*immense hubbub*" (332). But to result in music it must restrict the field of objects it studies and concentrate primarily on those which, in theory, are "suitable" (for music). So we come to a compromise (which is part of the method of **successive approximations** so dear to the author of the T.O.M.), consisting in a "[musicianly] *classification of sound objects which is not without musical choices amongst the criteria* **[42]** *for sound*" (346). Reference to the past in music is not abandoned where musicianly listening to, and invention of sound objects is concerned.

**Musicianly listening** "*is thus doubly restricted, on the one hand because not all the sound structures of the object are given to it to elucidate, but only the structures by which it is identified (…) but also, because suitable objects are chosen for it from what it offers (…). It is in return for these two restrictions that it makes reduced listening into a 'specialist' area*". (348) (see **SUITABLE OBJECT, 40**).

b) *Relationship between musical and musicianly listening, and natural listening.*

Musical and musicianly listening differ from *natural* listening which is "*the primary and primitive tendency to use sound to gather information about the event*" (120).

Freed from the usual cultural conditioning, musicianly listening could, in its "return to sources", be tempted to direct itself towards "*what is not the sound object, but the event*"

(345). It must all the more vigorously resist this and, conserving its natural curiosity, concentrate on the sound object itself.

For its part, a listening which believes itself to be "musical" and contents itself with identifying a performer heard on the radio is simply a "natural listening" looking for indices. In this sense, "*musicians often practise natural listening*" (345) arising from their performance skills. Conversely , "*the natural ear sometimes does musical listening*" (345) and may refer to musical criteria perceived within the sound: "*The doctor talks about an arrhythmic heart, whistling respiration, a beautiful death-rattle. The mechanic talks about his engine in musical terms…*" (354).

c) *Musical and musicianly invention.*

The same dualism occurs in *Making*, the making of objects where musical and musicianly invention can be distinguished as complementary to each other. But the latter is not without reference to the past, particularly in that it chooses suitable objects to facilitate reduced listening and musical research.

Musicianly invention manipulates "*sources, to create objects*" (354) (concrete pole, of factures), whereas musical invention manipulates "*similarities to create structures*" (354) (abstract pole, of values). Both risk falling into the same type of trap: in the case of musicianly invention, the trap of the instrument, of causalities (the temptation "*to confuse sound bodies with the sound objects they deliver*") (356); in the case of musical invention, the temptation to extract prematurely structures, and values which are not sufficiently based on the properties of objects, and to compose before setting up a "*theory of suitable objects*". But they do necessarily complement each other, as creation and research complement each other (358-359) in a permanent two-way process from hearing to making, and from making to hearing: "*With musicianly invention inherited from ancestral practices, we will find ways of creating sound objects which lend themselves to a renewal of music, i.e. suitable objects. And once these are obtained, we will find further ways, through decontextualised musical listening, to hear them as bearers of intelligible elements in new systems yet to be deciphered*" (354).

d) *Musical/musicianly and musical/sonorous.*

Given that the word musical takes on a different meaning depending on the word it is contrasted with, P.S. enjoys intersecting the two pairs. For example:

"*It could be said, and it would be more than a play on words, that traditional musical listening is listening to the sounds of stereotyped musical objects, while musicianly listening is musical listening to new sound objects put forward for use in music*" (353).

**[43]** The meaning of the word "musical" oscillates between two poles which magnetize it: it is pulled towards the past and traditional values when it is near the (active) word

"*musicianly*", which "repels" it in that direction: and it is drawn towards the future, the active, when it is near the word "sonorous" (which is passive compared to *musical* in the pair musical/sonorous). This is an example of how P.S. uses his pairs of opposites, not as rigidly antagonistic, but as a sort of "magnetic field" creating forces and subtle polarities.

MUSICAL/MUSICIANLY: 150, 151, 152, 271, *332-348*, *353*, 355-359, 369, (PROGREMU), 370, 381, 432.

## » 17. PITCH

1) It is difficult to deny that in a large number of traditional musics (including Western music) *pitch* is the privileged sound characteristic, the most *pregnant* with meaning, in the same way as rhythmic pulsation, but also the best able to function as a *value* and give rise to rich, complex, well-perceived relationships. This is why musical research must reflect on what this criterion is all about, and why it deserves this place of honour.

2) In musical perception, compared to other characteristics of sound (dynamics, grain, allure, etc.) pitch benefits from a *triple reinforcement*: (383).

- Due to its dominance as a *characteristic*, particularly when the pitch is fixed and locatable (i.e. *tonic*); in other words, it is often what, amongst all the characteristics of sound, most immediately strikes the ear.

- Due to its dominance as an *ordinal* relationship, i.e. its special capacity to be put into *scales* and *calibrations* organized according to ordered relationships.

- Due to a unique property not shared with any other characteristic: its capacity for *cardinal* evaluation, i.e. to be understood very precisely as an *absolute value* (absolute pitch), in contrast to other characteristics of sound which can only be evaluated relatively. This capacity "*is thus the only one of all his perceptions which is given naturally to man*" (383).

- Lastly we should add "vectorial tensions" (the tension between consonance/dissonance, phenomena of attraction etc.), which it can mediate.

Hence the privileged status of pitch in music, as the sole *value* (with, in second place, duration) capable of offering so large a number of organisational opportunities, which are both abstract and clearly perceptible: everyone recognises a melody transposed into different keys, yet this is a purely abstract relationship between sequences of intervals.

3) This predominance is shown in instrumental activity. "*Whether with strings, membranes, metal strips, pipes, simple or multiple instruments, it is* (…) *clear that instrumental experimentation has been almost entirely concerned with variations of pitch. It seems that the liberating gesture, the capacity for abstraction which gives birth to music, musical potential as much as* **[44]** *the instrumental act, all these things have pitch as their*

*key*" (48). Bearing in mind, however, that pitch "*has not always dominated with so much arrogance and desire for exclusivity*" (48). African music, for example, places more emphasis on *rhythms*. Others use pitch not only as a *value*, based on a discontinuous scale, but also as a concrete characteristic, whose continuous fluctuations colour and enhance instrumental playing (oriental musics? but also Western bel canto).

4) In traditional Western music, the value of pitch predominates to the extent that, in order to be considered as "musical" and not be rejected as "noise", the sound material has to have a fixed and locatable pitch (to be "tonic"). This law is implicit in Traditional Theory. According to Danhaüser: "*musical sound is distinct from noise in that pitch can be precisely measured, whereas the musical value of noise cannot be evaluated*".

The T.O.M. takes this into account as well, by identifying two types of perception of pitch, *two fields of distinct pitches*, depending on whether the pitch of the sound is fixed and locatable ("harmonic" field), or else either variable, or fixed and non-locatable in pitch, and therefore not amenable to cardinal evaluation ("coloured" field). On this point, see **PERCEPTUAL FIELD (25)**.

5) If the notion of *musical value* is to be defined as a "*quality of perception common to different objects which are called musical* (…) *allowing these objects to be compared, ordered and (possibly) put into calibrations, despite the disparity of their other perceptual aspects*" (303), then it is clear that only one characteristic of sound comes near to satisfying this definition: pitch.

This dominance should not, however, discourage attempts to question the "natural" privilege of pitch, by trying to bring out *other values*…

6) This dominance will simply be acknowledged by choosing as the first criterion for the classification of sounds (in *typology*) their greater or lesser locatability in pitch, and by giving a special place in *morphology* to the problem of pitch and the study of the criterion of *mass* (which is simply a generalisation of it).

a) *Can pitch be challenged?*

So it is not easy to challenge the dominance of the perception of pitch in the range of musical values, as did experiments such as "Klangfarbenmelodie" (timbre-melody) carried out by the greats of the Vienna school and their disciples. If we look closely at attempts such as these, we see that the perception of potential timbre-melodies is masked by pitch-melodies which "*unfailingly dominate when they are used as values*" (302). For a timbre-melody to have any chance of being perceived, the pitch of the sounds must remain the same from one note to the other all the time (as Schoenberg tried to do in *Farben*). Even then you cannot be sure that linking up different timbres on the same note creates a real melodic relationship with its particular properties (transposability, abstract character). At least this experiment demonstrates the will to carry out a permutation of the usual **[45]** system based on the

relationship Permanence of the Characteristic Timbre / Variation of the Value Pitch (Law PCV2. see **27, 28, 29**).

b) *The perception of pitch is not the same as the perception of a physical parameter, frequency.*

Several experiments demonstrate this, such as the one in which the ear perceives fundamental sounds which do not physically exist, but which it infers from high-pitched harmonics (experiments on RESIDUAL SOUNDS); or those which demonstrate the existence of another calibration of pitches, MELS, distinct from harmonic degrees; or again the experiments which highlight the great variability in the perception of "differential thresholds" of pitch depending on context. From all this it is clear that the concept of pitch "*far from being* (…), *as people maintain, linked only to the frequency of the fundamental, is a complex and plural concept* (188)". Perception of pitch can also differ considerably depending on whether the listening context is the experimental laboratory or *calibrations on an instrument* (the problem of the "bass register" on the piano "*heard an octave above a pure frequency of the same nominal value*") (188) or "*calibrations of intervals*" (using pitch as a pure structural value, independently "*of the nature of the objects that produce it*") (189).

So musicians wanting to think up new abstract pitch-relationships but who ignore all these new factors may well be working in the dark.

c) *Natural foundations of pitch calibrations, consonance and temperament.*

Is this privileged position simply convention? And since the problem of music is being discussed in terms of a dualism between the natural and the cultural, will we not have to come back to the old question: "*are scales natural or artificial? Are they the product of historical usage, linked to tradition (but then how do we explain how such a tradition arose?), or are they determined by the structure of objects, the meeting point of the individual person and nature, physiology and acoustics?*" (522)

Like Pythagoras and Zarlino, P.S. inclines towards the second solution, he thinks there is a "*necessary relationship between the degrees of the scale and the successive partials (or harmonics)*" (523) and this is how he attempts to explain the phenomenon of consonance and the "viability" of temperament which, for him, is not a "*dreadful compromise*", a sort of "*sin*" committed by the system, but its "*salvation*" (523). Nor is the diatonic scale determined by the mind. He reaches the conclusion (the detailed arguments can be found in the T.O.M.) that "*the perception of intervals rests firmly on facts, which classify them in a given natural order*". (608)

The study of correlations, in book III, confirms this assertion by demonstrating that fixed-pitch "tonic" sounds can be inferred from their harmonics, even when the fundamental is "physically absent", i.e. there is no physical vibration at the perceived pitch. "*Starting from*

*here*, says P.S., *the explanation becomes convincing: when we compare two sounds, we are not comparing two numbers (their simple relationships would not necessarily explain any law of perception), but we are comparing two structures (of harmonics) which have a greater or lesser number of 'shared features' and 'differing features'. (…) The more shared elements two of these structures have, the more their consonance stands out. (…) The fewer they have, the less natural their relationship.*" (609)

From these undeniable "*fundamental natural elements*", common to all civilizations, could be built, according to different cultures, all manner of scales and modes, **[46]** which "*are not simply the product of choice, tradition and conditioning*" (609-610). The basic natural/cultural dualism of music can be seen in the divergence of musical cultures from their "natural shared stock".

So, it is impossible to construct preconceived new systems of compostion which attack this natural order while claiming to reclaim its elements (the twelve chromatic degrees) without falling into confusion or contradiction. Besides, so-called atonal music often ends up "*re-establishing the functions of intervals outside the framework of diatonicism*" (610), as Edmond Costère's analyses have demonstrated.

So perception of pitch demonstrates a "miraculous" but natural correlation with arithmetical relationships; and it can no longer be said that simple interval relationships are conventions imposed by usage and without any natural foundation.

PITCH: 16, 46-49, *172-193*, 289, 302-304, 373-374, 383, 431-432, 513, 520-524, 605-613, 635.

## » 18. CALIBRATION

1) In the field of music, a calibration is a graduated series of different states of a criterion or a dimension, this series being in accordance with what is called a relationship of order, i.e. each degree is situated between others in a certain order which cannot be changed. The scale is an example of a calibration.

In fact, the only calibration known in traditional music are *scales of pitch*, because pitch has the property of being perceived in clear degrees, and also has the unique capacity of allowing each of these degrees to be perceived as an *absolute value*, and not solely by reference to others.

2) The T.O.M. envisages the possibility of creating calibrations which are not of pitch, but of grain, allure etc. and to this end its programme of research includes a stage called *analysis*, where the capacities of different sound criteria to form *calibrations* in the *perceptual fields* are evaluated. The degrees of these possible calibrations are called *species* and an

attempt is made to situate them in the three perceptual fields of pitch, duration and intensity. This is in keeping with a hypothesis according to which only *calibrations of criteria* are capable of creating abstract relationships and not dynamic or impressionistic ("plastic") relationships; this is because they bring into play relationships, differences, and not solely concrete qualities attached specifically to objects.

3) The *Traité* initially defines two types of calibrations: solely *ordinal* calibrations, which permit an evaluation which is solely relative or at best numerical, of the different degrees of which they are composed (the author calls this type, calibrations of *colour*, for the perception in pitch of non-tonic sounds); and the other type, calibrations which are not only ordinal but also *cardinal*, which also allow an evaluation of the degrees and their intervals as absolute values and which form scales. The only possible cardinal calibrations we know of are (locatable and fixed) tonic pitch.

**[47]** So at best we shall try to develop ordinal calibrations without claiming to go as far as creating *scales.*

a) *Calibrations are not in themselves "natural" but cultural*. Thus, they vary with different musical civilizations. But the harmonic degrees and the intervals on which these calibrations are built are *natural* and so linked to properties of human perception.

b) According to a theory by the American psychologist G.A.Miller, "*it is not really in our power, generally speaking, to discern more than seven degrees or nuances in one perceptual dimension*" (with yet again the exception of degrees of pitch). Hence, in analysis, the decision to limit the number of degrees in general to seven (593) when the values of a certain criterion are being *put into calibrations.*

c) *Multiplicity of calibrations of pitch.*

The psycho-acoustic study of perception of pitch demonstrates that in addition to the usual perception of *tones* and semitones (for Westerners), there is another way of perceiving intervals whose unit is the *mel*, and which is as different from tones and semitones as the calibrations of temperature in degrees Celsius and degrees Fahrenheit "*So, from the viewpoint of the experimental psychologist, a fifth or a third in the high range has fewer "mels" than in the medium range*" (183). A calibration of mels has been set up experimentally and "*coincides with the harmonic calibration only in a limited zone of the register* (185)".

Furthermore, in the area of pitch a further distinction must be made between calibration of intervals in the abstract and instrumental calibrations, which differ with the instrumental context (a C or an A is different depending on the instrument which produces it), and also *"experimental" calibrations*, where the perceived pitch of the sound differs

according to the greater or lesser degree of acuity with which it is broken down into harmonics (see **PITCH, 17**).

CALIBRATION: 183, 185, 188-190, 276, *375*, 487, 504, 521-524, 591-593, 605-606, 635.

## » 19. NOTE

1) In traditional Western music the note represents the *smallest significant musical element* (281), the one on which all discourse is structured. An idea confirmed by the conventions of the system, which take it as the unit of notation.

2) *Note and Phoneme*.

In a comparative study of the structures of perception of language and music, we could be tempted to compare the note with the *phoneme*, which in linguistics is "*the smallest unit of sound which distinguishes one word from another*".

The definition of the phoneme "*depends on its function in the whole system of the language*", and it is its function in a given system which distinguishes its *pertinent* characteristics from those which are not. In the same way, for *musical notes*, the system in which they function and are defined brings out their *pertinent* traits of pitch and duration, (which are called *values*) **[48]**, rather than those which are not, and which are called *characteristics*. In the act of perception the prominence of *values* can completely mask the presence of *characteristics*.

In the same way as for the phoneme, which tends to be confused with its written representation, *notation* misuses the musical note by making us think of it as a sign which exists before it is played. However, notation only deals with aspects of sound functioning as *values*. If we forget the system and the pertinent traits which it defines, and listen to the musical note with a fresh ear as a perceptible *sound object*, we discover, in addition to these pertinent traits which we shall call *values*, many other characteristics ("*which could perhaps become values in other structures, as a phonetic variant becomes a distinct phoneme in another language*") (290).

3) Nevertheless, when the musical note is played it is characterised not only by the aspects specified by notation (pitch, duration, and very vaguely, nuance) but also by a certain *dynamic curve*, with a precise temporal form, an attack, a continuant and a decay.

It is in this sense, and without considering notation, that we can try to extend the notion of the note and to reclaim it by applying it to all sound objects which have a dynamic form identifiable as such (*formed object*s in typology, designated by the symbol N when they are "tonics", see **65**).

A *balanced note* is a note in which the three temporal phases (attack, continuant and decay) are clearly perceptible; when two of these phases, or even all three, are combined into one, this is called a *deponent note*.

NOTE: 37, 281, 287-288, 290, 327, 447, 463, *529-530*.

## » 20. TIMBRE

The critique and redefinition of the notion of *timbre* is an important stage of musical research in the T.O.M.

The TRAITÉ principally attacks the "physicist" definition of timbre, which equates it with the harmonic spectrum of sounds - a definition adopted by many of the composers in the 50s, who thought that it would enable them to control the determination of timbre by the synthesis of harmonic sound spectra.

Only when the notion of timbre has been redefined according to the principles of reduced listening, and no longer in a physicist manner, will it be possible to build a new music theory of sound objects on new foundations.

1) *Empirical and traditional definitions of timbre*.

According to traditional theory "*timbre is that particular quality of sound which means that two instruments cannot be confused, even though they are producing a sound of the same pitch and intensity*" (Danhaüser, Theory of Music, quoted in T.O.M. 164).

This pragmatic definition comes down to: "timbre is what enables us to identify one instrument rather than another", or again "timbre is how we recognize that various sounds come from the same instrument".

**[49]** Taking this further, we can speak of the "timbre" of a horse galloping, of a certain make of car etc., the word "timbre" applying to anything within a group of sounds that allows us to attribute it to a single cause, and *possibly* to identify that cause. Indeed, in a reduced listening situation, the timbre of a new instrument can very easily be recognized and memorized before anything is known about the name or nature of the instrument, and one timbre can be recognized among a thousand without its being attributed to a causality known to the listener.

We can even speak of the "timbre" of some electronic manipulations (acceleration, filtering, playing backwards) of sounds that are very different, but recognizable by a particular "colour" such manipulations give to these disparate sounds. We can also speak of the "timbre" of a hi-fi system, etc. (83).

This initial definition, empirical and ultimately tautological, must be clarified.

2) *"Physicist" definition of timbre and critique.*

a) *Timbre and harmonic timbre.*

According to physicists, timbre is the same as the spectrum of frequencies, in other words, the timbre of an instrument corresponds to the characteristic profile of the spectrum of sound frequencies it produces. (165)

This is why, in the first serial electronic experiments which were based on this definition, composers believed they could refer to the synthesis *of timbre* when they made syntheses of harmonic spectra by superimposing frequencies.

This definition has been challenged by several very simple experiments. To test it, we only need to act on the spectrum of frequency of a recorded physical signal, and see if the perception of the timbre of the sound is greatly altered.

Now this experiment "*was repeated daily with millions of examples*" by the first record-players and wireless sets which, despite a very distorted transmission of the physical signal, allowed us to recognize the characteristic timbre of a singer or an instrument (even though the spectrum of frequency was transmitted in a pitiful state). (70)

The experiment of the "cut bell" also suggested that the concept of instrumental timbre was only partly linked to the presence of a characteristic spectrum.

It is true, however, that in the act of listening to the sound object, a particular perceptual criterion does correspond to the spectrum of frequencies. This is the *harmonic timbre*, and it certainly does play a part in identifying instrumental timbre, but along with other criteria, particularly the dynamic criterion.

The empirical concept of instrumental timbre must therefore be redefined in the context of reduced listening, and in any case clearly distinguished from the specific criterion of harmonic timbre.

So timbre is not a simple morphological criterion; with each instrument it defines itself as a particular structure of criteria which confers a particular "genre" on the sound objects produced by that instrument.

b) *Timbre of an instrument and timbre of a note.*

Furthermore, the *timbre of an instrument* is not defined solely by the particular timbre (or genre) of every note it plays (this varies with their situation in the pitch-register), but by a *law of variation in the genre of these objects right across the register*. This law helps to identify, as coming from the same instrument, sounds which, when compared to each other, differ in many other characteristics than pitch. (see **INSTRUMENT, 21**).

**[50]** 3) *Elements of a redefinition of timbre.*

a) *Role of attack in the perception of timbre.*

The simple experiment of recording a low note on the piano, then eliminating the phenomenon of attack by splicing "*somewhere after some tenths of a second*" demonstrates that this low sound "*amputated at first of some tenths of a second, then half a second, even a second, wholly reproduces the piano note, with all its characteristics of timbre and attack*". (219-220)

After repeating the experiment with various registers on the piano, then with sounds from other instruments, we are led to observe:

- that the perception of steepness of attack varies with the position of the splice;

- that the effect of splicing on the "timbre" of the cut note varies with the dynamic slope of the sound.

In the high register of the piano, for example, where the slope of dynamic decline which follows splicing is weaker than right at the beginning of the sound, gentler attacks are obtained, and the perception of "timbre" is greatly modified.

With the vibraphone and its double attack, splicing does not change "*the steepness of attack (the vibraphone dynamic is remarkably linear), but it changes the timbre (…) Aided by experiments in splicing, the ear learns to distinguish a steepness and a colour in an attack*" (221) (see **ATTACK, 91**).

These various experiments on splicing attacks demonstrate "*the importance of the attack as a factor in identifying sound with its timbre*", an importance which varies greatly with the type of sound objects played by the instrument.

*- With very brief sounds, attack plays a decisive role, it is characteristic of the timbre, as in percussive instruments (cf. the piano).*

*- With drawn-out sounds of medium duration, its importance (…) lessens. Attention begins to be given to the developing sound.*

*- With sustained sound with vibrato (the most common), the role of attack becomes almost negligible, it seems that in these cases the ear is attached to the development of the sound which fixes its attention throughout.* (224)

It is only in *a certain type* of sound that "*the ear deduces the elements required to identify the instrument by the attack*" (230)

In general it could therefore be said that "*the perceived timbre is a synthesis of variations in harmonic content and dynamic development; more specifically, it is revealed from the first moment of the attack when the rest of the sound flows directly from the attack*". (231)

b) *Timbre of an instrument and timbre of an object.*

Until now we have been dealing mainly with the "timbre of a sound" (as distinct from the timbre of the instrument). When the musician "*says again and again: a well-timbred note,*

*a good, a bad timbre etc., it's because he does not confuse two notions of timbre; one of the instrument, which indicates source in ordinary listening, the other of each of the objects played by the instrument…*". (232)

The first of these notions (timbre of an instrument) needs to be better understood "*by explaining the paradox whereby instruments supposedly have a timbre, and at the same time each sound object has its own particular timbre*" (232). Experiments on piano notes will help.

"*Strike various piano notes and examine their dynamics (…) and harmonic content. You will discover:*

*1) A general law of dynamics: they are steeper the higher one goes in the tessitura (…)*

**[51]** *2) More precisely, dynamic registers distinguished by a regular contour in the low range notes and a fluctuating contour in the medium and high range (…)*

*3) Harmonic developments during the resonance* (…)" (233)

Since the piano "*seems to produce notes whose physical characteristics vary with the register, how can we explain how it has nevertheless a characteristic overall sound, in short such a clearly identifiable timbre?*" (233).

"*We shall make some progress if we look at both the harmonic content and the dynamic profile. And in fact the higher the tessitura, the steeper the dynamic, while the lower the tessitura, the richer the harmonic complexity*". (234) From this we may consider that "*an instrument such as the piano (…), depends, as instrument, on a characteristic correlation between the following*:

- *The dynamics (thus the steepness of attack) vary in direct ratio to the tessituras* (the higher the sound, the "steeper" the attack).

- *The harmonic complexity varies in inverse ratio to the tessituras* (in other words the lower the sound, the richer the harmonic timbre).

*So we could write: (…): Dynamic steepness* X *Harmonic richness = constant,* a formula *which represents the "law of the piano", which we were looking for to explain the 'musical suitability' characteristic of the objects which this instrument presents to the ear*". (234-235)

It is likely that the timbres of other instruments are regulated by the same type of law.

4) *Critique of Klangfarbenmelodie. The concept of timbre in traditional and experimental musical systems.*

In the traditional musical system, timbre was, as it were, the "concrete" cladding of the abstract values indicated on the score. The instrument indicated on the score is not a symbol. It is no more than a verbal direction which allows the performers to "stage" the work, and which guides the inner listening of anyone who reads the score.

"*From the moment I read: G on the clarinet or violin, I introduce values other than pitch: without being necessarily obliged to play the sound of a particular clarinet or violin, in my thoughts I give this note the colour of its generic timbre*." (312)

The balance of the traditional system requires orchestration to serve, materialize and colour the discourse of musical values. But we know that with the growing refinement of orchestration, a preoccupation of composers has been to use timbre, not for empirical, expressive or impressionist purposes any more, but as a musical value "structured" by a compositional intention. This type of preoccupation has led to experiments in *Klangfarbenmelodie*, i.e. timbre-melodies by Schönberg, Boulez, Messiaen, etc.

The T.O.M. remains sceptical about the feasibility of composing timbre-melodies like these, especially associated with pitch and duration series, where the perception of these, which is already difficult, masks out any possibility of identifying the timbre-melody.

Furthermore, timbre requires a complex qualitative perception which, as we have seen, is a synthesis of perceptions of numerous criteria linked together in structures. And then, in order to be able to speak of timbre-melodies, we should perhaps have to define a *field* of variation for timbres; we would have to abstract the concept of timbre from the instruments that carry it, as colour can be abstracted from the "visual object" it colours.

Now, the concept of timbre seems precisely to be the least capable of being abstracted, designating as it does the qualitative residue that remains at the bottom of the psycho-acousticians' test-tube once they have broken sound down into three **[52]** measurable parameters: frequency, amplitude and duration. A qualitative residue which, as we have seen, cannot be reduced to the straightforward perception of a characteristic spectrum of frequencies.

The T.O.M., therefore, prefers the hypothesis of calibrations of *criteria* to the experiment of *Klangfarbenmelodie*. One criterion, such as grain, could perhaps be abstracted from the sound which bears it, whereas timbre represents only the overall perception of a structure of criteria, which defines the personality of a sound object or instrument in relation to others. (see **CALIBRATION**, **18**).

If we want to leave the traditional system and devote ourselves to researching an experimental system, we must *give up the concept of timbre*, which is too vaguely defined, and stop re-enlisting it as a value, "out of nostalgia for pure music", as the supporters of *Klangfarbenmelodie* have tried to do.

So the concept of timbre, too coloured by its traditional meaning, is replaced by the more general concept of characteristic or *genre*, and the more subtle concept of *criterion*.

So the word timbre will no longer be used in future (except as an abbreviation to describe harmonic timbre) (see **93**), but will for the most part be replaced by morphological criterion (see **88**).

TIMBRE: 55, 57, 63, 66-67, 70, 71, 83, *164-165*, *219-231*, *232-243*, 302, 315, 317, 318, 328, 336, 367, 369, 371, 372, 417, 511, 516, 608 (NB: in addition, the term timbre is often used in the T.O.M. for harmonic Timbre, see this word.)

**» 21. INSTRUMENT**

1) *Definition.*

The instrument, which is at the origin of all music, is defined thus: "*Every device from which a varied collection of sound objects - or a variety of sound objects - can be obtained, whilst keeping in the mind the permanence of a cause, is a musical instrument in the traditional sense of an experience common to every civilisation.*" (51)

2) *The three criteria of instrumental analysis.*

Hence, the instrument is defined in *theory* by the law of permanence-variation "*a notion which dominates all musical phenomena*". But in this definition, what constitutes permanence, what is subject to variation?

*Permanence* is that aspect of what is called, for lack of anything better, the instrumental *timbre,* whose initial definition can only be tautological: it is what tells us that several sounds come from the same instrumental source. Now, we have seen (cf. **20**) that the timbre of an instrument cannot be defined by notes, but only by a *law* which determines the variations of all the notes which the instrument plays.

**[53]** The concept of *timbre* is therefore a kind of *abstraction* sensed by the ear in all the potential sounds of a certain instrument. If such is the identity of timbre, we might ask on which *variations* this pseudo-permanence rests. These variations are of two kinds:

a) "Abstract" variations or variations of values in the *registers* of the instrument: primarily registers of *pitch* (but there are exceptions, as in African music, which is mainly rhythmic), secondarily, registers of *intensity* etc. These are the variations which are written on the score, if there is one, and which are the *pertinent features* of abstract musical *discourse*.

b) "Concrete" variations or variations of characteristics in *playing* the instrument, which are more or less rich depending on the potential given to them by the instrument and according to the instrumentalist's style, touch, *manner of playing*.

TIMBRE, REGISTERS and PLAYING POTENTIAL (one permanence in contrast to two variations) are therefore the *three criteria for instrumental analysis* which will be used to criticize existing instruments, the new sound devices which claim to be defined as instruments, and finally the techniques which seek to go beyond the instrumental stage of music (musique concrète and electronic music). Indeed, due to the vagueness of definitions,

there are many "false-friends" of the instrument which instrumental analysis, armed with its three criteria, should allow us to unmask more easily.

3) *The two poles of the instrument, abstract and concrete*.

All traditional musics start with the instrument. Now, the peculiarity of the instrument is to make it possible to hear *abstract* structures (directed towards a *meaning*), starting from the range of *concrete* sounds (directed towards hearing *indices*) which it enables to be played. The improvement of instruments by instrument makers (the piano, for example) aimed, generally speaking, at establishing a balance between their *abstract* capabilities (the capacity to enable the hearing of registers of musical values) and their *concrete* playing potential (virtuosity, colour, variety of timbres).

The "the instrumental fact", which is at the origin of all music as a "precondition" (chap.1: *the instrumental precondition*, 41-50) respects this complementary duality, in traditional musics, by establishing the two "correlative aspects" of the "musical phenomenon": "*A tendency to abstraction, in so far as playing releases structures; the adherence to the concrete, in so far as it remains limited to the potential of the instrument*."(46)

These two faces, concrete and abstract, of the instrument have their importance and "*each instrument, even and above all the Western instrument, should no longer be reduced to the stereotyped* (abstract) *registration which determines how it plays. We must recognise its concrete aspect, appreciate the "rules of playing" which determine its scope and its limits, the degree of freedom which it allows the performer*". (47)

This remark is aimed at the criticisms of "imprecision" made of traditional instruments by contemporary composers, who were expecting machines, "*technical perfection*" (47) in this field, based solely on abstract values, to the detriment of concrete playing potential.

The three criteria, of TIMBRE, REGISTER and PLAYING in instrumental **[54]** classical music, combine in a certain equilibrium, which ensures a good balance of the abstract and the concrete (and also of permanence and variation). If this equilibrium is lacking, there is a risk of confusion.

4) The *instrumental fact* is, therefore, the first fact of all traditional music, its concrete basis, a precondition even to musical systems and languages. These systems and languages themselves are closely linked to the types of instruments which allow them to be expressed. Do the new musics bring this basic fact into question? Does what is replacing it (the studio, synthesised sound) promise enough to justify abandoning it? This is the question which is asked in the *Traité*. The answer which it gives suggests a *broadening of the notion of the instrument*, which would be retained and redefined within the framework of the programme

of musical research: a music which would articulate *suitable* objects of the same *genre*, located and calibrated according to *perceptual fields*, by *calibrations* of *criteria*, this music would rediscover, by new ways and causalities, the basic laws of the instrument, stated as the laws of all music: permanence of characteristics, variation of values.

*The instrument found, lost and found again*

a) *From the implement to the instrument.*

At the origins of music the implement and the instrument were probably linked and contemporaneous: "*We are willing to bet that in reality there was no difference, and the same gourd was used equally for soup and music*" (43). But when it was used for music "*the signal that referred to the implement becomes a pleonasm, cancelling itself out by repetition. Sound objects alone remain, perceived quite disinterestedly, which 'strike the ear' as something altogether functionless, but which nevertheless impose their presence and are enough to change the cook into an experimental musician.*" (43)

Therefore "*instrumental activity, the visible and first cause of every musical phenomenon, has the distinctive quality that first and foremost it tends to cancel itself out as material cause*". (43)

This is the *instrumental paradox* from which music is born, by virtue of the law *permanence-variation.*

b) *Calling the instrument into question.*

The disregard of the *concrete* aspect of the instrument explains why contemporary musicians have criticized the "*alleged imprecision of instrumental playing*" compared to what they want instruments to play from a preconceived score.

And so we are seeing a *questioning of the instrument* in contemporary music, in the name of new technical developments and new rule-bound speculations. This questioning has three different aspects:

- Firstly, an *excess of abstraction*, a disregard for the concrete aspects of music, characteristic of an advanced culture. A disregard demonstrated by "the parametric score", which considers sounds solely as complexes of pitch, duration and intensity, to be used in an abstract combinatorial mathematics expressed in *numbers* and combinations. "*A score like this* (… ) *is stripped of its instrumental structures, the guardians of permanence of characteristics and perception of values.*" (493). This criticism is aimed at serial, stochastic works, *Klangfarbenmelodie* music etc.

- Secondly, *the intrusion of false instruments* in the modern orchestra, **[55]** among them most percussion instruments. So the gong in a modern score disrupts the system; it is not

integrated into the orchestra in order to serve the musical discourse, it stands out from the rest as an isolated "object-structure", a "*solitary sound object*". (330)

Classical instruments themselves are pressed into a use which diverts them from their usual function - violins are struck, flute keys clattered etc. so that instruments are used as a *sound body* - good for anything. As the permanence of the instrumental timbre is no longer guaranteed, so the law of *permanence-variation* is breached.

- Thirdly, *musiques concrètes and electronic musics*, which appear to represent progress beyond the artisan stage of the *instrument,* for which they substitute *machines* renowned for their effectiveness, their precision and their polyvalence.

The *Traité* engages in a thorough-going critique of "*the electronic instrument*" and "*the concrete instrument*" (this distinction, let us remember, refers back to a precise period of history when these two rival schools in the use of magnetic tape could just about be distinguished). (63-66)

The "two systems" are taken to task for the initial mistake of "*confusing, for long enough, studio instruments and musical instruments*" (61). A confusion which concrete musicians are said to have rejected, no longer recognising in machines anything other than "*the strange power of elucidating the phenomenon of sound*". (62)

The two approaches apparently led, by two opposing routes, to the negation of the instrument as a vehicle for true musical expression. This was because they were "*affected by opposing imbalances in relation to normal instrumental structure …*" Imbalances resulting "*from an excess of concrete and an excess of abstract* (…) *which the ear perceives as the same shortcoming*". (66)

Firstly, the excess of *timbre*, in the broad sense, the timbre of manipulations which are heard as recognisable procedures, instead of fading into the background. Next, the excess of *register* (registrations which *"are heard as manipulative procedures rather than shaping the object*"); finally, the excess of playing and intentions which "*wear away the object and make it shapeless or illegible*". (67-68)

In these musics, however, a "*sequence of well-formed suitably registered objects*" can give rise to relationships of permanence such that these sound objects seem to come from the same instrument, which is imaginary, and which can be called a "pseudo-instrument". Here we see the beginnings of a move to reclaim the idea of the instrument. (68)

c) *The rediscovery of the instrument?*

When in 1963 Pierre Henry composed his "*Variations pour une porte et un soupir*" where he systematically *plays* the creakings of a door it was, if not music, at least a study of the ways an instrument could be played.

"*The experimenter, here a composer, explores all the limits of possible expression of these objects, based on all the possible ways the instrument can be played*" (355). But be

careful! "*Experimentation like this in an instrumental field is the main pitfall in research … At the beginning of a piece of research we are too tempted to turn towards instrument making*", (355) rather than building a music theory of *suitable objects* which is essential for the redefinition of the musical and the musician.

Research should however leave room for a good technological description of sound bodies, leading to a *generalisation of the concept of the musical instrument*. But the only way to make these *sound bodies* into real *instruments* is by defining new *registers* (not indiscriminately), which will form a basis for a musical discourse, and not simply create sound effects. The *Traité* **[56]** does not go as far as this; it contents itself with suggesting possible ways of *putting* certain sound criteria *into calibrations*; a process which will help to define *registers*, including the new *scales* thus created.

Thus, the three criteria of the instrument would be rediscovered: *timbre* ("a pseudo-instrument" suggested by bringing together suitable objects of the same *genre)*, *register* and *play* (these devices being activated by performers careful to bring out a personal *facture* from the *objects* which they make).

INSTRUMENT: 19, 41-68, *234*, *239*, 320-326, 330, 355, 404, 406, 411, 493.

## C. *Structures of perception*

> So, the word "structure", so popular in modern thought, occurs here as elsewhere. But here it designates what elsewhere (I mean: in musical research) is treated as an unimportant fact: the structures of perception themselves, the activity of the perceiving subject.
> This is the law Object/Structure, with its satellite pairs *Context*/*Contexture*, and *Identification*/*Description*.
> It is the revolutionary concept, (found nowhere else in this sense), of the Perceptual Field which reverses habitual enquiry: we no longer take objects as starting points and assemble them "in themselves", and then leave it to perception to gather together its young; we start fairly and squarely from the subject who perceives, hears, or at least attempts to hear.

## » 22. OBJECT/STRUCTURE

1) The fundamental Object/Structure relationship is the basis of our perceptual activity; it expresses the reciprocal relationships of definition between our perception of objects and structures. We could therefore say:

- Every object is perceived as an object only in a context, a structure, which includes it.

- Every structure is perceived only as a structure of objects which compose it.

- Every object of perception is *at the same time* an OBJECT in so far as it is perceived as a unit locatable in a context, and a STRUCTURE in so far as it is itself composed of several objects.

2) We perceive objects and structures in accordance with two models of perceptual attitude: *identifying* and *describing*. The Object/Structure relationship can therefore be explained more precisely in these terms:

- Every object is IDENTIFIED as an object in a context, a structure which includes it (but at this stage not all its characteristics are considered, only one characteristic, one *value* is retained).

- If we examine this object, we can DESCRIBE it as an original structure of constituent objects. These constituent objects can in turn **[57]** be *identified* as parts of this structure and *described* by the structure that they themselves are part of and so on.

3) This relationship therefore defines *an object-structure CHAIN, going down to the infinitely small* when the object is analysed as a structure of constituent objects which can themselves be analysed and so on, and *ascending to the infinitely great* when we place the object in the structure which contains it, and which can in turn be considered as an object in a context, etc. These are the "*two infinities*" (279) of perception.

a) *The Object-Structure relationship in traditional and experimental music.*

In traditional systems the *structures* are given and perceived in one. But in experimental music, they must be "re-synthesized".

In traditional music, the note seemed to be the smallest link in the chain, the musical atom. The note is identified by its function, its situation in the melodic structure. This melodic structure can in turn be considered as an object, identified as a THEME by its place in a musical form… But we cannot go lower than the base level of the note and break it down into its constituent criteria.

It is precisely the aim of the morphological study in the TRAITÉ to carry out such an analysis, in order to address the following problem: how can we describe the note which used to be simply identified, and how can we analyse this object as a structure made up of constituent criteria?

Experimental music theory should help us to DESCRIBE sound objects by IDENTIFYING their constituent criteria, but this is only the first stage in musical research, whose ultimate aim is to make a new SYNTHESIS of musical objects, as structures of criteria suitable for use in music (see **48**).

Now, it seems that the object-structure chain "*unravels in one direction*" (381). The easier or at least more possible it seems, by careful analysis, to break the sound object down into constituent elements, the more difficult and aleatoric it seems to *synthesize* musical objects into structures of criteria, then musical phrases into structures of musical objects. It seems we can only do this by relying on very broad principles (the concept of the suitable object, the value-charactertistic relationship, etc.), which are necessary but inadequate, and by a process of trial and error, of repeated experimental comparisons and regroupings.

At the very most we can expect that, as in architecture there must be an affinity between the material and the construction, so in this new music there will be an affinity between the object as micro-structure, and the musical phrase, the macrostructure, of which it becomes an element. So, to be successful, the synthesis of musical objects presupposes some preliminary idea about the nature of the musical language we are hoping to find by articulating these objects.

This initial idea is the hypothesis that musical discourse can be created by *bringing together sites and calibres of sound objects in perceptual fields*, and by the emergence from these perceptual fields of variations of values common to several objects of the same genre. This hypothesis leads to *research into a new type of 'instrument making'* which could make collections of objects of the same genre (see **GENRE**, **42**).

However, it is worth noting that in the "Études aux objets" composed as an experiment (this is the title of a work by Pierre Schaeffer realized in 1958) the perception **[58]** of *unexpected* structures receives more attention than the perception of objects and criteria that were intended to emerge (488).

b) *Gestalt - form - structure.*

The words GESTALT, FORM and STRUCTURE are often used interchangeably. In the TRAITÉ, they are defined as follows:

"*We shall use the term STRUCTURE in the sense of an organized entity, instead of FORM, which is the same as GESTALT. And in fact we shall need to use the latter word in a very precise sense: the temporal form of the object, as opposed to its matter*" (275) (see **FORM-MATTER**, **48**).

So, for the usage of the word STRUCTURE, we shall refer to the definition of FORMS given in Lalande's philosophical vocabulary "*groups, constituting autonomous units which have internal solidarity and their own laws"* (275).

c) *Perceived and perceptual structures.*

Used in this way, the word STRUCTURE has two meanings; it describes both the perceived structure and the activity of perception.

"*Whether we call it FORM or STRUCTURE, the organized group can be an ACTIVITY, as well as its CORRELATE, PERCEPTION as well as the PERCEIVED (…). If the categories subjective and objective are in constant correlation, it is inevitable that the same concept, and, consequently, the same word, will be applied to both.*" (275)

We are thus led to think that there are general PERCEPTUAL STRUCTURES which determine our PERCEPTION of particular STRUCTURES.

"*General rules of perception, applicable to music as well as language (…) are based not on a miraculous affinity between things, but apparently on a same mental activity in relation to them.*" (279)

And if we wish to create new STRUCTURES OF OBJECTS in our quest for a new music, we must make sure that they correspond to our perceptual structures.

"*Every new system of music, …must be able to be experienced at the two extremes: of materials, for the STRUCTURES actually PERCEIVED, and of ultimate meaning, where PERCEPTUAL STRUCTURES, which are still quite general, come into play.*" (627)

This investigation leads to the study of, for example, the relationships between music and language, which could be related to the same kind of "perceptual structures" (see **32** and T.O.M., chap. XVI, 279-293).

d) *Continuous and discontinuous structures.*

As if to add to the difficulty, we must make it clear that a MUSICAL STRUCTURE is not necessarily a discontinuous structure of interconnected but discrete objects, but that it can also be a CONTINUOUS structure, made of a macro-object whose internal variations form a whole discourse.

So a structure such as a melody need not be "scalar", but CONTINUOUS: "*for example, a continuous glissando, a pitch arabesque, or a concrete MOTIF: dynamic profile, variation of mass…"*. (278)

So there are two kinds of structures, for two kinds of perception. These lead to *two pure kinds of music,* using exclusively either one, or the other. The first kind of music made of combinations **[59]** of discrete objects, is probably the more truly *musical*. The other, made from continuous structures, can better be described as "*plastic*".

OBJECT/STRUCTURE; 33, *261-293*, 373, 375-376, 384, 435, 481, 485, 488, 495, 578.

## » 23. IDENTIFICATION/DESCRIPTION

1) Two procedures which apply to every object of perception, therefore to objects of listening, and which correspond to two possible attitudes towards them, according to the view adopted.

Identification consists in isolating and identifying an object, or a sound criterion, in the diversity of a context or a structure (for example, identifying a *G* in a melody, a sound object in a sound "chain", a "grain" in an isolated sound object …)

Description consists in describing and characterising the object or the selected criterion, from its internal qualities.

2) Identification is done by reference to the higher level of context which includes the identified object, as an object in a structure.

Description analyses the object as a structure and describes it from its component objects.

Therefore, the identification/description chain corresponds closely to the object/ structure chain.

a) *Identification-description of notes and timbres.*

For the musician in the traditional system, melodic listening is done by *identifying* the notes of which it is composed (inversely, the melody he listens to is *described* by its constituent notes). If the musician stops at one note in the melody, he can identify its constituent elements (attack, sustain, decay etc.). By examining this fragment of an object (this "feature") he will try to describe it, as a structure whose elements he wants to identify.

"*So we go down the chain of identification. Inversely, we go up the chain of description. The feature describes the notes, the notes the melody etc.*" (327-328)

b) *Identification and description of the sonorous and the musical.*

"*Musical objects, phonetic objects, industrial sounds, bird-song etc. are sound objects. The common stock of these has as many branches as categories defined by these terms. How can we separate what belongs to the common stock and what is a matter for description?*

*So we are obliged, when listening to sound objects, to make a distinction between the two aspects, one to do with the identification, the other with the description of the objects. For the purpose of identification the hypothesis of very general rules has been put forward, which allow the objects to be articulated in the universe of sounds, independently of the pertinent characteristics of each source. If in this way we can work out an approach towards sound objects which, if not precise, is at least so general, this approach will be particularly applicable to the musical object*" (347, the rule in question is the rule Articulation/Stress, see **59**).

"*On the other hand, we shall not pursue any overall study into descriptions of the sound* **[60]** *object*" (347). There are in fact too many of them, and they depend too much on all the possible uses of the objects.

In other words, in musical research, the process of identification will aim to isolate objects from the totality of sound; the process of description will be limited to objects which might have a chance of becoming "musical" (so-called suitable objects, **40**).

The structure of the traditional musical system allows us to identify sounds through their musical function in the structure (a sound is a *C* in the pitch structure, a *quaver* in the time-structure, etc.). But whereas the musical is precise and codified in this system, the sonorous is still vague (as it is not clarified in the system). We do no more than *describe* it by using various analogies.

In the new programme of musical research, "*the identification of the musical and the description of the sonorous exchange their fields of operation and their priorities*" (359). The sonorous becomes a matter for *identification* (by isolating and locating types of objects through *typology* in the chaos of a sound context), and the musical, a matter for *description* (description, through morphology and analysis, of structures of criteria in the perceptual field). These similarities and contrasts can be summed up thus:

| IDENTIFICATION | DESCRIPTION |
|---|---|
| of an object as | |
| an OBJECT in a STRUCTURE where it is IDENTIFIED | a STRUCTURE composed of OBJECTS enabling it to be DESCRIBED |
| is applied in the traditional musical system | |
| to the explicitly MUSICAL | to the vaguely SONOROUS |
| and conversely in the Programme of Musical Research | |

| | |
|---|---|
| to the SONOROUS which is clarified by means of a TYPOLOGY (rather like TRANSLATION [VERSION]) | to the MUSICAL which is established by means of a MORPHOLOGY (rather like PROSE COMPOSITION [THÈME]) |

**[61]** So the pair Identification/Description can be found in the Programme of Musical Research (PROGREMU) with identification in sectors I and IV of the traditional system, and 2 and 3 in the experimental system; whereas definition is in sectors II and III in the traditional system, and 1 and 4 in the experimental system (PROGREMU, 369).

IDENTIFICATION/DESCRIPTION: 154-155, *327-328*, 334, 337, 347, 359, 367, 369 (PROGREMU), 370, 373, 392-393.

**» 24. CONTEXT/CONTEXTURE**

1) The *context* of a sound object is the whole structure in which it is identified as a unit and from which it is extracted to be examined individually; its *contexture* is the structure of which it is itself made up and which allows it to be described and qualified in accordance with the stacking principle of the Object/Structure rule.

The identification of sound objects in their context (with the help of the *Articulation/Stress* rule) comes under *typology* (see **41**).

The description of sound objects in their contexture, the description of them as structures made up of constituent objects, comes under *morphology* (*Form/Matter* rule) (see **43**).

From reference to the broadest level of *context,* where the sound object is identified as such, right to analysis at the lowest level of its internal *contexture*, we "go down" the Object/Structure chain towards the infinitely small.

2) In a more specific and rather different sense, the concept of context corresponds to discontinuous relationships between objects, and contexture by a "continuous" structure inside each variant object (p. 503-504, 521).

CONTEXT/CONTEXTURE: 369 (PROGREMU) 383, 384, 497, 502, *503-504*, 521.

## » 25. PERCEPTUAL FIELD

1) The thesis of the *natural perceptual field of the ear*, in which sound objects, their criteria and relationships emerge and are located in accordance with *natural* laws, is one of the main theses of the T.O.M.

According to this theory, the perceptual field consists of *three dimensions*: *pitches* (which is a double dimension), *durations*, *intensities*. These three purely perceptual dimensions should not be confused in any way with the three corresponding parameters: frequency, "objective" chronometric time, dynamic level.

2) But the first of these three fields - pitches - is *double*: there are indeed two modes of perception of pitches according to whether we are dealing with a *fixed and locatable* ("tonic") *pitch*, which is heard in the *so-called "harmonic" field* of pitches and is the most conducive to "cardinal" **[62]** perceptions, assessment by intervals and scale formation (this is the field of traditional music); or else according to whether we have sounds of *variable* mass or *non-locatable* ("complex") *pitch*, and the so-called *"coloured" pitch-field*, giving rise to more hazy, impressionistic perceptions which lend themselves much less to abstraction: the sounds of contemporary or experimental music (percussions, clusters, effects of mass and glissandi etc.) are often situated in this "coloured" pitch-field. Naturally, in many cases we have a *mixed* perception of the same sound phenomenon in the two fields at one and the same time.

3) Every sound object, therefore, occupies each of these three areas to some extent and the evaluation in *site* and *calibre* of each of the criteria which characterize it can be carried out with more or less precision in relation to each of these dimensions; in other words depending on its *position in the field* (site) and depending on its *bulk in the field* (calibre). For example, a certain sound of complex mass could be defined in the "coloured" area of pitches as having a "high" position and a "thick" bulk, if its mass is situated in the high register and it is perceived as thick.

This natural triple perceptual musical field should give rise to musical *values*; it is in this field that criteria could be organised into calibrations (of grain, attack, allure?) and sound objects assembled into significant structures.

4) This notion of perceptual field, however simple it may appear, necessitates a *radical inversion of classical theory*: it is not based on properties or parameters of sound objects naively thought of as "outside consciousness", as in the majority of systems of composition, but on the inherent faculties of human perception. Moreover, the notion of field has met with resistance from many musicians: "*to suggest to them that they must also pay attention to the perceptual field seems to them to be an offence, a crime against the score, and also that they are being accused of naturalism …*" (475).

The author's reflection on the mechanism of musical meaning and the fundamental dualism of music (Natural/Cultural) leads him to consider that "*the more or less inevitable*

*relationships between combinations of objects and the properties of a perceptual musical field, inherent to man, appear to be the essential problem of music*" (331).

This is the problem which he attempts to attack head on with his theory of the Three Perceptual Fields, the basis on which he attempts to evaluate each of the 7 morphological criteria (grain, allure, mass, harmonic timbre, dynamic, melodic profile, mass profile).

This comparison of criteria in the perceptual field is called ANALYSIS and it constitutes the fourth stage of the Programme of Musical Research (see **48**). It is summarised in columns 5 to 9 of the TARSOM. Analysis is mainly concerned with "*evaluating the structures in the perceptual field which could be put into cardinal or ordinal calibrations*" (497). From the evidence provided by analysis, we could hope, at the final stage of SYNTHESIS, to recreate new musical objects **[63]** which could emerge in these perceptual fields according to the law PCV2 (see **27**).

5) There are different, more or less precise, ways of estimating the position and the bulk of a criterion in a perceptual field, and above all of assessing and defining the *intervallic* value between the different degrees of a single criterion from within several sound objects in a musical phrase:

- either we can just make an overall and instinctive description, possibly "*by analogy with other, not necessarily musical, perceptions: we do indeed say grainy, velvety, hollow, bright etc.*" (375);

- or else we can assess them by a "temporary lay-out", an approximate arrangement (e.g. we could make "scales of allure in the duration-field" from the widest to most narrow): ordinal calibrations based on a *relationship of order*;

- or else, and this is the best, we can locate these values "*by means of a calibration, where the relationships are cardinal, and no longer solely ordinal, and are even positioned in their field as vectors*" (375). And here … the author is thinking obviously of *pitch*, the only dimension that can give rise to such evaluations (see **PITCH, 17**, and **CALIBRATION, 18**) at least in the "harmonic" field, therefore with *tonic* sounds.

It is indeed clear that the three fields of pitch, duration and intensity, do not give all the criteria occupying them a perceptual framework which is always so easy to mark out, assess, calibrate: here again the pitch-field is more privileged than the others because it is *double*; in this field, especially the harmonic field, the human ear demonstrates a capacity for discrimination, identification, and the calibration of criteria which is exceptional, and which the other two do not offer.

a) *Morphological criterion and perceptual field.*

The complex relationship between the morphological criterion and the perceptual field is mentioned in the section MORPHOLOGICAL CRITERION (see **81**) to which we refer the reader, restricting ourselves here to mentioning the "*relationship of indetermination*" which

unites this criterion and the perceptual field, which are two facets of one mode of perception. A criterion can only be identified and described by its place in site and calibre, fixed or variable in duration, in the fields where it "emerges"; conversely, the perceptual field can only be located by the criteria of the sound objects which measure and mark it out (383).

Each of the 7 morphological criteria is dominant in one or two of the three fields,

- MASS and HARMONIC TIMBRE belong to perceptions in the field of pitches which may be "harmonic" or "coloured" (see below);

- the DYNAMIC CRITERION is initially perceived in the field of intensities and, when there is dynamic development, in the field of DURATIONS;

- GRAIN and ALLURE, the two criteria of sustainment, can be analysed as more or less rapid and intense micro-variations in the three dimensions (fluctuations and unevennesses in pitch, duration, intensity);

- the two criteria of variation MELODIC PROFILE and MASS PROFILE are essentially continuous variations of MASS (coloured pitch- **[64]** and duration-fields) but also secondarily of DYNAMICS; hence, by definition, they are involved in the three fields.

b) *The intensity-field.*

Some of the most mysterious pages in the *Traité* are in sub-chapter 31, 6 (542-544) which is an investigation of the dynamic field, the field of intensities.

"*We suggest that the reader thinks about what we call the dynamic field for the perception of forms as the counterpart of the pitch-field for the perception of masses*" (542). This field is presented as still almost unknown, taking into account the phenomena of *masking* (between simultaneous sounds) and variations of intensity in sustained sounds, where a distinction must be made between an overall intensity and the relative intensity of accidents of profile etc.

As a "study guide" for researchers tempted by this problem the author suggests three ideas:

- *the mass profile*, defined here as what is made up of "*all the (perceived) intensities of the various components of the sound spectrum*" (542). It is not the criterion of variation which has the same name, but rather the relative profile of the various intensities perceived simultaneously in a sound where the mass covers a certain spectrum (whereas the criterion of MASS PROFILE in morphology indicates a development of mass *in time*);

- *the weight of a mass*, i.e. the intensity of a given sound in relation to one or several other sounds. This notion of weight is considered again in the study of dynamic species of mass (545) and in the TARSOM (548-587).

- *the field of nuances* (“*the ear has noticeably better capacities of sensitivity and attentiveness for faint sounds*”) (544).

What emerges from this little study guide is that the perception of nuances in degrees, in “calibrations”, varies enormously according to context, which means that psychoacoustic experiments on hypothetical examples in the laboratory do not have much musical importance; rather, according to the author, the study of this field should be made through an Experimental Theory, using more complex sound objects, closer to the materials of music.

c) *The pitch-field*.

Further information on this can be obtained by referring to the articles PITCH (**17**) and MASS (**89**). Note that this field is *double*.

d) *The duration-field*.

This is seldom studied for itself, but it is often alluded to in so far as all sound characteristics are manifested in duration.

The most important idea put forward in the T.O.M. on the question of durations is the idea of an optimal “time slot”, during which objects must be presented if they are to be well perceived and memorised: this is a medium duration between the too short (impulses), which does not leave enough time to form a clear image of the object; and the too long, which blurs the perception of the object as an overall form (see **FORMED SOUNDS**, **72** and **VARIATION**, **30**; see also **CONTINUOUS/DISCONTINUOUS**, **26** to b).

PERCEPTUAL FIELD: 311, *375*, 379, *383*, 384, 399, 475, 497, *503-504*, 521-522, 542-544, 583, 584-587 (TARSOM) 588-591, 596, *632-636*.

## [65] » 26. CONTINUOUS/DISCONTINUOUS

1) There appear to be two types of musical structure, corresponding to two types of perception:

- one, based on the contrasts and comparisons between discontinuous (or as they say in linguistics “discrete”) elements.

- the other, based on *continuous* variations within the sound objects themselves.

Faced with these two types of situation, the ear apparently behaves in very different ways.

2) The first of these situations is well known, since it occurs in traditional "abstract" musics. The second is generally unrecognised as a specific phenomenon: we try as far as possible to reduce it to the first type, of *discontinuous* calibrations. For example, we attempt to analyse glissandi (continuous structures) by the pitches where they begin and end - whereas the human ear hears it differently: for it the glissando is a "*new musical object, different in every respect from the nominal interval which it occupies in the symbols of music theory*" (562).

3) Thus, as we have seen, there are apparently *two pitch-fields*: the *discontinuous or "harmonic" field* for tonic sounds, which is the best known, and the *continuous or"coloured" field*, in which both sounds varying in tessitura, and sounds of fixed and complex (non-locatable pitch) mass are perceived. And also, perhaps, in the same way, two perceptual fields of objects in *duration*: a rhythmic field, and a "dynamic" field (see below).

4) These two ways of perceiving the discontinuous and the continuous would lead logically to two different musics: one, strictly "*musical*", favouring abstract relationships (in accordance with the rule *Value/Characteristic*): the other, known as "*plastic*", characterised by continuous variations, and giving rise to relationships of a more diffuse, sensuous type, in accordance with the (fairly vague) rule *Variation/Texture*.

Naturally, there are numerous musics which combine these two pure types to a greater or lesser extent, and in a more or less conscious or ambiguous manner.

The first "musical" music can only be constructed using discontinuous calibrations, arrived at by putting objects which share a criterion into relationship with each other; the second results from the study of examples of typical variation, particularly through the study of the criteria of variation (*mass profile*, *melodic profile*).

a) *Interdependence of the continuous and the discontinuous.*

*"The continuous is the other side of the discontinuous, and ensures that it is perceived"* (565).

What does this mean? That we can't perceive discontinuous phenomena unless there is a minimum of continuity in each of its component fragments. Thus, we can't make a melody (of discontinuous pitch values) unless we can perceive every pitch degree in a continuous form (*"sensing pitch, an A, and not distinguishing 440 rhythmic pulses"*).

**[66]** When our listening changes in order of magnitude and goes further into the detail of musical structures and objects by "dilation", what was perceived as discontinuous starts to become continuous and vice versa (for example, a low frequency begins to beat, we can hear its pulsation).

This is where the Object/Structure chain comes in:

"*At a certain level of phenomena, the (isolated and coherent) object was a structure fused together with continuous elements, which were not perceived separately. It was not itself perceived as a structure, but rather as an object taken from a structure higher up the chain: discontinuous. Is this object dilated (or fused with others) at a level where now it is this (continuous) structure which presents itself in the framework of normal perceptual durations? All the previous lowest levels of (masked, subconscious) perception come on to the agenda; perception of the higher level disappears, fades away for lack of structure: the object is its own perceptual structure. If it happens to be composed of discontinuous elements, these, in turn, will gradually take on the register of what was previously perceived.*" (566).

The example of the low register of the bassoon (and even more the contrabassoon) illustrates the gradual change from the discontinuous to the continuous, when a series of discontinuous rhythmical beats starts to be perceived as a continuous sound with a grain and a pitch.

So, the continuous and the discontinuous are mutually dependent and inter-referential.

b) *Three or four fields?*

- In book VI of the *Traité* (632-6), the distinction between the *three* perceptual fields, made until then, is again called into question by new considerations, when this time the author defines four fields starting from the pitch-field and the duration-field, each one divided into two, when he considers the two cases of the criterion coming up against the perceptual field in the context of a *continuous* relationship, or a *discontinuous* variation. In the same way that two fields of pitches (harmonic and coloured) were distinguished, now also *two fields of intensities in duration* are differentiated:

- *the rhythmic field*, corresponding entirely or not at all to rhythmic structures, creating perceptions of time gaps in duration; it is (like the "harmonic" field for pitches), the most amenable to abstraction, as it deals with discontinuous values;

- *the dynamic field*, corresponding to dynamic structures where the ear follows the profile of sounds in the dynamic development, and their "impact"; as in the "coloured" field of pitches, it provides the basis for more "plastic", continuous relationships.

"*The four relationships on which pure musics are based are therefore as follows:*

*the harmonic field with tonic objects;*

*the coloured field with complex objects;*

*the rhythmic field with time gaps or with homogeneous sounds;*

*the dynamic field with the impact of formed sounds.*" (633)

These 4 relationships based on two perceptual fields split in two apply where *discontinuous* objects, each one the carrier of a fixed criterion, are used.

"*Let us now imagine fluid objects where this time these four criteria (tonic or complex mass, homogeneous duration or impact) develop in continuous variation.*" We then notice that a glissando of pure (tonic) pitch "*appears the same as a sound of complex mass developing in pitch"* (634).

This is why, in typology, there is no problem in classing together **[67]** tonic-variable and complex-variable objects without differentiating them. The important thing is the manner in which the mass varies: how rapidly, and whether in a (discontinuous) scalar or (continuous) progressive manner. Depending on the type, it belongs either to the harmonic field or the coloured field; the same goes for intensity which develops in duration and which is followed as a "dynamic trajectory": according to its speed and manner of development, it will be classed with values of duration or the rhythms of the time gaps (see table p.635).

Most commonly, perception is ambiguous, "*since we know that the relationships of the continuous, depending on the speed of development, oscillate between the recollection of old perceptions and the originality of new perceptions*" (634).

The table on page 635 summarises *six kinds of fundamental relationships* – between the objects to be heard and the perceptual registers. There are four pure relationships (discontinuous objects) and two ambiguous, oscillating relationships (sliding or profiled objects).

This sort of comparison could serve to clarify the confusion which prevails in contemporary music when it uses notations from the second column (see the revised and corrected table in the 1977 edition of the T.O.M, p.635), and "*to understand how it is possible to go from one music to the other by changing the types of objects*" (635).

CONTINUOUS/DISCONTINUOUS: 205, 385, 505, *562-565*, *634-638*.

## D. *Axioms for a general music*

> From what has already been said, the reader will already have found throughout the text the elements of a *law of the musical*, which we shall call the law PCV2 (Permanence of Characteristics/Variations of Values). Let us be clear that the said law is never explicitly formulated in the *Traité* in the condensed form which we have given:

THE LAW OF THE MUSICAL
(PCV2)

amongst several (sound) OBJECTS the PERMANENCE of a CHARACTERISTIC[1] is the CONCRETE SONOROUS basis
of a STRUCTURE of VARIATIONS of VALUE[2] forming the ABSTRACT MUSICAL discourse.

This double chain sums up a large number of fundamental pairs of opposites through which, for Pierre Schaeffer, "*the mechanism of music*" is expressed. It has two complementary stages: a sonorous-concrete stage and an abstract-musical stage. We have already seen that the constant **[68]** preoccupation of the author of the T.O.M. is to articulate the two and particularly not to sacrifice either. Let us see how he goes about it.

## » 27. MUSICALITY/SONORITY

1) In traditional music, taken as reference and model, "musicality" is the *abstract* aspect of the musical work, written and fixed on the score, whereas "sonority" is the *concrete* part which can vary with each performance, each embodiment of the work. This is the same pair of opposites as the pair: Language/Speech (see **32**).

2) In experimental research for a new music, the "sonorous" refers to the jungle of all possible sounds, still without musical function; here it is a question of choosing the *sound objects* which are judged *suitable* to become *musical objects* in certain contexts, and from which "values" have been derived (see **40**).

3) This reclaiming of the musical from the sonorous is inspired by our experience of traditional music, and follows the five-stage path of the programme of musical research (typology, morphology, characterology, analysis, synthesis) (PROGREMU, see **38**)

The pair Musical/Sonorous plays an important part in the "law of the musical" (PCV2) along with the pairs *Permanence/Variation*, *Characteristic/Value*, *Concrete/ Abstract* etc.

a) *Musicality/Sonority and Language/speech.*

There have been many attempts – particularly today – at comparative studies between music and language. Such studies are generally on the abstract level of the two disciplines: the *linguistic* aspect for language, and what could be called *musicality* for music; to the detriment of their other, concrete side: *speech* and *sonority* respectively. In other words,

[1] Such as *timbre* in traditional music.
[2] Such as *pitch* in traditional music.

language and music have been compared in their written, codified form (see: **LANGUAGE/MUSIC**, **32**).

The attitude of many contemporary musicians, which is attacked in the *Traité*, has been to consider music as a pure *language*, and even more, to attempt to sneak in all the *sonorous* with the *musical*, all the concrete with the abstract, through a process of hasty formalization which reduced the inexhaustible resources of the sonorous to four questionable parameters (and attempting to define the conditions for *pure music*).

This, for example, was the spirit of the *Klangfarbenmelodie* experiments mentioned elsewhere (see: **TIMBRE**, **20**).

b) *Musicality/Sonority in the traditional system*.

The written text, the form in which the traditional musical work begins its existence, has the particular characteristic of "*bringing together an infinite number of possible realizations, all of them having in common the musicality of the score, each of them having a sonority of its own*" (319).

Thus we can clearly define how large a share each field has in traditional music. The pair musicality-sonority, whose laws are so clear in this music, can be expressed in the following diagram, which shows the 4 basic sectors, **[69]** and which is an "adaptation" for the sake of clarity of figure 20, page 320 of the T.O.M. (Summary Musicality/Sonority "traditional system").

| ABSTRACT (3 + 4) | | CONCRETE (1 + 2) |
|---|---|---|
| ABSTRACTION OF MUSICAL VALUES<br>(traditional symbols)<br><br>/ The values which are specified on the score and which we learn to handle in musical writing./<br><br>4 | and | GENERAL REFERENCE TO INSTRUMENTAL TIMBRES<br>(tablature)<br><br>/ The reference made on the score. We can in fact take it that there is a general notion of the timbre of an instrument which the score refers to. /<br><br>1 |
| 3<br>GENERAL QUALITIES OF SONORITY<br><br>/ Values which enrich sonority in addition to the values pitch and duration: resonances, harmonics, fluctuations, profiles etc. / | and | 2<br>CONCRETISATION OF TIMBRE IN A SPECIFIC PERFORMANCE<br><br>/ Whatever varies with each performance, particular sonority. / |

The musical, everything that can be made explicit by symbols, is at the top of this diagram (sectors 4 and 1), the sonorous, that is to say, *what is left,* is below (sectors 2 and 3): on one hand the complementary values of the notes, anticipated and manipulated implicitly by the composer when he orchestrates (sector 3), and on the other hand in sector 2, the "*contingent residue … the only distinctive and ultimately the only concrete element which, even if we exhaust the contents of its symbols and its implicit expectations, the score cannot determine*." (321). It is a free space left for the performance.

In 2 and 4, therefore, we have simple, clear examples, and in 1 and 3 intermediary and less clear examples.

All this seems to be quite in order, with the roles properly assigned. Only, the development of contemporary music has challenged this order.

c) *Musicality/Sonority in contemporary music*.

The first challenge consisted in wanting to reclaim all the "concrete" aspects of sound for musicality, to make everything that is a *characteristic* function as a *value*. This has already been discussed. (**TIMBRE**, **20** see also **28**).

**[70]** The second, on similar lines, consisted in introducing more and more often into the orchestra new sound bodies which no longer functioned as instruments in the service of the musical system, but produced solitary sound objects, alien to the system, with the effect that the *sonorous* began to precede the *musical* at the very time when composers, confident in the abstract value of signs and musical writing, were seeking the opposite effect.

What can be done in this situation? How can the relationship Musicality/Sonority be redefined?

d) *Redefinition of the relationship Musicality/Sonority*.

*Studying every aspect of sonority*, i.e. all possible definitions of the sound object, is a challenge, since the qualities to be observed are infinite, and can only be distinguished and developed by means of the use to which they are put.

Conversely, clarifying musicality could solve the problem of sonorities, provided that the definition of musicality does not lead to the preconceived rejection of a whole area of the sound-field as non-musical.

*In order to rediscover what has been lost to music, we must start with the sonorous*.

So we will define criteria for the identification of sound objects from *musical* (as opposed to *musicianly*) subtexts, broader, however, than traditional music, which allow an initial screening, *a typology* of the sonorous to be made.

"*The laws for the identification of sound objects give musical research new material free of the most narrow musical prejudgement; in addition, exploring musicality for reasonably universal musical objects could give rise to methods which lead, if not along parallel lines, then indirectly by generalisation towards a particular field of sonorities*". (347)

MUSICALITY/SONORITY: 293, 305, 319, 320, 321, 328, 331, 346, 347, 358, 359, 369 (PROGREMU), 371, 384, 397, 398, 562.

## » 28. VALUE/CHARACTERISTIC

1) Values are the *relevant features*, which emerge from several sound objects placed in a structure and form the elements of the *abstract* musical discourse properly speaking; the

other aspects of the object which are not relevant in the musical structure but which form its concrete substance, its matter, are grouped together under the name of *characteristic*.

The model of the relationship: Value/Characteristic is the pair Pitch/Timbre in traditional music. Pitch is, in any case, the privileged value in the majority of the systems of traditional music.

2) The law of the complementarity of Value/Characteristic can be expressed in this formula: "*objects emerge as values in relation to their similarity in character*" (303).

Hence, this definition of musical value: "*a quality of perception common to different objects (…) enabling these objects to be compared, arranged and (possibly) put into calibrations despite the dissimilarities in their other perceptual aspects*". (303) In other words, value only exists from the moment when there is more than one object, and when in several of these objects there appears a *difference* in one aspect, one property, which is common to them all. The resemblance in *character* among the sounds assists us to perceive the value which they carry by **[71]** helping to: "*weaken the interest which could be taken in identifying objects which would otherwise present as a series of heterogeneous events*". (303)

3) The criteria which act as values, relevant features in sound objects, and also the calibrations, the "scales" which arrange these values in order, can only be defined within an overarching musical system. In traditional musics, these values are given all at once, as it were, "directly" to consciousness; in musical research these values will have to be reclaimed through the study of criteria, and particularly Analysis of them. The stage of analysis will seek to detect which features of the sound object are likely to emerge as values in the musical perceptual field, in accordance with the implicit premise that *values can only emerge within the dimensions of the triple natural perceptual field of the ear* (see **25**).

4) We will equally seek to define the general criteria which sound objects have to satisfy *a priori* to promote the emergence of musical values, and the sound objects which meet these conditions will be called *suitable* objects (see **40**).

5) In other respects, what functions as value in the sound object can still retain its concrete dimension of characteristic: "*A pitch structure reveals the value pitch. The tautology is only apparent. The word pitch is employed here in two senses. One is the characteristic attached to the object* (…) *Put together, the objects* (…) *reveal a structure of pitches in a second meaning of the term, the meaning of value* (…) *The value of the object, and the object is now forgotten as such, is no more than a quality whose structure allows abstraction*" (373-374). In order to create pitch-relationships as *value* amongst them, sound objects should display the common *characteristic* of pitch. This can be expressed in the paradoxical formula: "*what varies, is what is fixed*" (373).

a) *Can timbre be a value: Klangfarbenmelodie.*

The relationship Value/Characteristic postulates that Value is not a fixed and unique property of objects, "residing" permanently within them. It is a role, a function, which could be taken on by any one or other characteristic of the object, according to the context, the system, the rules of assembly. Therefore, when a musical note is heard as a sound object, we can always imagine that the characteristics which are discovered in it, besides the traditional values of pitch, duration etc., would themselves be: "*perhaps capable of becoming values in other structures, as a phonetic variant becomes a distinct phoneme in another language*" (290). Experiments such as *Klangfarbenmelodie* have attempted to achieve this *permutation of values.*

"*Let us now take a borderline case. A bassoon, a piano, a kettledrum, a cello, a harp, etc., playing at the same pitch are supposed to create a melody of timbres (…) In preceding examples timbres generally appeared as characteristics and pitch as value. Here, as all the sounds have the same characteristic of pitch, we need to seek elsewhere for values (…) We will not necessarily find a clear value before us; perhaps we will still recognise instruments and not a true Klangfarbenmelodie. These timbres are either too pronounced or too blurred for us to hear a clear value emerging from them*" (302). So we know that we cannot count on timbre, a rag-bag, very heterogeneous notion, to establish a new value, but on criteria which emerge from reduced listening.

**[72]** b) *Abstraction of values.*

In listening to the sound object, first there is the inexhaustible CONCRETE, "*whether all the potentialities for perception contained in the sound object, or all the causal references contained in the event* (which the sound refers back to)*"* (119). The organization of a musical intention, the emergence of abstract values, are impossible if one does not go through a process of STRIPPING DOWN, which consists "*of retaining from the object only QUALITIES which allow the setting up of relationships with others, or reference to meaningful systems*" (119). The programme of musical research (PROGREMU) seeks to create the means to carry out this process of "stripping down" and the setting up of relationships between objects to allow an abstract musical organization of objects based on their concrete qualities.

This operation of ABSTRACTION of musical values is long and difficult if we are not happy notating it on the score but if we want these values to be perceptible.

ABSTRACTION, according to the *Technical and Critical Dictionary of Philosophy* by André Lalande, quoted by P.S., is a "*mental activity which considers on its own an element – a quality or a relationship – of a representation of a notion, paying particular attention to it and ignoring the rest*". (317)

Spontaneously, with each act of listening, "*abstract valorisations, logical descriptions, emerge in relation to the concrete datum, which tends to organize itself around these without, however, ever being completely reduced to them*". (119).

Listening to someone speak, for example, we retain abstract "pertinent characteristics" from what we hear, leading to the understanding of a meaning, while the CONCRETE DATUM of the voice, with its timbre (referring back to the speaker), its intonations, etc., remain present in our hearing.

c) *Morphological criterion and value.*

The Value/Characteristic relationship seems apparently to have been thought up by P.S., starting out from the model of Western traditional music, where it is presented in an ideal way, the Timbre/Pitch relationship: instrumental timbre is a perfect example of a concrete characteristic, and pitch is the ideal value, allowing the maximum of abstraction. Might it be possible to expand on the notion of value? and to wonder whether every criterion in its own way already represents a certain value, since it results from a process of abstraction based on sound objects?

This is how the author tackles the comparison between morphological *criterion* and *value*, and establishes the difference between these two concepts, which is a necessary part of the process.

α) Just as the criterion is a "*property of the perceived sound object*" and must not be confused with an "*acoustic parameter*", it is not a "*pertinent characteristic*" in relation to a musical structure: it is the values consisting of emerging criteria or bundles of criteria, which constitute these "*pertinent characteristics*".

Values "*…impose themselves immediately on musical consciousness, to the point that they appear as absolute properties of objects. In fact, they only appear if certain conditions are fulfilled, i.e. if the objects are part of a musical structure which itself implies the permanence of characteristics between comparable objects, just as much as the differentiation of values*" (502) (PCV2 Law).

In other words values emerge at once, but in a music which already functions in a highly organized system.

"*In contrast, criteria only seem to appear after a long process of abstraction and when the attention is deliberately turned towards a certain quality of the object which did not* **[73]** *immediately impose itself on perception. Thought, memory are necessary to identify in this way the same property in very different contexts*." (502)

Criteria, therefore, must be made to emerge during the act of listening, with objects taken out of any musical structure.

"*But is the distinction clear cut? Doesn't the fact that a criterion can be identified in various sound contexts imply a permanence/variation dialectic comparable to the one which produces values?"*

(…) "*And, even more naturally, isn't it the variation of a given criterion in the duration of a single object which guides us in our perception of it?"* (502)

In one way, it could be said that, within the object, the varying criterion is to the overall *contexture* of the object as, within a collection of objects, the value is to the context of their shared characteristics. An isolated object, in so far as it can be analysed in contexture, is then "*… a microstructure which has its own unity, continuity, temporal envelope, and it is with reference to this structure that criteria are then identified, just as values were previously identified in relation to the context of a collection of objects*". (502)

Here we see the "nesting" of the Object/Structure relationship.

β) While conceding that morphological criteria which vary "*during the duration of an object, while they seldom appear in traditional music, are nevertheless the rule*" (502-503), the author does not conceal his preference, ultimately, for the particular example of discontinuous relationships of different states of criteria or "bundles of criteria" (characteristic or genre) amongst several objects (this is indeed the type most conducive to the abstract nature of a discourse of musical values), rather than for the more usual examples of criteria varying in the continuity of objects, when the musical discourse could only arise from the more blurred relationship "*Variation/Texture*" (see below).

γ) As we have said, musical value cannot easily be created from *simple* criteria:

"*By bringing together the different states of one criterion which is present in various objects, we are trying to set up 'experimental tapes' which might lead to calibrations. We would then be tempted to say that we are going back to the formula Values/Characteristics where the criterion plays the role of common characteristic, and its different modules* (i.e. here, its "sizes" in the perceptual fields involved in this criterion) *illustrate the values which it takes on (…). In one sense, it is indeed a musical structure, but one that is no longer perceived spontaneously (…) It cannot be transposed into music as it is. The relationship 'module/criterion' is therefore infinitely more fragile and unstable than the formula Value/Characteristic."* (504)

It is not enough to attempt calibrations of grain or allure to reclaim musical values. The criteria must be combined "*into Value/Characteristic pairs*" (438). It is the practical task of new instrument making at the stage of synthesis in PROGREMU (section 1) to effect this combination of criteria into characteristic genres (i.e. "bundles of criteria").

δ) In this synthesis, natural sounds must serve as models, even if "electronic machines" are used.

"*Natural sounds would then be* models *whose properties could be retranslated, or developed, by the machine*." (632)

The author does not wish to delude you about the "… *claim, which would be very premature, that scales can be made like those of the traditional system, based on the dominant timbre-pitch relationship*. (…) *On the one hand, there are too many possible combinations of criteria in the various ways of ordering them, and on the other hand, our registers of sensitivity are not well enough understood for us to operate so logically*." (487-8)

If it were easy to discover Value/Characteristic relationships "… *outside the* **[74]** *traditional pitch-timbre structure, we would, by the same token, have invented as many new foundations for music, or as many new musics, as basic structures. We are far, very far, from having found a single one that is convincing. This is the whole problem, this is what is at stake in musical research*". (484)

d) *Variation/Texture*

Whereas the Value/Characteristic relationship governs the "musical discontinuous", i.e. music based on collections of distinct (or, as we say in linguistics, discrete) objects, the complementary Variation/Texture relationship is the one which governs the musical *continuum*[3], i.e. music that proceeds by continuous variations within fused and varying objects. As such, the Variation/Texture relationship completes the Value/Characteristic relationship, and with it constitutes the two founding relationships of the (utopian) stage of *synthesis* of musical objects.

Where continuously developing sounds objects are concerned, the musical value in fact no longer comes from the bringing together of distinct objects with a common characteristic, which emerges as a value, but from an *internal* relationship between the profile of the variation which affects the sound, and the particular texture of this sound.
It seems, therefore, that the Variation/Texture relationship is more diffuse, more plastic, more gestural than "musical", in the sense that P.S. understands it.

VALUE/CHARACTERISTIC:119, 282, 290, *301-304*, 311, 312-313, 315, 320, 326, 369 (PROGREMU), 371-377, 379-382, 383, 385, 484, 487, *502*, 504.
VARIATION/TEXTURE: 369 (PROGREMU), 379, 385, 575, 576.

## » 29. PERMANENCE/VARIATION

1) Every musical structure functions through the *variation* of certain aspects of the sound from one object to another, a variation made perceptible by the *permanence* of certain other aspects. The aspects of sound whose *variation* is pertinent and forms the abstract musical discourse are called *values*; those which give concrete *permanence* are called

[3] Not musical content, (misprint in T.O.M. p.385)

*characteristics*. Permanence of characteristics, variation of values: this seems to be the working rule for every musical structure.

The model for the Permanence/Variation relationship is the Timbre/Pitch relationship, illustrated by a melody of traditional music played on an instrument: the timbre gives permanence and the pitch varies between each "object" (or note).

2) The Permanence/Variation law "*which dominates all musical phenomena*" (51) is linked to the very birth of the *instrument*, which we find at the origin of all music. The same instrumental timbre across different sounds comprises the *permanence*, against which a sequence of *variations* is executed, using the register and playing potential specific to each instrument.

3) The law PCV2, "the law of the musical", functions in a perfect and balanced way in traditional music. But contemporary research tends to disturb this balance by an excess of variation, (but with certain aesthetic tendencies after the publication of the *Traité* **[75]** the author could complain of an equal excess of permanence!). The *Traité* tries to redress the balance by denouncing this excess of variation, which, it claims, saws off the branch that musical discourse is sitting on.

4) The author finds the *Permanence/Variation* law at every level of the musical phenomenon, including in the emergence to perception of morphological criteria (502), and he sometimes formulates it in this paradoxical way: "*What varies, is what remains the same*." In other words, amongst several objects we notice the *constant* presence of one characteristic (pitch for example), provided that the pitch *varies* amongst the different objects, forming a melody and emerging as a "value".

5) By another paradox, it happens that a certain variation (such as a continuous development of pitch in the tessitura, a "glissando") is so regular, predictable and constant that it finishes by being perceived as *permanent*: when it changes in any way we have a *variation of the variation*.

PERMANENCE/VARIATION: 51, 64, 239, 301, 302, 334, 337, 367, 369 (PROGREMU), *372*, 375, 379-382, 385, 502, 578, 617, 623, 628.

## » 30. VARIATION

1) Variation is a multifaceted notion in music. Here, we are essentially concerned with variations *in the pitch-field*, and the term is applied to what varies *continuously within a sound object* or a process, and not to what is "different" between several sound objects (as in the pair: Permanence/ Variation).

So, here we are dealing with *processes of internal variation* which affect some sounds, the effect of which is that their endings are not like their beginnings (e.g. a piano sound - but it cannot for all that be said to "vary"), but also that the ending cannot be deduced from the beginning, since between the two there is an event, a development which does not follow from the initial moment.

Variation, in this sense, is an awkward notion. Morphology, in most of its descriptions, works on fixed or only slightly varying objects, where the criteria can better be observed. But where a sound happens to vary, particularly through an unpredictable development in tessitura, it is very much more difficult to grasp its component criteria. *Then the variation itself becomes the prominent phenomenon in the sound.*

2) This is why, in addition to typology and morphology in the general sense, the author creates a separate "domain" for study, given only in outline, a *Theory of Variations*, which distinguishes different types of varying objects, and establishes two morphological criteria specifically defined as *criteria of variation*: the *melodic profile* and the *mass profile*. In fact, this typology of variations and study of melodic profile are put together under a common heading.

On the other hand, in addition to the *Value/Characteristic* relationship, which establishes the interplay of discontinuous discrete musical values, P.S. added **[76]** a further relationship, specific to objects which vary in a continuous manner, the *Variation/Texture* relationship.

3) The study of variation leads us to the problem of the continuous and the discontinuous and the two modes of perception which belong to them.

*a) Problem of variation for morphological criteria.*

α) *Mass*: variations of mass ultimately create two distinct criteria, the *melodic profile* and the *profile of mass*, according to whether the variation is either a trajectory of the sound in the tessitura, or else a development of mass *within* the sound itself, as if it were "sculpted".

β) *Harmonic timbre*: we will use the term *harmonic profile* to describe variation in harmonic timbre during the course of a sound (very common when the sounds resonate, for example).

γ) *Dynamic*: the study of dynamic merges with the study of variations in dynamic. There is no reason to create a specific criterion.

δ) *Grain* and *Allure*: the variations of a grain or an allure during the course of the duration of a single sound object will be considered along with the study of these criteria.

b) *Connections between variations.*

It should not be forgotten that the variation of any criterion in a single sound object is most often linked to other variations which affect other criteria in the same way. Thus, a

variation in dynamic generally goes together with a harmonic profile, and possibly a variation in allure, if the sound has one.

c) *Variation of the variation.*

We also consider the case where the variation cancels itself out as such because it is regular and predictable (e.g. objects classed as "sirens"). But the examples studied are rather those which could be described as "variation in the variation", i.e. where the variation is not 100% predictable in its development. "*Thus, a melodic or mass profile can accelerate, slow down, fluctuate or modulate in the course of its duration*" (570).

d) *Types of variation.*

A variation can be discerned on the one hand by its facture, i.e. the manner in which it is executed, and on the other hand by its distinctive "speed", its "density", i.e. the relationship between the variation and its duration.

α) We shall therefore consider whether the *facture* of variation is characterised:

- by a fairly noticeable instability within an essentially stable process (variation of the *Fluctuation* type);
- by a continuous and progressive transformation (*Evolution* type);
- in a "scalar" manner, i.e. by discontinuous stages (*Modulation* type).

β) On the other hand, there are three types of density:

- either the speed of variation is slow, with little density, we shall call this *progress*;
- or its speed is of medium density, and this is *profile*;
- or it is rapid and will be referred to as *anamorphosis*.

These three types of densities together with the three main types of facture will allow the principal types of varying objects to be classified (T.O.M., p.570-2).

VARIATION: 500, 503, 561-579, 584-587 (TARSOM).

## [77] » 31. POLYPHONY/POLYMORPHY

1) The contrast polyphonic music/polymorphic music is presented in the last pages of the *Traité* in order to complete and intersect the contrast suggested earlier between a so-called "musical" music (based on discontinuous relationships, as in Western classical music), and a so-called "plastic" music, which is more instinctive (based on continuous developments, as is often the case in contemporary research).

Taking up "*the very classical alternative of counterpoint and harmony*", (637) the pair Polyphony/Polymorphy therefore distinguishes:

- on the one hand, musics based on the coexistence of horizontal voices and distinct interrelated discourses (*polyphonic*);

- on the other hand, music based on vertical "blocks" and fused objects (*polymorphic*)

The history of music demonstrates the progressive transition of certain musics from a "polyphonic" to a "polymorphic" stage, as the voices are progressively fused into compact harmonic aggregates.

2) By intersecting this pair with the pair Musical Music/Plastic Music, we get "*four poles of musical implementation, cardinal points which help us to situate the various fields of musical organisation*" (637-638):

1. *Musical - polyphonic* music ("original polyphony");

2. *Plastic - polyphonic* music (on an "architectural" model);

3. *Plastic - polymorphic* music ("*music perceived as a sequence of objects, linked to one another as logically as possible*");

4. *Musical - polymorphic* music ("harmonic" music, historically following on music 1; or else over-elaborated contrapuntal music of the serial type).

POLYPHONY/POLYMORPHY: 498, 636-638.

### E. *Is music a language?*

> So now we come to the notorious present-day debate which the *Traité* does not evade, but which it goes over with a fine-toothed comb. If Music is a language, it replies, it is certainly not in the same way as Language as such: for musical structure is inextricably linked with the perceptible qualities of its material, which is not interchangeable. Even "pure music", this extreme example, is "made to be heard", albeit inwardly.

## » 32. LANGUAGE AND MUSIC

The language/music parallel (where language is understood in its specific meaning, the subject of linguistics) is tackled in the T.O.M. in a quite detailed way, **[78]** with the intention of clarifying the problem of the *meaning* of music and defining its units.

At the end of this comparison, for which he refers to some elementary linguistic concepts put forward by Saussure and Jakobson, the author of the T.O.M. reaches a conclusion which has the merit of being clear, even if it lends itself to discussion.

This conclusion consists of two propositions:

a) The parallel language/music can only work in a truly satisfactory and rigorous way in the borderline case of *pure music*, within the historical and geographical confines of traditional Western music where, with Bach, music rediscovered the features of a *pure language* (*The Art of the Fugue*)

b) A fundamental difference separates language and music: in language, the level of perceived meaning is radically different from the signifying materials (law of the arbitrariness of the sign laid down by Saussure, in other words the complete arbitrariness of the link between the signified and the signifier), whereas in music the perceptible properties of the basic musical element - note or sound object - maintain a link with the musical "meaning"- whatever one understands by this word, which is not arbitrary. This is why, taking as our starting-point the lower level of "sound material", we can hope to find a way into the problem of musical structure, whereas in the case of language this enterprise would be hopeless. In other words, according to the author of the *Traité*, "*if the linguistic sign is arbitrary, the musical sign is not*".

1) *Why a Music/Language parallel?*

The question "is music a language, and what sort of language?" is very ancient, and contemporary music has itself instigated much research inspired by linguistic models: either the speculations of composers trying to transpose linguistic models; or attempts at analysis by researchers on these musics themselves. The attraction to linguistics can partly be explained by the seductiveness, for the musician, of linguistic "scientificness", which, like the "scientificness" of physics, gives the hope of controlling the always more or less contingent act of composition, by adopting laws and principles taken from an "objective" field. This is why, according to P.S., we are always "*dragging music by hook or by crook from physicist determinism to linguistic structuralism*" (639). Not that music has nothing to do with the two disciplines, as with others. But rather than hastily "slapping" linguistic, or other, considerations on to the musical phenomenon, we really should make a detailed study of the possible correlations, the areas of similarity between the linguistic sciences and music. Just as, through experiments on the correlations between the physical signal and the sound object, the T.O.M. studies the physics/music relationship, it makes a dispassionate study of the language/music parallel, being careful not to bring linguistic conceptual tools too hastily into the domain of music.

We are already involved in this parallel through the formulations of traditional teaching methods, according to which, to quote Danhäuser (sic.), "*music is written and read as easily as the words we say are read and written*" (284). But deeper reasons for it can be found. P.S. quotes at least three:

1. "*In no other field* (than language) *do we find so clearly stated* **[79]** *the problem of defining units within structures; and thence in relation to a system and its dominant aim.*" (284)

2. "*Like music, language is sonorous and takes place in time. It is interesting to compare the uses, structures and perceptions which arise from this common base*" (284). So the chosen basis for comparison is the *sound object*.

3. We speak of the meaning of music, as of linguistic meaning. What is the nature of musical communication?

2) *References for linguistic concepts.*

Without wishing to give a course in elementary linguistics here, let us consider the basic linguistic concepts which P.S. uses in the *Traité* for his language/music parallel. For a better understanding, the reader can refer to a manual of elementary linguistics.

We shall not, of course, join the debate on the different trends in modern linguistics and its criticisms of Saussure's axioms (for which we quote here the *Cours de Linguistique Générale*):

a) *The LANGUAGE/SPEECH distinction*: language being "*the social part of language external to the individual*" (CLG 31) and speech "*individual execution of language*", P.S. attempts a comparison between the pair Language/Speech and the pair Musicality/Sonority.

b) *The SIGNIFIER/SIGNIFIED distinction*: "*The linguistic sign links not a thing and a name, but a concept (the signified) and an acoustic image (the signifier). The link between the signified and the signifier is arbitrary*" (CLG 101-102) in the sense that it has "*no natural connection with reality, the only exceptions that can be given, onomatopoeia and exclamation, being of secondary importance and not challenging this law*" (see: CLG 100-102).

P.S. puts forward the idea that the musical sign is not arbitrary.

c) *The concept of VALUE*: the value of an element in the linguistic system is purely due to its place in the system, and is not due to any intrinsic property. In the same way as in the game of chess, "*the knight is not by itself an element in the game; in its pure materiality, outside its square and the other conditions of play, it represents nothing to the player, and only becomes a real and concrete element once it has taken on its value and has become one with it*" (CLG 133-134). Having thus stated that value is a purely differential concept, "*what matters in a word is not the sound itself, but the phonic differences which allow this word to be distinguished from all others, because these are what carry the signification*" (CLG 163).

In the context of the value/characteristic pair, P.S., on the contrary, states that *musical value*, even if it is functional and differential, nevertheless *relies on intrinsic properties of the sound object*: another split between the system of language properly speaking, and the hypothetical system of a "musical language".

d) *Rules of language according to Jakobson*: "*Speaking implies selecting certain linguistic units and combining them into linguistic units at a higher* (sic) *level of complexity*" (ELG[4], quoted T.O.M. 297).

P.S. attempts to apply these rules of *selection* and *combination* to music (298). Then he observes that they can only be properly applied to Western classical music.

Jakobson also attempts to define a number of areas of study, which P.S. tries to compare with music.

e) *The different areas of music according to Ullmann* (294-295): Ullmann suggests an overall framework for linguistic studies, which is quoted by P.S. as controversial because of certain "unclear parameters".

**[80]** 3) *Towards a Language/Music parallel: the question of levels.*

P.S. always insisted that the problem of music could be approached from either end, from the two extremes, which are separated by a series of distinct intermediate stages: the so-called lowest level of the material, the object (this is the level on which the T.O.M. essentially concentrates, for reasons which are explained at great length) and the other level of final MEANING, which is far more difficult to determine a priori, to construct artificially. At the same time he maintains that there is a huge gap, a certain incommensurability, between these two extremes.

Now, linguistics posits several distinct intermediate levels between these two extremes, which could perhaps offer a way forward: "*In linguistics, where sound objects are still much more implicated* (than in music) *at the higher stages* (of utterance, meaning), *it seems possible to set out the subdivision of the disciplines in stages, each having a different degree of freedom.*" (36)

Beginning with the stages of higher complexity, the author sketches out the following parallel (362):

| | |
|---|---|
| - utterances from the language | - pieces of music |
| - sentences from the language | - musical phrases |
| - words from the lexis | - rhythmic or melodic intervals, chords, motifs, etc. |
| - phonemes (distinctive features) | - values (pitch, intensity, timbre, duration). |

But we know, he says, that all this is only a first step: "*Continuing in this way does not allow an analysis in the opposite direction, i.e. a synthesis, which going back to the elementary stages. Fundamental research should be going in this direction.*" (362)

Then P.S. completes the list (see bottom p.362).

[4] 'ELG' refers to: Jakobson, R. *Fundamentals of Language* translated as *Éléments de linguistique générale*. See: Chion, *Guide des Objets Sonores* p.179.(JD/CN)

The T.O.M. has been criticized for restricting itself to the lowest level, the object. The author is the first to say that "*objects are made to serve*" (34) and "*once they are grouped into structures, they are forgotten as objects, and each one simply brings a value to the group*" (33). However, he remains at the stage of an elementary musical theory, seeking in the material itself its potential to be placed in a structure. This will be a *musically-orientated theory of music*. In linguistic terms, he could be said to be restricted to the levels of phonetics and phonology: "*These levels are much more essential for music than for language*" (294). In fact, the author says, as a summary of his point of view, "*any close parallel between music and language is doubtful, because of the arbitrariness which remains in the choice of meaning, the free nature of the relationship between signifier and signified, which makes the word into a sign, whereas the musical note has always seemed to impose itself irrespective of any arbitrariness like a 'given' in the physical world, to which we are sensitive*" (35).

4) *Problem of the definition of units*: phonemes, words etc.

Language cannot be studied without defining linguistic entities (CLG 145). Now, these units (phonemes) have, in language "*no special or intrinsic phonic character, and the only definition of the linguistic unit that can be given, Saussure says, is a slice of sound which, to the exclusion of what precedes and what follows in the spoken chain, is the signifier for a certain concept*" (CLG 146). This division seems not to present any problems in language, but if we easily divide a discourse into sentences and words, our recognition is conditioned by our knowledge of the meaning and our understanding of the system. There are no pre-defined signs which fall into place later; the smallest element or phoneme is not reality in itself. There are also great individual variations, the phoneticians stress, between individual executions of the same phoneme, and yet this phoneme can **[81]** be identified in acoustic images which are often very different from one individual, one region to another. "*Under these conditions, why and how do we identify these phonemes? Why do they remain the same despite their variations?"* (286). Because "*its (sic) definition is relative to its function in the overall system of the language to which it belongs*" (287). We identify it not from its sonorous characteristics as a whole, but from its pertinent features. "*Some features of sound in a language are important for identification (these are values), others are not (characteristics). Each vowel and each consonant articulated in a context contain distinctive or pertinent features, together with a number of features which are not distinct or pertinent*" (Malmberg, quoted in T.O.M., 287)

Hence the necessity, in language, to distinguish between *phonetics* (the study of the acoustic material of sounds in language, independently of its particular functions) and *phonology*, the study of functional units within the framework of a language system. This distinction has been the subject of much controversy about their relationship: are they so different, so independent?

The paradox of the phoneme, which can be defined only by reference to meaning and opposition, which can have considerable variation from one pronunciation to another, but which seems to have an autonomous material existence, as writing seems to demonstrate, occurs in the musical note "*which even has the aid of a notation which misleads us, by making us think that it is a sign which exists before its realization*" (288).

In the same way that listening to phonemes demonstrates "*considerable acoustic variations*" (289), we could argue that the values of pitch and duration, as pertinent and functional features of the musical discourse, can have variations in execution without affecting their function. But this is only valid in traditional Western music.

So can phonetics provide a model for a "*theory of verbal objects*" whose principles could be applied to sound objects? "*Yes and no*" (289). Yes, because phoneticians practise a sort of reduced listening. No, because phonetics depends on linguistics as a whole, particularly the "*higher*" stage of phonology, "*the science of systems of relationships and oppositions*", from which it receives "*its objects, already defined*" (290). It is not concerned with the sound object independently of the way it is used in various languages, and needs only to point out the differences, expressed in a "*physical, articulatory description*". (290)

5) *Language/Speech parallel.*

In the same way that Language can be studied separately from Speech, once one has been distinguished from the other, can musicality be studied separately from sonority? No, except for the borderline case of pure music "*where musicality is so stripped down that it can do without sonority*". (293)

In other cases, because the musical sign is not arbitrary, it follows that Language and Speech are linked: what affects the second immediately affects the first. Now, it is the musician's temptation to *sacrifice speech* and to claim, most often mistakenly, to attain to the conditions of a pure musical language.

To music, "*speech must be restored*" (313) and reconnected with "*the inexhaustible resources of sonority*". But we must also avoid imprisoning ourselves in *pure speech*, which is no more than virtuoso chatter, lacking abstract substance (research into sonority).

So, the Language/Music parallel only works for pure musics, where musicality seems to be independent of sonority, as language is from speech in linguistics. But this is a very limited and specific type of music, and even here a fundamental difference still **[82]** separates music and language: whereas the meaning of language has only an arbitrary connection with its signifying acoustic medium, musical values, even abstract, are linked to the properties of the object (see: below **33**, **34**, **35**).

LANGUAGE/MUSIC: 33, 34-36, 131-133, 282, *283-313*, 314, 315, 362, 377, 480, 605, 623-624, 626, 628, 629, 639, 658-659.

**» 33. SIGN**

The word "sign" is used in the T.O.M. with two main meanings according to context:

1) In the study of listening intentions: the sound is heard as a *sign* if our intention is to understand a meaning with reference to a language, a system of values. On the other hand, it is heard as an *index* if our intention is to recognise a cause, an agent, an event etc.

2) Within the framework of a parallel between language and music, the musical "sign" is compared to the "linguistic sign" as Saussure defined it: the association of a signifier (an acoustic image) with a signified (a concept) through an arbitrary relationship. P.S. postulates that the musical sign, contrary to the linguistic sign, is not arbitrary and that its meaning derives from the intrinsic properties of the object, the material (for example, the musical note, the simple relationships of the fifth and the octave etc.) in keeping with natural laws and perceptual structures which we might dare to call universal.

The musical sign must not be confused with the sign of notation, as homonymy makes most musicians believe: it is "*made to be heard, and differently from the linguistic sign*" (305).

It is not the same as the sound object which conveys it, but only, in the sound object, it is "*all the values or pertinent features which make a given sound object function in a musical structure when its other, irrelevant features, are excluded*" (377).

*Terminology: signal, sign, index.*

As these 3 terms can be confused in normal usage, P.S. distinguishes them according to the following conventions.

- SIGNAL denotes the sound as "*physical signal*" studied within its acoustic parameters.

- INDEX denotes the sound considered as referring to a cause, an event, a phonic agent (or what in the sound refers back to an agent, event, etc.).

- SIGN, according to the context, takes on the two distinct meanings studied in section **33**.

SIGN: 35, 268, *296*, 305, 306, 311, 377, 612.

**» 34. PURE (MUSIC)**

1) The problem of the *meaning of music* is stated in the purest way in *pure music*.

Indeed, pure music is the borderline case where music comes **[83]** closest to language, a language disengaged from speech: in the same way, it is a *musicality entirely disengaged*

*from sound*, and the sound object is used entirely as a sign: all that remains is *relationships,* and music here consists only of the interplay of values, of distinctive features of pitch and duration. This borderline case is symbolised in a work such as *the Art of the Fugue* by Bach, a work written without anticipating any instrumentation, or again in his *2 and 3 Part Inventions*, where the permanence and neutrality of the timbre make it fall into the background, to the advantage of the musical discourse.

2) With reference to the circuit of the 4 listening modes it could be said that "pure music" is music which can occupy only sector 4, meaning and abstract values. The mere reference to instruments immediately introduces references to indices (sector 1), and therefore to the dimension of sound.

3) So, pure music is music which, while being the closest, as close as possible, to the conditions of a *language*, yet at the same time, in the greatest conditions of "purity", affirms the radical difference between language and music: it shows, contrary to language, that it is built on a system where the sign is *not arbitrary,* and where its values are based on the actual properties of the perceived object ("simple relationships" of pitch). "*We link* (...) *all musical language to values developed at the stage of perception*." (133)

a) *A possible "musical language": pure music.*

According to the author, pure music reached its highest form in traditional music with Bach, and this historic miracle cannot be repeated; in fact, only pitch can be the basic value for a pure music, through its great capacity for abstraction, and particularly the fact that it can be completely abstracted from the objects which mediate it.

Even then it will not function in this way unless the natural framework of the simple fifth and octave relationship, the basis of most systems of traditional music, is observed. Thus, the author totally dismisses the possibility of rediscovering the conditions for a pure music in serial research (which denies "simple relationships") or in "timbre melodies" (which ignore the meaningfulness of the value pitch). So, the ideal of pure music is relegated to the past.

b) It is in the context of the comparative study of the structures of language and music (book IV, chapter 17) that the T.O.M. makes a detailed analysis of the significance of this borderline case. The author first observes that, perhaps influenced by the linguistic model, traditional music, which originally grew out of the instrument, i.e. the concrete (in the same way, Saussure remarks that from an historical point of view speech always precedes language) "*tends gradually to dissociate itself from sonority to form a "language", i.e. a system of pure values (…), in such a way as to retain from sound objects only one or other distinctive feature, a compromise between natural and social acoulogy. This is the ideal programme for pure music*" (309). What is pure music? It is perhaps "*the point where music*

*and language come most closely together and clearly demonstrate this*", a state of "*maximum closeness*" which at the same time more clearly shows "*their essential differences.*" (309)

So pure music is like a frontier zone between these two neighbouring countries, and for this reason it is interesting to study it.

c) A mistake to be avoided in the comparative approach to pure music and **[84]** language is to refer to the written text which notes them down and "*validates*" them. Now, the written symbol originally arises from musical homo faber (310), in the same way that, historically, speech precedes the act of writing. The written text is not the structural content: even when it is read it is coloured in our imagination by "*an abstract and universal generic timbre*" (312). In pure music then, the value/characteristic relationship reaches its highest level of abstraction.

So, the possibility of controlling and composing music by means of a text, by combining written signs, does not give us leave to forget the perceptible characteristics that these signs notate, or to avoid the question of the musical perception of the structures generated in this way. "*We are absolutely certain that, even if* the Art of the Fugue *can be entirely reduced to a numerical game, the meaning of this game consists in its manifestation as sound, because from the outset it is based on criteria of musical perception which arithmetic perhaps translates but certainly does not determine*" (133). So pure music does not escape the law which states that all music is made "*to be heard*", even in the mind.

d) Why is pure music possible? Because timbre itself can be taken to a high degree of abstraction: "*the term violin, in the indication 'a G on the violin' is no less abstract than the value indicated by the symbol G. What has been retained , while everything else is forgotten, is what all possible violins can have in common*" (317). So, in the same way, reading a non-instrumentalised score allows us to colour the pitch and duration values written on it with an imagined and generalized generic timbre, based on materials furnished by the memory. But the fact that instrumental timbre is capable of abstraction does not mean that it can be manipulated like a value, and put into calibrations ("Klangfarbenmelodie").

Instrumental music often shows a great abundance of timbres in sector 1 (causes, sources) and uses them liberally (the "*tendency to orchestration*") but it can also equally attempt to shift instrumental sound into the field of values (Klangfarbenmelodie).

The fluctuations of contemporary music reflect the tension between "*nostalgia for pure music*", as expressed in a priori musics, which boast of their "concrete" impurity, and emphasize the return to sources and facture.

The author of the T.O.M. therefore refutes both the pretension to pure music (a summit which he believes impossible to reconquer), and the headlong rush into the concrete.

Setting out from the concrete, but in order to reclaim the abstract: this is his programme. In this programme, pure music plays the part of a sort of star of Bethlehem, which cannot be attained, but which shows the way.

PURE (MUSIC): 131-133, *309-311*, 312, 318

## » 35. MEANING/SIGNIFICATION

1) *Signification*

The T.O.M. uses the term SIGNIFICATION in two different but closely connected meanings.

- Either as specific significations considered in sector 4 of the Four Listening Modes:

a) "*abstract significations*" with reference to the concrete sound material, when listening is guided by "*a particular form of cognition*". (114)

**[85]** b) "*ordinary" significations* considered in ordinary hearing, which originate in sector 3.

c) specialised "*specific significations*", the goal of different specialists in their skilled listening (123): the state of the patient's lungs when he is told to say "99", the accuracy of the notes for the musician, the phonetic make-up of the word for the phonetician (etc.)

- or in contrast to meaning, in the thorny debate about the problem of significations in music.

Signification here takes on the meaning of a *particular connection between a signifier and a signified when each is relatively precise* (a connection which in language is arbitrary in Saussure's sense); whereas meaning is a more general notion.

In these two senses the term signification is applied to something particular, whereas meaning is applied to something general. So, the author puts forward the idea that *music has a meaning rather than, like language, significations.*

2) *Meaning*

The problem of MEANING is discussed in the T.O.M. in two different contexts, depending on whether it refers to:

- meaning which is commonly the goal in "natural" listening to the object, where the sound object is taken as a "sign" referring to a message which is perceived according to a code, a system of references (this is in contrast to the other mode of "natural" listening, which takes sound as an indicator referring to a cause, an agent, an event etc.);

- the meaning of music in general, a thorny problem.

P.S. puts forward this formula: music has a general meaning rather than, like language, particular significations. Moreover, unlike language, musical meaning rests on a relationship with the signifier which is *not arbitrary*, which does not, therefore, entirely depend on differential structures completely independent of the acoustic medium, but which

is linked to general properties of the perceptual structures of the human ear and its three perceptual fields. This is true even for the borderline case of "pure musics" (see *above*).

a) *Meaning and signification.*

When P.S. postulates that music "*in a different way from language, has a meaning, rather than significations*" (281), he seems to be concentrating on particular significations, the connections, associations between concepts, that language mediates, and contrasting them with the idea of something more general: THE meaning. The comparative table of language and music materials, organized along the lines of the four listening sectors, has for language, in sector 4, "*signification?*" with a question mark and, for music "*meaning*". (314)

So, signification, in the sense of a one-off connection between particular signifiers and significations, is the opposite of the general "meaning" of music. (310)

**[86]** "*We have avoided using the term "signification" for music, as it too obviously suggests a code, or the purely arbitrary signifier-signified link, which refers to the concept through sound. Conversely, we can hardly deny that music has a meaning, that it is a communication between an author and a listener, despite its essential difference from language*." (377)

b) *If we postulate*

- that the problem of music is approached from its two extremities: one "lower", of "materials", the other "higher", of works and their organization;

- that these two stages (again unlike language) are not completely heterogeneous, that not any sound material is suitable for any music (principle of SUITABLE OBJECTS), that musical organization cannot be something that comes entirely from the dictates of the mind, but that it must rely on the properties of the natural perceptual field of the ear;

- that between these two extremes, traditional musics have an intermediate stage of structures of reference (melodico-harmonic rules, for example), understood by a community, a stage which contemporary musical experience lacks…

…Then the problem of making an experimental music which still has a "meaning" can be stated in new terms.

This music, rather then being the interplay of "*differential structures*" within a melodic-harmonic code of reference (which allows us to go beyond the stage of sound to build up a "musical language"), would be an architecture constructed on the logic of the material itself, with its meaning in its "*internal proportions*". (629)

c) This architecture-music would perhaps be more universal, more "natural", being built directly on the logic of the material itself, and by-passing the intermediate stage of a conventional system of reference: but also, perhaps, because of this, less refined.

Such a music would more than ever have to rely on a thorough understanding of the sound material *as it is heard*, and of the properties of the perceptual field of the ear.

We might, however, retain the hope that it would rediscover "*common meaning*".

"*Sound objects, musical structures, when they are authentic, (…) move away from the descriptive world, to speak all the better to the senses, the spirit, the heart, the whole being, ultimately about itself. Finally, symmetry is established between languages. Man described to man, in the language of things*". (662)

d) *Common meaning*.

This new meaning may be the "common meaning" produced by the symmetry between nature and man "*with their contradictory and reciprocal order*". The model is given by the example of Francis Ponge in poetry, demanding that *language be cleared of its ideological adhesions*, "*in an attitude (he wrote) of phenomenological reduction*" (return to the Husserlian épochè). This gave "*not the work of an author who has something to say, but work on words which end up saying more than the author knew, by taking him towards meanings that he himself only perceived after the event*" (658). Without hoping to transpose **[87]** this experiment wholesale to music, the T.O.M. proposes to rediscover the path of mankind and common meaning: in the sense that "*What things have to say to us has been buried within them for generations, since the invention of language*" (659).

MEANING/SIGNIFICATION: 114, 115, 116, 123, 124, 127, 154 (BIFINTEC), 281-282, 284, 294, 310, 311, 314, 377, 612, 615, 626, 627, 628, 629, 641, 642, 658; 659-660.