

MICHEL CHION

GUIDE
DES OBJETS
SONORES

Pierre Schaeffer
et la recherche musicale

GUIDE TO SOUND OBJECTS

Pierre Schaeffer and musical research

(English translation by John Dack and Christine North, 2009)

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It is almost ten years since Michel Chion thought of providing a guide for readers of the *Traité des Objets Musicaux*, which could form the basis of a dictionary. It was doubtless as a result of hearing me constantly returning to the same key words (value and characteristic, sonority and musicality, permanence and variation, which always sing in duet) when he was a Pupil-Teacher at the Conservatoire, that he was one of the first to understand the strange musical dualism that lies at the basis of all music (a fact which, alas, eludes most of our contemporaries). As a result his Guide is a sort of variation on the *Traité* or more precisely a reprise of the themes with a simplified itinerary. It is always good to hear another person restate what the first meant to say, and which is never altogether said, nor fully understood.

These few words of introduction give me the opportunity to repeat once again, and definitively, what will and what will not be found in the *Traité des Objets Musicaux* to which Michel Chion's Guide gives a method of approach which is personal and original, but kept within the strict limitations of his purpose.

I could not in any case make myself clear without mentioning the fundamental hypothesis which underlies both of these works. This is the hypothesis of a three-stage musical problematic, or, as linguists would say, in two articulations: the sonorous/the musical/meaning. We should explain that in this triad, acoustics is already considered as superseded, developed and filtered by the sense of hearing. The triad is therefore quite specific to music, and involves no other discipline, scientific or humanistic, except, of course in the frontier zones. In traditional music, these three stages are clearly evident: the notes that are heard (including *the sonority* of the piece, the instrument, the virtuoso), then *the musicality* of the whole, and finally, for the involved, informed and sensitive listener, what, for lack of any other word or any way of describing or clarifying it, we must call *the meaning*: this is precisely what makes music irreplaceable, and interchangeable with no other form of expression. My hypothesis was that no other music, primitive or new, could exist outside these three categories.

Now, the *Traité des Objets Musicaux*, as I am constantly repeating, concentrates its research right in the middle of the triad. It takes on the sonorous, all the sonorous, for the first time, and this is doubtless its merit; then it suggests ways of accessing the musical, particularly with the idea that not all sound is suitable for music, that choices of the "suitable"

music be made in the light of the “structures” to which all listening which is seeking meaning must refer. In traditional music [10] these structures are, of course, relationships of interval and the interplay of tonalities and/or modalities. Needless to say, we have found nothing that is equivalent to these.

It was on the brink of this defeat that the *Traité* ended, as the author admitted his uncertainty. So there are two hypotheses, which go beyond any biographical argument. Either *structures of reference* remain to be found, and only the future will tell (and these structures will only be found through the creative work, the tentative progress of composers, involving a great deal of wastage) or, alternatively and more plausibly, we shall have to agree that, even if the sound universe (the universe of sound forms) appears limitless, the musical universe (the universe of meaning to which we have become accustomed through the classical, and often exotic, repertoires) is limited. Thus music is not indefinitely extensible, and what we have discovered since the 50s would only be a generalization of “sound arts”, analogous to the plastic arts, while during this period, music would have gone off in search of impossible meanings.

I am not trying to bring a premature end to this debate, which is so serious, so weighty that one feels like a skeleton at the feast even by articulating it. I must however say that, even if the *Traité* makes (or made) every effort to formulate “research programmes” which are summarized in the Guide, it has not undertaken or presented them as something that could lead to music, in the authentic and respectable sense that this term still has for me. Furthermore, these programmes are limited to enumerating theoretical structures, probable arrangements, and above all the dominance of certain criteria. Not only does the *Traité* never attempt to encourage composing, but, negatively rather, it warns against this prejudice, that confusion. Is it appropriate for me, in the present climate, to praise this negativity for its originality?

Should I mention here so much evidence denied? That a harmonic sound will always be “dominant” in a group of sounds? That a fixed sound will always be heard differently from a sliding sound (because of two different ways the ear has of functioning)? That *Klangfarbenmelodie* is a snare, a delusion at least as long as it hopes to outdo other more classical methods of calibration? Now, all these ideas, which are linked with universal tradition, are the opposite of the fashions which have held sway for more than half a century. Musical fashion has naïvely associated itself with politics, and with scientism; it adopts egalitarian, permutational ideas which come from simplistic inspiration. Musicians have to be very naïve to believe that science teaches the permutation of egalitarian elements, and that

chance determines its creations. You would think that a sub-culture had taken hold of Art (because this does not apply just to music) in order to slap the worn-out label of Chance and Necessity on to it.

Indeed, when cleverly manipulated, these two terms can sometimes be the short-term key to a number of things we don't know. Far from being the key to true knowledge, they are catch-alls for when theory fails or practice falters. Science is also and principally the will to power, prediction and challenging the possible. Art, by contrast, was also man's attempt to situate himself, to develop through self-expression, at the same time escaping from determinism. Oddly, fashion is blowing the other way, and has promised [11] machines, instruments, deus ex machina to help us undertake ridiculous journeys.

The researchers who have decided to follow me over the last thirty-five years or so are fully aware of the contradictory field into which I have led, and sometimes retained, them in relation to and against the current fashion. So it is not surprising to find in the Pupil-Teacher's guide, discreet but perceptible traces of these debates and warnings. Perhaps the limits of this research have not been indicated clearly enough. Its thesis remains open, its discoveries, certainly full of possibilities, are incomplete, and its conclusion, alas, desired by everyone, is totally lacking: i.e. a treatise, not on musical objects, but on the musical work! The future, gentlemen, belongs to you. Do not complain if I have left the most difficult part to you. All you will find is a way of proceeding: not one real rule of Art.

But perhaps, on the other hand, you will come across something unexplained, surprising. Indeed, is not musical meaning, to which I am constantly referring without being able to define it, like other questions in life to which we do not know the answer? After all, does life have a meaning? Who can define it? Is there consensus about it?

And even if we limit ourselves to music — to Music even — can these questions be answered? What is music? What is its function? (or functions). Is it universal, singular, plural? Are musical works objects, in the sense of a product, or means of communication amongst human beings, or more than that, a glimpse beyond, into that which we call, for example, the spiritual?

Now, without replying to such questions, since the sphinx itself gives up, we can accept or not accept that they are asked, that they prevail, somewhere, in the individual or collective unconscious. In short, in Music as well, we could distinguish, not atheists and believers, but those who believe in the here and now and those who believe in the beyond of music.

With the result that across this whole debate there is a subtext (or a misunderstanding) which it would be good to clarify once and for all. Yes, for my part, I believe that music is more than music, that it is not a run of the mill, utilitarian or aesthetic object, but a spiritual undertaking, or as an old Master used to say, a “beingful exercise”, an activity of the whole being. So I cannot deny that, sometimes, in the course of the most trivial musical theory, the most apparently technical experiment, the thesis of the spiritual reappeared, the intention of a going beyond which is difficult to name, but even more impossible to deny.

That is why I advised Michel Chion to add to this preface a text which he wrote in former times (when, exactly?), half-way between mockery and tenderness, and in which I shall never cease to admire his story-telling talents and his attention to the essential. I hope you will read this text without frowning. It is indeed a “send-up”, but also in this treasure chest can be found the savour of a precious wood, a scent of friendship and nostalgia for a Master in despair at the limitations of his knowledge.

Pierre SCHAEFFER

[12] *At that time Peter was with his disciples, and one of them said unto him: "Master, which is the greatest commandment in the law?"*

Peter answered and said unto him: "The greatest of all the commandments is this: thou shalt work at thine instrument. This is the commandment of my Father, and the second is like unto it: thou shalt work at thine ear as at thine instrument."

He spake to them again: "There is a time to hear (entendre) and a time to listen (écouter); those that have ears to perceive (ouïr), let them comprehend (comprendre)."

Another of his disciples said unto him: "Master, it hath been said: thou shalt structure thy music, and thou shalt speak only of the Object."

Peter answered and said unto him: "Dost thou not see that whoso understands the Object, he alone understands Structure? For Structure was made for man, and not man for Structure."

But the Chief Priests murmured amongst themselves and said: "He speaketh blasphemy against Structure."

And again he said unto them: "The hand is willing, but the ear is weak. Harken ye therefore unto to what ye make. For there is a time to prepare and a time to play. Let thy right ear know what thy left hand doeth."

"Harken unto to the sounds around you, they program not, neither do they calculate, and yet I say unto you that the Grand Computer in all his glory has never sung like one of these."

"Verily, verily I say unto you, unless ye reduce your hearing, ye will not find the Sound Object, and unless ye find the Sound Object, ye will not touch man with your music, for the Musical Object is but a suitable Sound Object."

And again he said unto them: "That which varies, is that which is constant. Whoso beholdeth the Object, beholdeth Structure." Yet still they understood not.

Peter spake unto them this parable: "A man went forth to plough a closed groove. At the tenth turn his neighbours and his friends mocked him. But at the thirtieth turn there was more music than in all the fields around. Verily, verily I say unto you, cultivate your Perceptual Field, and the Kingdom of Music shall be yours."

But the crowd reviled him saying: "Thou that sayest thou canst change the sonorous into the musical, change it!" And they stoned him with great words.

Peter said: "Father, forgive them, for they hear not what they do."

M.C.

[13]

Introduction, by Michel Chion

Our ambition, with this *Guide to Sound Objects*, has always been to give researchers, musicians, music-lovers and all who are directly or indirectly interested in the sound-universe an unbiased, clear and *dependable tool* (if this can be done) for a better knowledge and understanding of Pierre Schaeffer's considerable contribution to this field, by means of an inventory of the ideas and concepts developed in his most important work, the *Traité des Objets Musicaux*.

This imposing book, published in 1966 and twice re-edited (the first with very slight corrections, the second in 1977, with a new postscript by the author) has often been consulted, but the breadth and complexity of its architecture, the diffuseness of the style and presentation, and the lack of an index at the end of the book makes it difficult to use. We wanted to resolve this problem by means of this work, which is the result of a commission from the Groupe de Recherches Musicales in 1972! So, we have taken ten years to begin it, put it aside, take it up again and complete the definitive version.

For this undertaking presented numerous problems. Should we, for one, go through the theses in the *Traité des Objets Musicaux*, keeping only those which could be judged to be tried and tested or beyond doubt? We decided against this, considering that it was important to include everything and leave the reader to come to his own conclusion. Of course we have not forgotten to point out, in every case, where the author is venturing into rushed hypotheses, and where he is presenting results which he can guarantee. But a bold and on the spot concept such as *weight* or *impact* can open up new avenues almost as much as a slowly developed idea. Time will put all these new concepts "to work" and we cannot know in advance which will bear the most fruit.

Although wishing to be faithful, this book is not a "digest" of the *Traité des Objets Musicaux*. A quick comparison of the two works will show that it is the result of a long and far-reaching process of *reduction*, reclassification, interpretation and *reformulation* (aiming for a more synthetic, succinct style of writing), which makes it quite different from an abridged version.

This *Guide to Sound Objects* has been written with three complementary aims in mind:

- the modest but indispensable aim of providing the *Index* lacking in the *Traité des [14] Objets Musicaux* (with page references to the *Traité* at the end of each section; here we should point out that the pagination is the same in the three editions, and that the index can therefore be used for any version of the *Traité*):

- the aim, right from the start, of providing a *Dictionary* of the main key-concepts (often presented in pairs) in the *Traité des Objets Musicaux*, bringing together all the approaches to them which that work puts forward. We have chosen 100 of these concepts - and these pairs - , designated by terms in common usage to which the author gives his own particular meaning: Grain, Facture, Sustainment, Mass... They can be found in alphabetical order in the *Alphabetical Index* at the beginning of this work, which gives the number of each section;

- finally, the more recent aim of providing a *Reader's Guide* going from the first to the last page, and summarizing the main themes of the *Traité* in a logical order.

As a result of these three aims, the *Guide to Sound Objects* has two parallel superimposed structures:

- a *logical progressive structure* in five parts, which only very minimally reflects the structure of the *Traité des Objets Musicaux*, and which is in essence completely new;

- a *numbered "list" of 100 sections* within the sections of the above structure, but which can be read independently and separately, as each section has its own *Index*.

To make the independent reading of each section possible, without requiring too many back-references, we have had to repeat ourselves from time to time, but the few repetitions when the book is read through systematically are, we believe, a minor inconvenience when compared to the usefulness of being able to read the book in two ways.

To sum up our project, let us say that the *Traité des Objets Musicaux* is a work largely written from a *diachronic* viewpoint, like an itinerary, an almost initiatory journey whose meanders, regressions, difficult gestations should be followed through (no important concept is presented without an *account* of the intuitions, the trials and errors which gave rise to it), and that we have cut out much of the *synchronic* material even though this means compacting and flattening out the text. Otherwise our work could have been of hardly any interest if it had simply been a digest of the *Traité*. Our wager is that this reduced vision will allow a more thorough, better guided, more "informed" new reading of the *Traité*, because of the *other viewpoint* it gives.

Similarly, we have selected *five* of the most important diagrams in the *Traité* (which contains very many), and have appended them so that the reader can find linked together most

of the key concepts dealt with separately in the Guide. For greater convenience, these diagrams are referred to by short “code-names”: BIFINTEC (Final Summary of Listening Intentions), PROGEMU (Programme of Musical Research), TARTYP (Summary Diagram of the Typology of Musical Objects), TARSOM (Summary Diagram [15] of the Theory of Musical Objects), together with the introductory table of the *Four Listening Modes*.

Finally, our grateful acknowledgments to all who have enabled this work to be completed: first to Pierre Schaeffer, who showed us the very great confidence of allowing us to write it in our own way (it is unnecessary to mention here all that we owe to him: the *Guide to Sound Objects*, which we dedicate to him, should bear witness to this); also, to François Bayle and the INA/GRM, patient commissioners of this *Guide*; and to Geneviève Mâche and Suzanne Bordenave, who typed most of it with great accuracy; Jack Vidal, who contributed extensively to reducing the *Traité**; to the Department of Music and Dance of the Ministry of Culture, whose financial support will make the price of this work more accessible to the wider public to whom it is addressed, and finally, to all those many people who have encouraged us to complete it by expressing their most friendly impatience for it to be finished!

M.C., 10-11-82

* Éditions du Seuil who have kindly allowed us to reproduce quotations and diagrams from the *Traité des Objets Musicaux* in this work.

This table allows the reader to consult this Guide like a dictionary; the numbers indicated refer to the numbering of the articles from 1 to 100.

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We would like to express our thanks to Michel Chion for his co-operation in producing this translation. Chion's exegesis of Pierre Schaeffer's theories has, in our opinion, the rare merit of being as indispensable as Schaeffer's original work. We hope that our translation captures something of the spirit of both Michel Chion's 'Guide des objets sonores' and Pierre Schaeffer's 'Traité des objets musicaux'.

We would also like to express our gratitude to Daniel Teruggi, the current director of the Groupe des Recherches Musicales, for supporting this project. His enthusiasm for the translation of French texts into English was greatly encouraging.

Lastly, we would like to thank Professor Leigh Landy, the director of the Music, Technology and Innovation Research Centre at De Montfort University, UK. Without Professor Landy's help this translation would, without doubt, still be seeking a suitable academic home. We hope his considerable patience during the course of many revisions has been finally rewarded.

John Dack, Christine North.

March, 2009, London

A. *The acousmatic revelation*

A number of historical circumstances has led to the notion of the sound object. First, the initial discoveries of “musique concrète” with its two inaugural experiments: the *closed groove* and the *cut bell*; then, the awareness of a listening situation, not new, but whose originality had never been identified or given a specific name; the acousmatic situation.

» 1. ACOUSMATIC

1) *Acousmatic*: a rare word, derived from the Greek, and defined in the dictionary as: *adjective, indicating a noise which is heard without the causes from which it originates being seen.*

The word was taken up again by Pierre Schaeffer and Jérôme Peignot to describe an experience which is very common today but whose consequences are more or less unrecognised, consisting of hearing sounds with no visible cause on the radio, records, telephone, tape recorder etc.

Acousmatic listening is the opposite of *direct* listening, which is the “natural” situation where sound sources are present and visible.

The acousmatic situation changes the way we hear. By isolating the sound from the “audiovisual complex” to which it initially belonged, it creates favourable conditions for *reduced listening* which concentrates on the sound for its own sake, as *sound object*, independently of its causes or its meaning (although reduced listening can also take place, but with greater difficulty, in a direct listening situation).

2) *Effects of the acousmatic situation*: the acousmatic situation alters the conditions of listening, with certain characteristic effects. Some of these are:

a) The help provided by sight to identify the sound sources is absent. “*We discover much of what we thought we were hearing was in reality only seen and explained by the context*” (93).

[19] b) Sight and hearing are dissociated, encouraging listening to sound forms for themselves (and hence, to the sound object).

Indeed, if curiosity about causes remains in acousmatic listening (and it can even be aroused by the situation), the repetition of the recorded signal can perhaps “exhaust” this curiosity and little by little impose “*the sound object as a perception worthy of being listened to for itself*” (94), revealing all its richness to us.

c) By repeated listening to the same recorded sound fragment, the emphasis is placed on variations of listening. These variations do not arise from a “blurring” of perception, but from “*specific moments of illumination, directions which are always precise and always reveal a new aspect of the object, towards which our attention is deliberately or unconsciously drawn*” (94).

3) *The acousmatic experience*: the rare word “acousmatic” also described in Greek a sect of the disciples of Pythagoras who were said to follow a form of teaching where the Master spoke to them hidden behind a screen. This was done in order to distract their visual attention from his physical appearance.

P.S. emphasises the *initiatory* significance of the acousmatic experience which enables the listener to become aware of his perceptual activity as well as of the sound object.

It was the acousmatic nature of sound on the Radio which, in 1948, led him to develop a self-contained “noise music” which he was to call *musique concrète*. This is why he came to extend the meaning of the term “acousmatic” and speak of the “acousmatic experience” to describe a new way of hearing: “*giving oneself over entirely and exclusively to listening*”, in order to discover the path from the “sonorous” to the “musical”. The tape recorder in this research plays the initiatory role of “*the screen of Pythagoras*”, by creating not only new phenomena to be studied (by manipulations in the studio), but also and above all “*new conditions for observation*” (98).

Acousmatic and acoustic

We must take care not to misinterpret the acousmatic situation, for example by making a distinction between the “objective” – what is behind the curtain – and the “subjective” – “*the listener’s reaction to these stimuli*” (92) in an over-scientific simplification of the phenomenon. On the contrary “*the acousmatic involves a reversal of the normal course of events (...) it is no longer a question of knowing how a subjective listening interprets or distorts ‘reality’ or of studying reactions to stimuli; the listening itself becomes the origin of the phenomenon to be studied. (...) The question: ‘What am I hearing?... What precisely are you hearing?’ is turned back on to the subject, in the sense that he is being*

asked to describe, not the external references of the sound he perceives, but his perception itself.” (92).

So Acousmatic and Acoustic are not opposites like objective and subjective. Insofar as it is a procedure (and not just simply a situation) the Acousmatic “*must be unaware of (...) measures and experiments which apply only to the physical object, the acoustician’s ‘signal’.* But the fact that the Acousmatic is focused on the subject does not mean that it must give up all claim to its own objectivity (...). The problem is how, by comparing subjective experiences, we might find something that several experimenters could agree upon” (92).

[20] This research, guided by the *reintroduction of phenomenology* which inspires every stage of the T.O.M. will lead to a definition of the *sound object* in its “inherent objectivity” based on a new listening mode: *reduced Listening*.

ACOUSMATIC: 90, 91-98, 150-151, 468.

» 2. CLOSED GROOVE / CUT BELL

The “closed groove” and the “cut bell” are the two “experiments in interruption” which were at the origins of *musique concrète* and certain discoveries in experimental theory.

1) At a time when such music was made on *supple discs*, the closed groove experiment consisted in closing a recorded fragment in on itself (as is done accidentally by a scratch), thus creating a periodic phenomenon taken, either by chance or deliberately, from any sound continuum and able to be repeated indefinitely. With the arrival of the tape recorder, the tape loop replaced the closed groove by creating an exactly similar effect. Widely used in *musique concrète* during this period, the closed groove led to an awareness of the sound object and reduced listening: how, indeed, could this sound fragment be described *in itself*, when the “causal” and anecdotal perception was soon over and when it presented itself to the listener as an “object”, always identical yet always capable of revealing new characteristics when heard over and over again?

2) The experiment of the *cut bell* also involved intervening in the progress of a recorded sound: if a fragment of the resonance of a bell was “taken out” after its attack, then, by evening out its dynamic behaviour and repeating this fragment using the technique of the “closed groove”, “*a sound like a flute*” (417) could be heard. This experiment led Pierre

Schaeffer to the idea, which he was to verify in subsequent experiments, that the recognition of a timbre was not linked as much as was thought at the time to the presence of a distinctive harmonic spectrum, but also to other characteristics in the *form* of the sound (particularly the attack).

As an “*experiment in interruption*”, isolating a sound from its context, manipulating it, and thus creating a new sound phenomenon which could no longer be traced directly to its cause, the experiment of the *cut bell* together with the *closed groove* encouraged people to practise “reduced listening” and draw out from it the notion of the sound object (391).

Typologically, the closed groove can be put under the same heading as an *ostinato* (cyclic repetition of a fragment) in its usual sense, whereas the artificial and brief sounds of the cut bell, if they are not repeated in closed grooves, can be classed with *fragments* (see **80** and **81**).

CUT BELL: 391, 417, 455.

CLOSED GROOVE: 23, 65, 391, 455.

[21]

B. *Physical Signal and Sound Object*

Before discussing in detail what a sound object is, we shall begin by saying what it is not:

- It is not a simple “translation” by the ear of a physical signal, as a whole current of musical thought contemporary with the T.O.M.’s research encouraged people to believe. Hence, several pages of the T.O.M. contain a formal critique, backed up by numerous experiments, of this tendency which involves reducing auditory perception to a sort of identical copy of an “objective” physical signal. It points out that there are very variable *correlations* between the physical signal and the perceived sound, which can be characterised by phenomena called *anamorphoses* and which demonstrate that sound cannot be reduced to a linear translation of a stimulus.

- Similarly, if the sound object is associated with a new listening mode which we shall call reduced listening, we should first try to understand the mechanism of “ordinary”, non-reduced listening modes. For there are several: at least 4. These are the 4 *listening modes* defining 4 *sectors*, 4 ways of considering our relationship to sound. These four sectors recur throughout the *Guide to Sound Objects*.

» 3. PHYSICAL SIGNAL

1) We cannot deny that every heard sound is the perception of a vibrating phenomenon occurring in the physical world. But it is impossible to claim to deduce from this, as was often the case during the 50s and the 60s, that perceived musical values are measurable and identifiable from the particular parameters of this physical signal.

Indeed, it is important to distinguish SOUND as a physical signal and thus measurable by machines, and SOUND as a sound object, which arises from a perceptual, qualitative experience, which can no more be identified by a physical phenomenon than the perception of a colour is by a wavelength.

2) The “PHYSICAL SIGNAL” is, therefore, sound as an energetic phenomenon acting in the physical world (electric current, mechanical vibration), existing independently of any “listener”, but which allows him to hear a “sound object”.

This physical signal can be located and quantified by its particular qualities (frequency, amplitude, chronometric time, etc.) using measuring devices; it can be recorded and reproduced by recording and reproducing equipment which also allows it to be manipulated; and it can also be synthesized electronically with very precise determination of each of the characteristics cited above (frequency, amplitude, etc.).

[22] It is true that the CORRELATIONS between the variations of a physical signal and the perceived sound object which corresponds to it are close, but they are not a direct copy. It is the job of “psychoacoustics” to study these correlations from simple physical examples (pure frequencies for example), and particularly all the phenomena of distortion (anamorphoses) which occur when moving from one to the other, as a result of the PHYSIOLOGICAL properties of the ear and the PSYCHOLOGICAL data which intervene in the act of listening.

The active role of the ear in constructing and defining the characteristics of perceived sound can be demonstrated by showing that in certain cases the ear perceives fundamental notes which do not physically exist but which it supplies from the spectrum of their harmonics.

Pierre Schaeffer’s challenge to “scientific prejudice” (through which sound is equated with the perception of its physical components, giving the practice of music the status of a “science”) is based, therefore, on PSYCHOACOUSTIC experiments (reported in book III),

but it aims to go beyond the elementary examples studied by ordinary psychoacoustics to attain the status of MUSICAL EXPERIMENTATION.

The aim of this experimentation, which Schaeffer differentiates from psychoacoustics is “*to establish experimental relationships between the physical signal (sound, defined by acoustic parameters) and the musical object (perceived with the intention of musical listening)*”, this research “*is not affected by any preconceived theories based on the findings of psychoacoustics*” (168).

a) *Difference between physical signal and musical object.*

“*The physical signal... is not sonorous, in the sense of something which is grasped by the ear. It has to do with the physics of elastic environments. It is defined in relation to norms, and its own system of reference*” (269).

In his research into sound, Schaeffer says, “*the acoustician is concerned with two things: the sound object which he listens to, and the signal which he measures. From his erroneous viewpoint, all he has to do is first put down the physical signal, consider what he listens to to be its result, and the sound object as a subjective manifestation... He forgets that IT IS THE SOUND OBJECT ITSELF, WHICH IS GIVEN IN THE PROCESS OF PERCEPTION, THAT DETERMINES THE SIGNAL TO BE STUDIED, and that therefore it cannot possibly be reconstructed from the signal. The proof of this is that there is no principle of physics which would enable him, not only to differentiate, but to have any notion of the three sounds C, E, G, contained (and mixed together) in a few centimetres of tape*” (269).

b) *Psychoacoustics and experimental music in relation to the physical symbol.*

Whereas psychoacoustics looks for simple examples, such as pure frequencies, in order to study “*the connections between variation in an elementary physical dimension of the object and variation in a sensory value*”, the experimental musician, “*has no particular predilection for physically straightforward stimuli. What interests him,... are clearly perceived dominant musical perceptions, which may quite well be caused by sounds which are physically very complex... The musician’s ultimate point of reference is the ear*” (170).

So, in contrast to the psycho-acoustician, the musician does not seek to explain the individual’s “black box”. He lives “*in an original world which he studies for itself, the world of musical perceptions*”(171).

[23] PHYSICAL SIGNAL: 159-171, 269.

» 4. CORRELATIONS

1) The relation between the physical signal which produces the sound impression, and the perceived sound itself, is called the *correlation*. The term correlation signifies that there is no regular and automatic similarity between one and the other, but that perception intervenes with its own character and specific laws and is not content passively to “imprint” the variations of a physical “stimulus”.

The study of these correlations therefore consists in examining a certain number of those examples where perception apparently contradicts or problematizes the measurements indicated by the physical signal: not because it is “blurred” or “deceptive”, but because it possesses its own inherent objectivity which cannot be reduced to the world of physical phenomena.

The author notes that until now the study of these correlations has been neglected, particularly by those who wanted to base a musical technique on acoustic laws, and who therefore postulated that music and acoustics were consistent with each other.

2) More generally we intend to study the “*reasonable and reasoned correlations*” between *acoustics* and *music* by defining the “objects and methods” specific to each domain. While acknowledging the closeness of their relationship, the author believes it is time to define their true nature.

Examples of correlations between physical signal and sound object

Book III of the TRAITÉ examines, with supporting experiments, some examples of correlations between parameters that belong to the physical signal and properties of the perceived sound object.

For example:

a) *The correlation between spectrum and pitch*, where it appears that the concept of perceived pitch, “*far from being apparent, and connected, as people say, to the frequency of the fundamental, is a complex, plural concept*” (188) and “*the apparent bulk or mass of a sound, or its precise position in pitch do not exactly correspond to the physical bulk of the spectrum or the position of a fundamental.*”(192).

Experiments on the *thresholds* of pitch *differentiation* demonstrate the importance of familiarisation and context in the perception of very small variations (Francès’ experiment on harmonic vectors, cf. his book, *la Perception de la Musique*, p. 67ff.).

b) *Experiments on thresholds and transitionals*: the minimum time-thresholds of the ear for recognising pitches, articulations and timbres play an important part in the perception of the physical characteristics of sound.

c) *Experiments in “anamorphoses of dynamics and timbres”* (see ANAMORPHOSES): these experiments establish the importance of the dynamic development of sound, throughout its duration, to the perception of its attack and timbre.

d) *Experiments on time and duration*: these lead us to posit that perceived musical duration is a function of the density of information (time-duration anamorphosis).

[24] All these experiments, which demonstrate the discrepancy between the physical and the perceived, are a preliminary to research into a new experimental theory of perceived sound, which would define its own objective criteria instead of borrowing a semblance of objectivity from other disciplines.

CORRELATIONS: 58, 128, 144-147, 157-258 (Book III), 267, 275.

» 5. ANAMORPHOSIS

1) A particular example of the correlation between physical signal and sound object characterised by “certain irregularities” which are noticeable in the transition from physical vibration to perceived sound “*suggesting a psychological distortion of physical ‘reality’, and which demonstrates that perception cannot be reduced to physical measurement*” (216).

Anamorphoses which appear whilst perceiving sounds involve, amongst others, the dimension of time: these are called *temporal anamorphoses*.

For example, the attack of a sound is associated by the listener with the beginning of the sound, whereas splicing experiments show that this perception of attack is a synthesis made subsequently by the ear of the sound’s energy profile over its entire duration, and in a very variable manner depending on its specific dynamic and harmonic profile.

In other words, a phenomenon which is physically spread over the complete duration of a sound, i.e. its dynamic development, will be perceived as a specific quality of attack. This dynamic development turns out to be important in characterising the *timbre* of the sound object, which cannot then be reduced to a characteristic harmonic spectrum.

In the same way, experiments on time and duration lead to the contention that musical duration as heard is not the same as “objective” duration. Even when the “chronometric”

duration is the same, a sound which is rich in information will be perceived as longer than a sound which is “poorer” and more predictable. (TIME-DURATION ANAMORPHOSIS, 248).

Thus, a reversed piano sound will appear longer than the original because the reversed version is more unusual and engages the ear more actively.

2) In a secondary sense, derived from the first, the term anamorphosis is used in the study of the theory of variations (see 30) to indicate the most rapid and the densest of the three speeds of variation that can be heard. The two other degrees of speed and density are called *progress* (slow speed and density of variation) and *profile* (medium speed and density of variation).

ANAMORPHOSIS: 216-231, 232-243, 248, 251, 253, 255, 563 (in its second meaning of sounds with rapid variation, see p.567, 568, 572).

[25]

C. *The circuits of “ordinary” listening*

» 6. THE FOUR LISTENING MODES

1) There are *four modes of listening* (Listening [Écouter], Perceiving [Ouvir], Hearing [Entendre], Comprehending [Comprendre]) which can be arranged in a four quadrant table, with four *sectors* numbered from one to four. These four sectors, defined in such a way, clearly located and each given a code number, will help us to understand not only musical research and the functioning of traditional music, but also the relationship between music and language and the physical signal and the musical object. In effect, they arise from the intersection of two pairs which are encountered universally in every perceptual activity: the pair Abstract/Concrete and the pair Objective/Subjective (the meeting of the *object of perception* and *the activity of the perceiving consciousness*). The T.O.M therefore contains a certain number of tables focusing on various questions which, in their layout, stem from this initial matrix-table of the four listening modes:

4. COMPREHENDING [COMPREDRE]	1. LISTENING [ÉCOUTER]
3. HEARING [ENTENDRE]	2. PERCEIVING [OUÏR]

The clockwise numbering will soon become familiar: it indicates not a chronological sequence but a “circuit”, where perception moves in every direction and where the four sectors are most often involved simultaneously, interacting with each other.

But what are these four listening modes? What do these four everyday verbs mean in the language of the T.O.M.? Listening, Perceiving, Hearing, Comprehending.

In sector 1 - *Listening*, means listening to someone, to something; and through the intermediary of sound, aiming to identify the source, the event, the cause, it means treating the sound as a *sign* of this source, this event (Concrete/Objective).

In sector 2 - *Perceiving*, means perceiving by ear, being struck by sounds, the crudest, most elementary level of perception; so we “hear”, passively, lots of things which we are not trying to listen to or understand (Concrete/Subjective).

In sector 3 - *Hearing*, here, according to its etymology, means showing an intention to listen, choosing from what we perceive what particularly interests us, in order to make a “description” of it (Abstract/Subjective).

In sector 4 - *Comprehending*, means grasping a *meaning*, values, by treating the sound as a sign, referring to this meaning through a language, a code (semantic listening; Abstract/Objective).

[26] These four modes can be summed up more or less in this sentence: “*I perceived (ouïr) what you said despite myself, although I did not listen (écouter) at the door, but I didn’t comprehend (comprendre) what I heard (entendre).*”

(3) & (4)
 ABSTRACT

(1) & (2)
 CONCRETE

because the object is stripped down to qualities which describe perception (3) or constitute a language, express a meaning (4).

because the causal references (1) and the raw sound data (2) are an inexhaustible concrete given.

<p>(4) COMPREHENDING</p> <p>A meaning conveyed by SIGNS.</p>	<p>(1) LISTENING</p> <p>Events, causes, of which the sound is an INDEX.</p>	<p>(1) & (4) OBJECTIVE because we turn towards the object of perception.</p>
<p>(3) HEARING</p> <p>selected sound object by means of selective perception.</p>	<p>(2) PERCEIVING</p> <p>raw sound objects by means of raw perception.</p>	<p>(2) & (3) SUBJECTIVE because we turn towards the activity of the perceiving subject.</p>

(after the *Table of Listening Functions*, 116, see *Appendix*)

a) *The circuit of the four listening modes.*

First, the four listening modes involve two sets of comparisons:

- vertically, between abstract and concrete;
- horizontally, between objective and subjective.

The bottom half (2 and 3) concentrates on the person who is perceiving, the top half (4 and 1), on his objects of perception.

- On the left (4 and 3), we have the two abstract sectors: the process of listening, (below), with HEARING, which involves the selection of certain qualities of sound, turns (above) with COMPREHENDING, towards the comprehension of a meaning through abstract values, a code, etc.

- On the right (1 and 2) we have the two concrete sectors: listening (below), with PERCEPTION, a “raw perception” of sound, turns (above), with LISTENING, towards the recognition of the real-world source of the sound and its agent, through the indications given by the sound.

“Whether we’re talking about subjective listening, or values and knowledge emerging collectively, the whole idea in 3 and 4 is to strip down, and consists in retaining from the object only qualities which will allow it to be related to others, or to be referred to meaningful systems. On the contrary, in 1 and 2, whether we’re talking about every potential for perception in the sound object, or every causal reference in the event, listening turns towards a given in the real world, inexhaustible as such, even though specific” (119)

[27] These two sets of comparisons, between Objective and Subjective, Abstract and Concrete can, according to the author, be found in all human activity:

“In every act of listening (...) on the one hand there is the encounter between a person receptive within certain limits and an objective reality; and on the other hand, abstract value-judgements, logical ways of describing, detach themselves from what is given in the real-world, which tends to organise itself around these, but without ever being reduced to them” (119).

Every listener can “specialise” in one “*of the four poles which arise from this two-fold tension*” (119), but always in relation to the 3 others:

“No specialist can in fact dispense with “going round” the whole cycle of quadrants several times, because no-one can escape from his own subjectivity when dealing with a supposedly [abstract] objective meaning or [concrete] event, or from the [abstract] logical deciphering of a [concrete] event inexplicable in itself, and hence from the uncertainties and the progressive learning process of perception”(119-120).

b) A “*dangerous intersection*”: another compartment for the abstract.

So, until page 308 inclusive of the T.O.M., the various tables in 4 sectors which Pierre Schaeffer develops from the initial 4 listening modes table (113) for his own reflection, are

divided into a *concrete* side on the right (1 and 2) and an *abstract* side on the left (3 and 4). They are respectively:

- *The table of listening functions* (116) which summarises the characteristics of the 4 listening modes (this diagram is “visually represented” on the cover of the work in 4 pictures illustrating each mode);

- the diagram in two parts showing the *correlation between the physical and musical object* (fig.1, 144) for the physicist and musician;

- the two diagrams with their variants showing the listening mode *omitted in language* (307 and 308), comparing *language* with music;

The final summary of listening intentions (fig. 2, 154) does not follow the arrangement into 4 sectors, but can be found in a y-shape with a concrete side on the right (listening to sound as an *indication* of an event) and an abstract side on the left (listening to sound as the carrier of a *meaning*) (see BIFINTEC)

At one stage, where the “experimental system” is introduced, this dividing line is put into question. Sector 1, the causal reference to source (*listening* to an instrument) is relocated on the abstract side. For example, reference to an instrument (such as the violin) on a traditional score shows a certain level of abstraction despite appearances.

“Thus, the term violin in the indication “a G on the violin” is no less abstract than the value of the symbol G. Leaving aside everything else, what has been retained is what could be common to all possible violins” (317).

After this new interpretation of sector 1 as showing not only a concrete reference to a particular source (*violins*) but also a more general reference to the fact that *a* characteristic type of instrument (*the* violin, with its generic timbre), or even a *genre* of characteristic sources is an abstraction, only sector 2 (raw “hearing”) of the rest of the 4-sector diagrams in the T.O.M. remains truly concrete.

This is true of the following diagrams, in order:

- *Comparative table of materials for language and music* (314).
- *Summary of Musicality-Sonority (Traditional System)* (fig. 20, 320);
- *Sonority and Musicality of the instrumental fields* (fig. 21, 324);
- *Comparison between the code of conventional languages and the repertoire of noises* (fig. 22, 338);
- [28] *Traditional musical system* (fig. 23, 367);
- finally, and most importantly, the *Programme of Musical Research* (fig. 24, 369) known as PROGEMU (see *Appendix*).

In the latter, sector 2 (*Typology*) which is still concrete, is precisely the sector on which the 4-stage programme for the reclamation and synthesis of the musical is based.

These typographical considerations may seem otiose, but the T.O.M. continually shows the importance which the author gives to the *spatial arrangement* of the (usually dual) ideas he is dealing with, in *tables* which in most cases arise from the principle of 4 sectors, which is itself based on the intersection of 2 opposites. Without their relationships, their interdependences and their polarities (“visually” represented and created within a two-dimensional “conceptual space” in this great number of diagrams), the ideas in the T.O.M. have neither meaning nor function. So it is no surprise that Pierre Schaeffer takes two pages in the T.O.M. (316-317) to justify his reorganisation of the initial placing of the pair Abstract/Concrete within the 4 original sectors, and that he points out that the critical moment when concepts must be expressed in spatial terms is a “dangerous intersection” (§18, 2, p. 316).

c) *Summary of the diagrams in the T.O.M. based on the 4 sectors.*

1. *Table of listening functions* (116); this is the diagram on which the cover of the T.O.M. is based.
2. *Correlation between the physical and musical object* (144): here each has its diagram, there is one for the physicist, one for the musician.
3. *Final Summary of listening Intentions* (154, BIFINTEC). This diagram is not divided into 4 sectors, but is a new layout of the first diagram on p.116.
4. *Comparison of Language and Music* (307 and 308). Here, in the same way, language and music are compared in 4 sectors one after the other; there are two variants of the diagram.
5. *Comparative Diagram of materials for language and music* (314).
6. (Untitled) diagram illustrating the eventual “intersection” of the 4 sectors: instead of objective-subjective crossing over abstract-concrete we have meaning-event crossing over general-particular (317).
7. *Summary of musicality-sonority (traditional system)* (320): musicality is “above” (sectors 1 and 4); sonority is “below” (sectors 2 and 3).
8. *Sonority and Musicality of instrumental fields* (324). This diagram is shaped like a sort of kite with its four corners held out by the 4 sectors.
9. *The code of languages and the repertoire of noises* (338).
10. *The traditional musical system* (367). This diagram shows a new dualism

Identification (sectors I and IV) and *Description* (sectors II and III) (see **23**).

11. *Programme of Musical Research* (369, PROGEMU). This is the richest and most complex, as in effect it contains two interlaced diagrams, one on the “traditional system” (boxes I and IV in Roman numerals), the other on the “experimental system” (boxes 1 to 4 in Arabic numerals, where the four main stages of the Music Theory can be found: Typology, Morphology, Analysis, Synthesis).

12. (Untitled) *The “four musics”* (638) – see *Polyphony/Polymorphy* (**31**).

FOUR LISTENING MODES (THE): 112-120, 121, 125, 142, 144, 154, 307, 308, 314, 317, 320, 338, 363, 367, 369, 497, 498, 499, 501, 615.

[29] » 7. ORDINARY/SPECIALIST (LISTENING MODES)

1) One of the two pairs of listening modes, together with the pair natural/cultural.

Ordinary listening goes immediately to the *causality* of the sound, its origins, as well as its meaning (sectors 1 & 4, LISTENING and COMPREHENDING) but does not reflect very much on itself (sectors 2 & 3 PERCEIVING and HEARING) or on how it functions.

Specialist listening concentrates on a particular manner of listening. For example, the sound of galloping: ordinary listening hears it as the galloping of horses, but different specialised listenings hear it differently; the acoustician seeks to determine the nature of the physical signal, the Native American Indian hears “the *possible danger of an approaching enemy*”, and the musician hears *rhythmic groupings*.

We must, however, beware of thinking that ordinary listening is more “subjective” and specialist listening is more “objective”; the opposite could equally be argued.

2) Each listening mode has its own limits: ordinary listening gives an imprecise “automatic response” about its subject. Specialist listening shuts itself off from certain meanings, certain potentialities, or else it tries to bring everything into its own domain: for example, “physicist’s” listening, which ignores all the perceptions which it cannot reduce to its field, without seeing that “*every specialised auditory activity establishes a domain of objective practices which are entirely original*”(127).

ORDINARY/SPECIALIST: 121-122, 123-126, 127, 128, 152-154, 337.

» 8. NATURAL/CULTURAL (LISTENING MODES)

Natural listening is the “main and primitive tendency to use sound for information about the event” (120) and is expressed in the question: “What is it? Who is it? What’s happening?” It corresponds, therefore, to sector 1 (LISTENING).

Cultural listening “turns away (...) (without ceasing to hear it) from the sound event and the circumstances which it reveals about its source and uses it as a means to comprehend a message, a meaning, values” (sector 4, COMPREHENDING) (121).

The two pairs of listening modes, ordinary/specialist, natural/cultural, are interlocked, in competition or association: these notions clarify how listening and its circuits operate and thus bring out the originality of *reduced listening* in comparison.

NATURAL/CULTURAL (LISTENING MODES): 120-121, 152, 153, 271, 337, 345.

[30]

D. *Reduced Listening*

With the concepts of *reduced listening* and *sound object* the author aims to reinstate phenomenological concepts about music which, when he formulated these ideas, were contrary to the spirit of the times, and perhaps still are.

The phenomenological concepts of *intention* and *epoché* will help us understand what reduced listening is.

» 9. INTENTION

1) A phenomenological concept which maintains that the perceived object is an “*intentional unity, arising from acts of synthesis*” (263). If the object transcends every partial experience that I have of it, it is in my experience that this transcendence is formed. There is a correlation between a certain hearing intention and a certain heard sound object or sound criterion. “*To each domain of objects, therefore, there is a corresponding type of ‘intentionality’. Each of their properties reflects activities of consciousness which are ‘constitutive’ of them: and the perceived object is no longer the cause of my perception. It is the ‘correlate’ of it*” (267).

2) The correlation between perceptual intention and the perceived object is one of the fundamental notions of *phenomenology* which Schaeffer *reincorporated* into musical research, which was dominated in the 50-60s by the scientist notion of a musical object as an object in itself. For Schaeffer, on the contrary, the “*sound object is the meeting point of an acoustic action and a listening intention*” (271).

a) *The hearing intention.*

This is the title of chapter VIII of the *Traité*, where P.S. remarks that the word *hear* (*entendre*) implies the idea of intention by its etymology (“*intendere*”), but that the word has lost its meaning and now expresses only the idea of passive reception. Hence the etymologically tautological expression: HEARING INTENTION.

There are different hearing intentions: scientific, musical and “philosophical”. When we perceive through a sound which is the index of its cause, or the meaning it carries, on both occasions this is the result of a specific hearing intention (of course the two intentions can apply concurrently to the same musical object). *Reduced listening* is a new *hearing intention*, consisting in turning the listening intentions, which seek a meaning or event beyond the sound, back on to the object itself.

But these different intentions are not completely mutually exclusive.

“*Nothing can stop a listener from varying*” this hearing intention “*passing from one system to another or from a reduced listening to one that is not. (...) it is this swirl of intentions that creates connections or exchanges of information*” (343).

Part of the research into the sound object consists in defining new *hearing intentions* which groups of researchers can agree upon, with the help of a new vocabulary (which P.S. calls a “*metalanguage*”). So, the notion of a criterion for the sound object, contrary to the classical notion of “*parameter*” (which to a greater or lesser extent supposes the *objective* existence of a sound separate from the hearer) refers to a specific hearing intention which grounds it.

[31] b) *The heard intention.*

We can use this expression (which is not from P.S. himself) to describe, not the intention shown by the listener in his listening, but the intention which he senses is being brought into play, or otherwise, when he hears a sound: in this way we can differentiate between sounds without intention (sounds of natural phenomena, mechanical sounds) and

intentional sounds essentially made in order to communicate (352). For example: “*an animal cry, the human word and morse code or a tam-tam*” (352). In this case the particular status of music could be to be “*on the cusp between the strange duo of the agent and the message: the intention of making music consists in taking first category sounds (which do not belong to any form of language) and making them into a second category communication (but without wanting it to say anything)*” (352).

c) *Intention and invention.*

In contrast to the hearing intention is the intention to *make*, to manufacture sounds: this is where *invention* comes in (353-354). Invention, which relates to *homo faber* and *making* rather than *hearing*, can also bring a wide range of intentions into play.

INTENTION: 140-154, 155-156, 263, 267, 271, 276, 292, 293, 302, 339, 343, 352-354, 399, 480-482.

» 10. ÉPOCHÉ

1) From the Greek *εποχη*, this phenomenological term, borrowed from Husserl, describes an attitude of “suspending” and “putting in parentheses” the problem of the existence of the external world and its objects, as a result of which consciousness turns back upon itself and becomes aware of its perceptual activity in so far as the latter establishes its “intentional objects”. Époché is the opposite of “naive faith” in an external world filled with objects-in-themselves, the causes of perception. It is also the opposite of the “psychologist” model which considers perceptions as “subjective” imprints of “objective” physical stimuli. Finally, it differs from “Cartesian methodical doubt”, in so far as it avoids all theories about reality or illusion.

This disengagement of perception (also called: phenomenological reduction, exclusion from the physical and moral world, etc.) allows us to grasp the experience of perception. “... *at the same time as the object which it presents to me. And then I realise that transcendence [of the object in relation to the changing flux of the different ways it is perceived] is **formed** in my **experience***” (267).

2) In the particular case of listening, *époché* represents a deconditioning of habitual listening patterns, a return to the “original experience” of perception, enabling us to grasp the sound object at its own level as a medium, an underlay of the perceptions which use it as the *vehicle* of a meaning to be understood or a cause to be identified.

The “putting in parentheses”, which is what *reduced listening* is, and is thus an *époché*, leads us then:

- to “put to one side” the consideration of what the sound refers to, in order to consider the sound event in itself;
- [32] to distinguish this perceived sound event from the **physical signal** to which the acoustician attributes it, and which itself is not **sound**.

a) *Phenomenology without realising it.*

“For years, writes, Pierre Schaeffer, *we have been doing phenomenology without realising it (...)* It is only after the event that we recognized in Edmond Husserl’s heroically rigorous definition the concept of the object postulated in our research” (262).

P.S.’s attitude has always been phenomenological, insofar as phenomenology is a “philosophy which suspends the affirmations of the natural approach in order to understand them, but (...) also a philosophy in which the world is always “already there”, before reflection, as an inalienable presence and where the whole undertaking is to rediscover this naïve contact with the world and ultimately to give it philosophical status” (Merleau-Ponty, *Phenomenology of Perception*, Introduction, I).

Like Merleau-Ponty, Pierre Schaeffer has always adopted the principle that “*I am not the result or the interaction of the many causalities which determine my body or my “psyche”, I cannot think of myself as a part of the world, simply as a subject of biology, psychology and sociology, nor limit myself to the universe of science. Everything I know about the world, even through science, I know as a result of a viewpoint which is mine or an experience of the world without which the symbols of science would have no meaning.*’ (Idem. III)

b) Another point on which Pierre Schaeffer agrees with phenomenological thought right from the start is that *reduction*, or *époché* defined by Husserl, does not consist in denying natural perceptions and relegating them to primordial nothingness, but in placing them in a new perspective:

“*The universal sidelining, the “inhibition”, the “invalidating” of any approach we can take towards the objective world – and above all the approaches concerning: existence;*

appearance; possible, hypothetical, probable existence etc. – or again, as people still say, the “phenomenological εποχη”, the “putting in parentheses” of the objective world, do not leave us facing pure nothingness. What conversely and through this very process becomes ours, or better still, mine, belonging to me, the thinking subject, is my life in its pure state with all its pure lived states and its intentional objects”. (Husserl, Cartesian Meditations, 17-18)

In the same way reduced listening as defined by Pierre Schaeffer does not consist in invalidating “natural” listening modes (of sound as index or sign) or calling them an “illusion”, but in unravelling the various *intentions of which it is composed* and turning these intentions back on to the *sound object*, the carrier of the perceptions which use it as a vehicle, and so defining it through a new *specific intentionality, reduced listening*.

*“Before a new method of training is possible, and a new system of references appropriate to the **sound object** can be established, I must **free myself from the indoctrination** of my former ways and run the gauntlet of the **époché**” (270).*

This is a rite of initiation, a return to the sources, and not a “return to nature”, since *“we find nothing more natural than accepting indoctrination. It is an anti-natural effort to perceive what previously unconsciously determined consciousness” (270).*

Reduced listening, which establishes the sound object as its “intentional object”, its “correlate” (and which does not arise from it as from its cause, as in the “physicist’s schema” which Pierre Schaeffer refutes) thus arises from an *époché*, a putting in parentheses of “natural” perceptual intentions. It demands that virtue of “wonder” [33] at the world, which Pierre Schaeffer displays, and from the very beginning of *musique concrète* exhorts the researcher to display.

ÉPOCHÉ: 265-267, 270.

» 11. REDUCED LISTENING

1) Reduced listening is the listening attitude which consists in listening to the sound *for its own sake*, as a *sound object*, by removing its real or supposed source and the meaning it may convey.

More precisely, it reverses the twofold curiosity about causes and meaning (which treats sound as an intermediary allowing us to pursue other objects) and turns it back on to the

sound itself. In reduced listening, our listening intention targets the event which the sound object is in itself (and not to which it refers) and the values which it carries in itself (and not the ones it suggests).

2) In “ordinary” listening the sound is always treated as a *vehicle*. Reduced listening is therefore an “anti-natural” process, which goes against all conditioning. The act of removing all our habitual references in listening is a *willed* and artificial act which allows us to clarify many phenomena implicit in our perception.

Thus, the name reduced listening refers to the notion of *phenomenological reduction* (epoché), because, in a way, it consists of stripping the perception of sound of everything that is not “it itself”, in order to hear only the sound, in its materiality, its substance, its perceivable dimensions.

Reduced listening and the sound object are thus *correlates* of each other; they define each other mutually and respectively as perceptual activity and object of perception.

a) *Origins of reduced listening.*

As we have said, it was the initial experiments on the cut bell and the closed groove which led P.S. and his research group to practise reduced listening and to formulate the concept. These two “*exercises in interruption*” (391) taught them to lose interest in the causality of sound – which is cancelled out by the redundancy of repetition in the closed groove, or masked by manipulation in the cut bell, and also to ignore the meaning it carried (also cancelled out or masked) and to place the emphasis on the substance of the sound.

But reduced listening cannot be practised at a stroke; to achieve it we have to go through deconditioning exercises to become aware of our “by reference” hearing reflexes and be capable of “*suspending*” them (270).

It is thus simultaneously a process of elucidation and of deconditioning.

b) *The other side of ordinary listenings.*

Reduced listening still retains a link with “ordinary listening” and is like “its other side”.

“*However reduced the listening to the sound object for itself is, we cannot detach its two sides one from the other, and the attachments it retains to the two aims which usually [34] go beyond the object: “What’s going on?” and “What does it mean? (...)” But “we can change our direction of interest, without wholly disrupting the basic intention which determines the structure: if we cease to listen to an event mediated by sound, we nevertheless*

continue to listen to the sound as a sound event" (271). Thus, a sound anecdote (such as the noise of a marble rolling about on an uneven surface), listened to with the intention of reduced listening, will have a structure homologous to the event-anecdote to which the sound refers: with the same progression, the same shape, the same "story".

So, P.S. shows no inconsequentiality when, in order to analyse the different types of the criterion of *allure* (in reduced listening, since the criterion is a property of the perceived sound object only as it is apprehended in reduced listening), he refers to three types of established causalities: human, "natural" or mechanical, and so apparently to something that reduced listening should completely discard. In fact, heard *allure* is identified, and its different degrees *determined*, each with its own characteristics, by these three types of causality.

"Attention concentrated on the object of reduced listening can use what it knows about the event, or even the meaning, the better to understand how the object is made" (293).

REDUCED (LISTENING); 154 (BIFINTEC), 155, 270-272, 289, 293, 332, 343, 344, 345, 347, 348, 349, 391, 468, 471.

» 12. SOUND OBJECT

1) The name sound object refers to every sound phenomenon and event perceived as a whole, a coherent entity, and heard by means of *reduced listening*, which targets it for itself, independently of its origin or its meaning.

The sound object is defined as the correlate of *reduced listening*: it does not exist "in itself" but by means of a specific foundational intention. It is a sound unit perceived in its material, its particular texture, its own qualities and perceptual dimensions. On the other hand, it is a perception of a totality which remains identical through different hearings; an organised unit which can be compared to a "gestalt" in the psychology of form.

2) A series of confusions often occurs about the nature of the sound object:

a) *The sound object is not the sound body:*

The sound body is the material source of the sound which can be identified from it. In French, with certain people, the ambiguity of the word "objet" adds to the already very common confusion between the *sound* and its causal event. This confusion must be avoided at

all costs. The *sound object* as a notion arises precisely from the radical distinction between the sound and its real or imagined causality.

b) *The sound object is not the physical signal*: the latter is not “sound” at all.

c) *The sound object is not a recorded fragment*.

It is not the same as the fragment of magnetic tape on which it is recorded, or the groove of the disc or any other piece of recorded material. [35] Indeed the same fragment, read at different speeds by various equipment, or in different ways (forwards or backwards), can be heard as *completely different sound objects*; the sound object itself is solely “of our hearing” and relative to it.

d) *The sound object is not a notated symbol on a score*:

For the same reason it is not the same as the more or less accurate written symbol which “notates” it.

e) *The sound object is not a state of mind*:

It remains the same across different listening modes, “*transcending individual experiences*”(269). One can therefore analyse it and describe it, giving it an *objectivity* of its own. However, how objects are distinguished and isolated in a “sound chain” is an intentional and non-neutral act.

In this way, reduced listening, after having studied a sound object as a totality, a whole, can also consider it as a composition of small sound objects which can be studied individually. Conversely, it can place the object in the wider context of a structure which can be considered as an object (law OBJECT/STRUCTURE, see 22)

However, we shall rely on certain rules (such as the choice of medium duration, which helps memorise the sound as a whole), to determine the “order of magnitude” which will be adopted to demarcate sound objects.

Sound object and musical note: insofar as it is a unit of sound, a “gestalt”, which can be made up of several micro-events bound together by a form, the sound object in a classical music cannot precisely match each note on the score: a harp arpeggio on the score is a series of notes; but, to the listener, it is a single sound object.

SOUND (OBJECT): 23, 53, 76, 95-98, 115, 154, 156, 161, 261, 268-274, 279, 289-290, 292, 293, 334, 343-344, 346, 347, 358, 384-385, 391, 415.

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 *triple* 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 Danhäuser: “*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 composition 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 objects* 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*” (Danhäuser, 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-characteristic 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 CHARACTERISTIC¹ is the CONCRETE SONOROUS basis
of a STRUCTURE of VARIATIONS of VALUE² 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**).

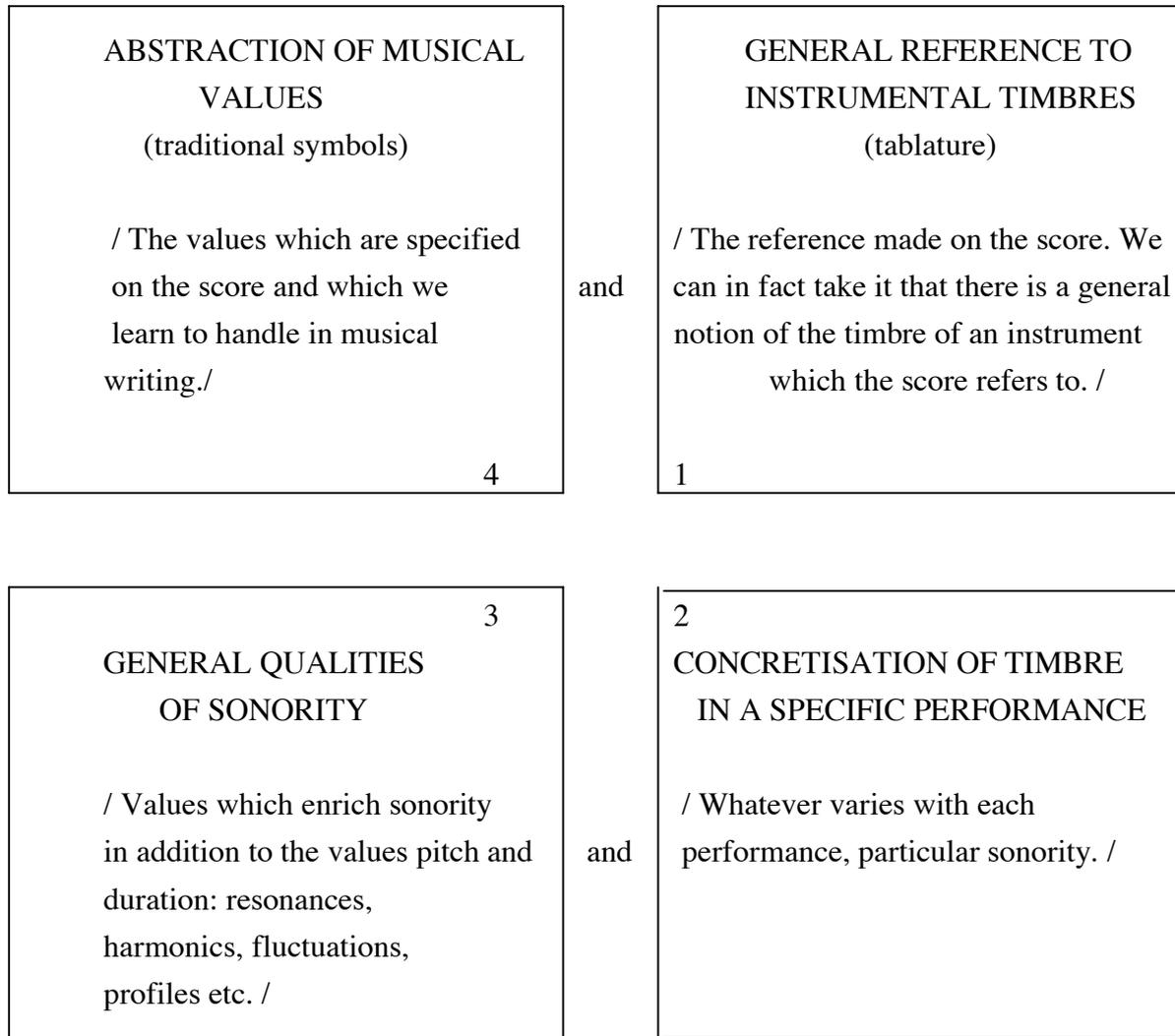
b) *Musicality/Sonority in the traditional system.*

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)



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 PROGEMU (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"* (ELG⁴, 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.

» 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 than 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 *epoché*). 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.

A. *Towards a new Music Theory*

Now we must tackle those tasks to which P.S. contrived to give the most forbidding names that he could find in the educational tradition: “Music Theory”, “Prose composition”, and “Translation” and all this to make “suitable” objects! A whole programme which, incidentally, is not lacking in humour: nevertheless we must give attention to it.

Without any doubt, with these words P.S. wanted to deter dilettantes, or those who thought they knew everything already, and whom he invited to start a new process of learning.

» 36. INTERDISCIPLINE, INTERDISCIPLINARY

1) The name interdisciplinary is given to research which, alongside specialist studies, seeks to find the functional link or the lateral relationship which can create a single subject, whose various aspects are scattered over disciplines which ignore each other either deliberately or by default. Music, insofar as it is an inclusive activity which cuts across many specific disciplines, is the privileged area for interdisciplinary research. This desire to demolish compartmentalizations and specializations is expressed in the subtitle of the *Traité*: “interdiscipline essay”.

2) There is also an intention to denounce the pseudo-interdisciplinary attitude in modern music which consists in mapping every discipline involved on to one privileged, usually scientific, model, (physics, mathematics, informatics etc.).

a) *Wariness of specialists: the general misapprehension.*

Contemporary practice is to “*publish only with extreme caution within the well-defined field of one’s competence*” (12).

This wariness is the source of much misunderstanding and leads to a neglect of broader fields of study and omission of the essential:

[89] “*For Westerners, music cannot be dissociated from a ‘theory of music’ which, if the manuals are to be believed, rests on a scientific basis, acoustics. University and conservatory teaching back each other up, and this is expressed in a certain number of definitions: musical note, scale, chord etc., considered as principles established once and for all, under the*

discreet keeping of specialists, physicists and musicians, who mutually support each other, or else declare themselves incompetent in a field which is not theirs” (18).

These specialists only labour so well in the field *“because they implicitly accept that there is a common stock, even a precise language, so that when they talk about music, they can understand each other. But as a result many well-known people work in good faith on principles which are only postulates, and terms which are ambiguous” (28).*

This is what the author calls the *“common misapprehension” (28).*

Hence his preoccupation: *“to discover the missing link between one discipline and another, not based on those crude or fragile links, physical content or literary analogy, but on a relationship cutting across all these, whose original workings are yet to be discovered” (11).* This exposes him to the constant risk of being at odds with the established order.

“It is to be feared that the author (...) may be in possession of a powder to make the specialists sneeze” (12).

The main disciplines which the T.O.M. discusses in relation to music are basically *physics* (book III) and *psychology*, as it happens, *phenomenology of perception* (book IV) and also *linguistics*.

“An interdisciplinary project is always ambitious, because of the specialisms it seeks to bring together. Either one researcher must take them all on, and he knows in advance that he will be no more than an amateur in each (...) or he must gather the specialists around himself, which is possible in theory but unmanageable in practice” (640), and P.S. adds, in 1974 *“a delicate matter socially”.*

b) *Music, a special challenge for interdisciplinary research...*

“ Music [as a universalizing activity which mobilizes several disciplines] validates what each contributes through synthesis, facts as much as ideas, and, in the same way as they do, presents itself as an act of discovery, which aims as much or even more to establish a branch of knowledge as to create works” (31) But it is not *“pre-established harmony”* that reigns between music and mathematics, psychology and acoustics, it is *“the disparate and the scattered”*. Why?

“If disciplines are so ill-met in music, even though this is a favoured place for them to come together, it isn’t because there’s something wrong with them, or that their coming together is badly organized, it’s because each one is pursuing its own specific goal, without any of them aiming for the main objective.” (29)

c) *Temptations for a single discipline to take over.*

We often try to unify the various disciplines under the umbrella of a single one.

“Tempted by the idea of unity, the only objectivity imagined by the typical scientist is physical objectivity. His acknowledgement of non-physicist truths is for him only the stage

which precedes their being annexed. He doesn't see that all specialized auditory activity establishes a field of objective practices which are entirely original, and not one of which can use the results of another unless it disqualifies its truths." (127)

The authentic interdisciplinary attitude is therefore, rather than hastily to claim unity, first to shed light on the *difficulties of moving* from one discipline to another: [90] this is what, for example, is being done by the study of *correlations* between physics and music, which is initially the study of their non-correlations (discrepancies, interpretative differences, double meanings of words, misunderstandings about concepts and finally actual mistakes in facts and statements).

So we must fight against "*scientific prejudice*" (the title of chapter 7, 1) which is responsible for the imperialism of mathematical and physics models taking over in music. The "rigour" of procedures based on these models comes to nothing if it gives "*results that cannot be interpreted in the field of music*". (138)

INTERDISCIPLINE: 11, 12, 18, 28-30, 31, 126-127, 137-138, 292, 640.

» 37. PROSE COMPOSITION/TRANSLATION

1) A pair of complementary activities referring respectively to "Doing" and "Hearing". Prose composition consists of *making* sounds, manufacturing them, recording them etc. with a scheme, a notation, an intention. Translation consists of *hearing* them, and trying to define precisely our perception of them in order to provide a (verbal) account which is as explicit as possible (460-461).

2) Considered in this way, contemporary music is characterized by a radical imbalance, favouring *prose composition* (we make many types of musics and sounds which are devised and justified solely by the procedures through which they are made) and completely neglecting translation, i.e. the *art of hearing*. To sum up, today: "*we do not know how to hear what we make*".

The experience of *musique concrète*, based initially on sound objects which are made by sampling (technique of the closed groove), has however led concrete musicians to concentrate on *hearing* them, thereby reestablishing translation. To give a *method for translation* is one of the principal aims of the T.O.M.

3) Translation, which raises the problem of identifying and sorting objects, leads to *typology*.

Prose composition, which raises the problem of describing and making objects, leads to *morphology*.

The programme of Music Theory thus comprises *exercises in translation* (a kind of "musical dictation" of sound objects, which we try to describe and evaluate in relation to the

perceptual field) and *exercises in prose composition*, which deals with *creating* sounds, starting from a preconceived schema.

4) Generally speaking, the spirit of the T.O.M. is to *restore translation*, and encourage musicians to practise prose composition (that is to say musical composition) only when they have a more solid foundation in translation so that they can hear what they make.

PROSE COMPOSITION/TRANSLATION: 86-87, 147, 341, 390-394, 397, 460, 468, 490-491, 596, 614.

» 38. MUSIC THEORY (AND PROGRAMME OF MUSICAL RESEARCH)

1) In the renewed sense which P.S. gives it, Theory becomes “*the art of practising better listening*”; it is an “*experimental ... and realistic*” [91] approach to the sound object, a kind of becoming aware of the new materials of music while distrusting preconceived ideas, and relying first and foremost upon what is *heard*.

But it is also a “*GENERALIZED MUSIC THEORY*”, without notation, because it is intended to apply to the whole universe of sounds already available, or capable of being made, and not only to the sounds of traditional music, of measurable pitch, and produced by a limited number of instruments.

2) This MUSIC THEORY is situated rather in the area of HEARING than MAKING, it is descriptive rather than operational. The criteria which it seeks to bring out are not expressed by symbols leading to (premature) notations for new scores, but as a deepening of the act of listening, seeking in sounds their musical potential, prior to any plan of notation or composition.

3) This music theory “*is not yet music*” (488); it is the indispensable preliminary to it.

It is embodied in the five procedures of the programme of musical research: typology, morphology, characterology, analysis, synthesis (PROGREMU)

a) *The ideal of musical theory.*

From the beginnings of *musique concrète* P.S. sought not only a new music, but also natural perceptual bases which could establish a “concrete experience” of music. His first work on the subject, *A la Recherche d'une Musique Concrète*, published in 1952, concluded with a reflection on the concrete experience, which argued the need for a new “theory of music” to establish the new technique properly and authentically, and within the “outline of a concrete Music Theory”, drafted jointly with Abraham Moles. We can already find the seeds of what became the Music Theory of Sound Objects, but also hypotheses which were rapidly abandoned by Schaeffer (such as the “trihedron of reference” which attempted to give a 3

dimensional representation of the sound object, harmonic, dynamic and melodic). Was the still systematic nature of this Music Theory (which even calculates the possible number of families of “synthesizable” sound based on their constituent criteria) due to Abraham Moles? But also some of the notions, the criteria investigated in greater depth later in the T.O.M. are already there in a more or less rudimentary and early stage of definition.

P.S. recalls these first attempts in the historical summary in the first pages of the T.O.M., expressing his regret that in its theoretical development, musique concrète claimed at that time to be an expression of the “*trihedron of reference*” and Moles’ theory of the “*slab of sensation*”. The concepts of reduced Listening and sound Object had not been developed as they were later. However, it is these notions which allow us to bypass any ambiguous reference to acoustic parameters. Once these notions had been clarified, “*sound was no longer considered in relation to the three acoustic parameters; now we had perceived “sound objects”, which a new music theory aimed to study*”. (62)

b) *Generalization of music theory: from traditional to experimental music theory.*

Traditionally, music theory is “*the means of notating musical ideas, quite as much as translating these ideas into sounds*” (490), and the verb “*solfier*” means “*to get from an [92] instrument (which could be the voice), sounds corresponding to symbols in the sense of prose composition*”. (490)

This traditional music theory, enacted “*after the event*”, within the framework of a collectively constituted and assimilated system, can approach the description and the definition of sound material in very sketchy terms, since it has reference to a code of practice. The system functions very well without any need for a very precise perceptual or physical definition of its sound materials, these being always produced by a limited number of instruments with known timbres. Therefore, the definition of sound in the *Theory of Music* by Danhäuser, which was a reference work for learning theory at the conservatories, could be made in brief and simple terms, to which P.S. says, physicists simply added “*the idea that timbre coincided with the spectrum of frequencies*”. (165)

He had to *refute* the traditional equating of the perception of musical values with the simple perception of a signal “*read*” by the ear, and only the, *build up* a new music theory, new both in its foundations and principles.

c) *Experimental music theory and notation.*

Experimental theory challenges the validity of *traditional symbols of notation* for notating new sounds, and disputes the possibility of inventing others immediately, because “*notation is not the beginning, but the end, of the process*” (492). It is even harmful, since it *prejudges relationships between musical objects*. Now, these new relationships should be discovered by experiment, not laid down prescriptively.

Therefore, “*there is no notation, and for the moment, there should not be one*”. (492)

Notation, in “parameters” is no less misleading in this context than traditional notation: “*everything is naively related to a fussy notion of pitch, notated in frequencies, which no longer has any relationship to what is heard*”. And “*finding the way on an incorrect map is the same as being lost*”. (493)

d) *Programme for a generalized music theory (PROGREMU)*

This programme is presented only partially completed (given the amplitude of the task) in the T.O.M. It has five stages.

α) *Typology* (sector 2) consists in identifying i.e. *distinguishing* and *isolating* sound objects, then *sorting* them into *main types*.

β) *Morphology* (sector 3) consists in *describing* these objects by identifying the *sound criteria* that they are made of, and classifying these criteria into *classes*.

γ) *Characterology* (sectors 1 and 2 of the traditional system) consists in going back to the sound as a whole as a *bundle of different criteria* combined together, and trying to distinguish the different *genres* of objects according to their characteristics.

δ) *Analysis* (sector 4) consists in evaluating the sites and calibres of one or other criterion in relation to the perceptual field, in other words, exploring “*the structures of the perceptual field which can bring about perceptions of cardinal or ordinal calibrations*” (497); this means exploring the possibilities for abstraction, for putting into calibrations, new criteria (other than pitch), which are given to us by the natural capacities of the ear.

ε) *Synthesis* (the utopian stage) would consist in using the results of the previous stages to draw up rules for making sounds objects which could be used as elements in a *generalized music*, with a fully established theory (musical objects) (369, 383-385, 496-498).

The various types, classes, species, genres of objects are summarized in a huge [93] TARSOM (Summary Diagram of musical Objects) which the author presents as a “tool for investigation” and not as a table of results.

The general procedure in this music theory is to move forward in a series of approximations rather than in a straight line.

e) *From theory to music.*

P.S. did not just bequeath this music theory as it was, more descriptive than operational, without thinking about its possible “implementation”. He suggested at least two uses:

- In traditional, non-Western music, this music theory could help to remedy the inadequacies of the western classical symbols which ethnomusicologists have to use. “*On the contrary, we suggest a more universal approach to musics.*” (604)

- In contemporary music, this “realist music theory” (602), is put forward as an authentic means of rethinking music, and building new musical structures which take into account our perceptual structures, and can hope to create a collective consensus about their language, their systems of reference. The ambition of the theory is to enable these emergent systems to fit into a certain *perceptible order*, which does not however claim to predetermine them.

f) *Explanation of the diagram entitled Programme of Musical Research (PROGREMU) (369)*

This diagram, based on the four listening sectors, is in fact *two* embedded diagrams, one on the functioning of the traditional system of music (“outer” boxes numbered in Roman numerals I to IV), the other on the “experimental system” (inner boxes forming a diamond inside the square and numbered in Arabic numerals 1 to 4: i.e. going from box 2, *Typology, Morphology, Analysis, Synthesis*).

It is presented as a journey, a sort of game of snakes and ladders: you start at 2, go on to 3, and before going to 4 and 1, you make a detour through sector I of the traditional system for an extra stage called *Characterology*.

Leaving aside the traditional system, we will limit ourselves to a summary of the information given in each experimental system box. For each stage, in order, we find:

- the distinctions it makes (*types, classes, species, genres*);
- the “perceptual procedures” it requires (*identification* for typology, *description* for analysis and synthesis; both, according to standpoint, for morphology);
- what is studied at each stage: the *sound object* at 2, the *sound criterion* at 3, *structures of criteria* in the musical field at 4, *musical structures* at 1 – which shows that the lower sectors (Typology-Morphology) are still in the “sonorous”, while the higher sectors (Analysis-Synthesis) aim to achieve the “transition to the musical”;

- the contrasting pair or pairs which form the basis for the procedure under consideration. They are respectively.

α) - *Articulation/Intonation* (a variant of Articulation/stress) for *Typology*, sector 2.

β) - *Form/Matter* for *Morphology*, sector 3.

γ) - *Criterion/Dimension* for *Analysis*, sector 4.

δ) - *Value/Characteristic* or *Variation/Texture* for the *Synthesis* of musical structures and musical objects, sector 1, depending on whether we have a discontinuous structure or a continuous structure.

[94] g) *Musical and musicianly invention in the PROGREMU.*

In addition, these four stages suggest two distinct pathways for musical and musicianly invention.

According to the diagram, *musicianly Invention* moves directly from the *Typology* of sound Objects to the concrete *Synthesis* of musical Objects (1-2) and *Musical Invention* moves from the *Morphology* of Sound Objects to the *Analysis* of these Objects, inclining towards abstract research into structures and values (3-4).

“In 4 [Analysis], we form collections of objects in which we distinguish a particular sound criterion and try to see whether, despite the disparity of their other criteria, these objects display any meaningful connections with the criterion under consideration, i.e. connections which can be described, ordered or located in our field of musical perception (...)” (381)

This is the “*invention of the musical*” (381) which the author describes as a delicate operation and which he defines in similar terms at the conclusion of book IV (*Objects and Structures*), p.384.

MUSIC THEORY: 62, 162-165, 384, 488-489, 490-508, 509-528, 529-546, 547-560, 561-579, 580-597, 601-603.

» 39. ACOULOGY

[94] 1) A neologism coined by P.S. to describe the new discipline, the foundations of which he lays down in the *experimental Music Theory*.

The subject of acoulogy is the study of mechanisms of listening, properties of sound objects and their musical potential in the natural perceptual field of the ear. Concentrating on the problem of the musical functions of sound characteristics, acoulogy relates to *acoustics* in more or less the same way as *phonology* relates to *phonetics*.

	PHONETICS	PHONOLOGY
System of LANGUAGE (established)	“The study of the sounds of language in their physical expression independently of their linguistic function”. ¹	“The study of the sounds of language from the viewpoint of their function in the system of language”. ¹
	ACOUSTICS	ACOULOGY
System of MUSIC (to be established)	The study of the physical production of sound	The study of the <i>potential</i> in perceived sounds for producing distinctive characteristics which can be organized into music

2) *Acoulogy*, therefore, tries to forge a way between the “lower” level of the material and the higher level of organisation, of meaning, knowing that in traditional music there is between these two levels an *intermediate level*, of referential structures [95] and codes appropriate to each tradition, which permits communication. How, in contemporary musics which are abandoning these referential structures, can we go directly from the level of objects to the level of their organization except by strictly applying the principles of this organization to the perceived properties of the material, *music* to the laws of *acoulogy*?

3) Hence, for researchers, the importance of a rigorous investigation of this acoulogical level, which, by virtue of the fundamental dualism of (natural and cultural) music should find its foundations in the structures of human perception, before any cultural conventions. But acoulogy does not make assumptions about the musical organization to come (even if it is its prerequisite): “*it’s not acoustics, but it’s not quite music yet*”. (Solfège de l’Objet Sonore, side IV, 8th idea). In this sense it is the same thing as the *experimental Music Theory* put forward by P.S.

a) *Acoustics and acoulogy*.

The term *acoulogy* (or its derivatives), rarely appears in the T.O.M., and is never clearly posited or defined: sometimes it appears to be a straightforward synonym for typomorphology; elsewhere it refers to a more important undertaking. It seems, however, that for the author *acoulogy* is more or less the same as *experimental Music Theory*, an expression which, with his terminological modesty he prefers to use to describe the same undertaking.

The term acoulogy, apparently a Schaefferian neologism, derives from the term acoustics, modeled on the distinction between *phonology* and *phonetics* in modern linguistics.

¹ Definitions taken from the *Dictionnaire de Linguistique Larousse*

The definition of these two linguistic disciplines, as P.S. enunciates them, are as follows: phonology is: “*the science of differential sound units whose aim is to establish the system of phonemes*”, and phonetics is the “*study of the physical and physiological nature of the distinctions made*” (295).

We are less concerned here with discussing the validity of these definitions (which can be compared with those *above*) than to know how they can help us better to define acoulogy. Acoulogy is distinct from acoustics in that it is the *study of perceived sounds and perceptual structures*, seeking to distinguish *criteria* in the object and to situate these in perceptual fields for a musical purpose.

Unlike language, where the system is already established and where it indicates the units to be studied, here we must find in the object “potential units”, hypothetical distinctive features which could help us build up an as yet non-existent music.

In the same way that, for defining linguistic units, the links between phonetics and phonology are not simple, the links between acoustics and acoulogy are not straightforward: here we find “*the complex links between acoustics and an acoulogy operating on the same distinctive level*” (295), i.e. the definition of units.

In language, *language* itself, an established system, gives phonetics its units for study *via* phonology. On the contrary, there is no established system in experimental music to set out its units for *acoulogy*. So, should it take them from *acoustics*?

On the contrary, it is “*the sound object, given during perception, which shows the acoustician the signal to be studied*”. (269)

So acoulogy cannot turn to acoustics to “carve out” its [96] objects, it finds its own criteria for identifying sound objects and a *phenomenological* definition of the object at its own level, the level of perception.

The problem of the “distinctive level” remains in acoulogy, if we consider the higher level of musical organization, where we assume that acoulogy will only retain from the objects it assembles “distinctive features”, which perhaps will not tally with the “identification criteria” laid down in the Music Theory, which serve to identify objects prior to music.

b) *From acoulogy to music.*

The place of acoulogy in the programme of the T.O.M. is made clear in the last pages of the work (Book VII). The author distinguishes three “stages” which are in theory necessary for an emergence of a musical meaning: the “acoulogical” level of objects; the intermediate level of code and referential structures specific to each musical tradition; finally the “*higher level of meaning*”. (626)

“*In the traditional system we could clearly perceive these three levels of musical language. The “acoulogical” stage, so well integrated that it seemed almost immutable, with*

no possible variants, was a certain number of sounds given by a well-determined range of instruments, which defined a “musical” totally purged of the “sonorous”. Then there were structures given by musical theory and (...) the whole melodico-harmonic code (...) which of course gives rise to the entire traditional system of reference. Finally, there were the works, their meaning guaranteed by their internal economy.” (626)

In such a type of music, the acoulogical level is narrowly defined by the system, which determines the types of objects and the characteristics to which they should correspond, as well as the conditions under which they should be assembled to fulfill their function: for example, in traditional music, the objects can only be of tonic mass (defined pitch) with the typological features of “balanced objects”, and must be grouped together in such a way that pitch, and secondarily duration, emerge as a value in relation to their other sound characteristics.

In experimental music, and in musical research, where the intermediate level of “referential systems” is passed over, as it is impossible to reinvent from the dictates of mind, there are only the two outermost levels which we can try to articulate directly with one another. The function of acoulogy must then be reconsidered. Alone, it cannot provide the key to music, which comes from the higher level: we have *“the dead end of a music in itself, which only plays with objects, an acoulogy as devoid of meaning as phonology. It is clearly, of course (...) from the higher level that music, like language, takes all its meaning”*. (311)

In this difficult situation, the role of acoulogy, or experimental Music Theory, could be to prepare the ground for the reclaiming of musical meaning, by means of which we could just about *“place objects into structures directly, going straight from the “acoulogical” level to the level of overall organization, just as a structure is built in accordance with the logic of the material”*. (628)

So, in the last analysis, acoulogy is the study of the hypothetical logic of the material at the most elementary level; a logic which we assume to be potentially rich enough to dictate the laws of a structure without a code.

A severe discipline, then, this acoulogy which examines the object for its musical potential, but must always remain at the outer limits of music. For it starts out from below, from the sonorous, and no preconceived musical organization from above can in accordance with its own rules hold out a hand to help it haul itself up to the heights where meaning is enthroned.

ACOULOGY: 295, 309, 311, 314, 502, 504, 626, 628.

[97] » 40. SUITABLE (OBJECT)

1) Sound objects are called *suitable* when they seem to be more appropriate than others for use as a musical object. For this they must fulfill certain criteria:

- be simple, original and at the same time easily “memorable”, with a medium duration; therefore be *balanced* typologically;
- lend themselves easily to *reduced listening*, therefore not be too anecdotal or too loaded with meaning or emotion;
- finally, combined with other sound objects of the same genre, be capable of producing a predominant and easily identifiable musical value (the law PCV2).

2) We can also speak of a *suitable collection* of objects, which are only suitable *in combination* (relative suitability) for producing a musical value.

3) *Suitable, balanced, musical objects*: it would seem likely that suitable objects would be the 9 types of *balanced* objects of typology. But the notion of suitable object is an abstract and general notion whose concrete definition must remain open, whereas the balanced object is defined by precise typological criteria. A suitable object might at a pinch not be balanced, and vice versa.

In the same way, we could consider the suitable object (suitable for music) to be the same as the *musical object*. But the more general notion of musical object refers to a function, to musical structures. Suitable objects are, at most, objects which are judged “good enough”, without being thought of as “musical” beforehand: a certain context and a certain intention are needed for this. Even if the author says “*the musical is no more than a suitable sound*” (358), a deliberately tautological definition (“suitable” meaning nothing more than “suitable for music”).

The *suitability* of the object cannot therefore be defined by criteria which are, a priori, too precise.

4) *Creation of suitable objects*: in musical research, the suitable object is created and defined by a series of approximations, by going back and forth between *doing* and *listening*: first in *musicianly listening*, which is limited to “*the most simple, least anecdotal objects, which have a spontaneous, albeit minimal, musicality*” (337-339); next by *musicianly invention*, which must create suitable objects for a musicality which remains to be defined; lastly by *musical* (as opposed to musicianly) *listening*, which seeks to discover the potential musical values in these sound objects.

5) The Programme of Musical Research (PROGREMU), in its five stages, uses criteria for identification and description of sounds which give a central, favoured position to “balanced objects”, thus to objects which are most likely to be suitable, without ruling out sounds that are in theory too simplistic or too variable.

[98] a) *“Suitable Collection”*

Sound objects can be suitable in two ways: either in isolation, *a priori*, through their intrinsic characteristics, or collectively, if we compare several sound objects as a collection in order to carry out a “structuring” experiment on, for example, the characteristic of *pitch* of these sounds. We shall then discover that some are not suitable for this experiment, if we want to form a suitable collection for the experiment in progress: *“So, when comparing objects, there are three stages simply for a value to emerge: objects which are unsuitable because they do not carry the value as a characteristic; objects which are only just suitable because they have this characteristic, but completely mismatched with other characteristics; objects which are very suitable (to music, let us remember, therefore musical objects) because the perception of a value is reinforced, not necessarily in a simple way, by the other characteristics, which cause it to dominate.”* (374). This example does not mean that any sound object can become suitable in an appropriate context.

b) *Suitable, balanced, musical objects*: *“The sound objects most suitable for music are apparently those which fulfill the criteria in the nine central boxes”* of typology (443), therefore balanced objects, but the author never combines the two notions. In the same way, while it is said that *“the musical is simply a suitable sound, i.e. purified, simplified, selected in order not to be too complex”* (358) and *“objects which are very suitable for music can be called musical”* (see also above, 374), the author nevertheless takes care to distinguish these three notions, and to use them in different contexts.

SUITABLE (OBJECTS): 337-339, 344, 348, 354, 357, 358, 374, 392, 443.

B. *Five stages to reclaim the musical*

A typology to distinguish types, a morphology to classify classes... here, in theory, we are going to the heart of the subject. Indeed we are. It must be said immediately that *Characterology, Analysis* and *Synthesis*, the three final stages of this programme remain more or less precisely at the level of a programme: they are models for a method. They hold together, they provoke debate, but above all they are there in order to ask the right questions, the basic questions.

a) Typology

» 41. TYPOLOGY

1) The first stage of the programme of musical research, typology is the process of *identifying* and *classifying* sound objects, which should be able to encompass the whole range of possible sounds – *identification* [99] is a procedure which consists in isolating, cutting out sound objects from every possible sound context (rule: articulation/stress); *classification* is a procedure which consists of arranging them in families, in different types.

2) Typology thus carries out “*a process of selection from which sound material will emerge cut into pieces, categorised into (musical) types of (sound) objects*” (371). “*Musical types*” means that the classification is not random, that there is an idea behind it which is, by classifying them, to select the objects which will be the most “suitable for music” (suitable objects). *This process of selection is therefore based on a hierarchical principle*: it orders the objects into a hierarchy according to the greater or lesser facility with which they can be perceived and memorised and their (presumed) greater or lesser capacity for carrying musical values.

3) Three pairs of criteria are chosen to form the basis of this classification: a “morphological” pair, *Mass/Facture*, a temporal pair, *Duration/Variation*, a “structural” pair, *Balance/Originality*. The latter is the most explicitly “normative”, since it makes a value judgment about the sound object. Incidentally, it is difficult to contain these six independent variables in a single, two-dimensional diagram.

4) Typology distinguishes *about thirty types of object*, summed up in the table which is given the code name TARTYP (recapitulative table of typology). These objects are divided into three families: *balanced objects* (which are given a central and privileged place, as in theory they are the most “suitable”), *redundant objects* (not original enough) and *excentric objects* (too original and irregular).

5) This general typology is completed by an additional typology of *variations*, i.e. sound objects which vary significantly. (570-572)

It is important not to forget that the types put forward by typology are not always easy to identify, and we might be unsure whether to place a certain object in one box or another, depending on the context, the intention, the level of precision of listening etc.

6) A methodological problem which has for a long time deterred people from undertaking a typology, is that you cannot select objects without, albeit sketchy, criteria for describing them. It was therefore necessary to create an *elementary morphology*, represented by the notions of *mass*, *sustainment* and *facture*, and, more precisely, of the distinctions between tonic sounds, complex sounds, variant sounds etc. and between three types of sustainment. “Elementary”, because otherwise there would be too great a number of types of objects, and an infinite, unusable and over-crowded classification.

Typology and Morphology have thus developed by a sequence of approximations; an elementary morphology has enabled typology to put the final touches to its classification criteria, after which a more complex morphology can re-examine the objects and describe them accurately and in depth.

TYPOLOGY: 346, 363, 369 (PROGREMU), 371, 384, 397-399, 429-442, [100] 443-459, 459 (TARTYP), 466-467, 497, 499, 515, 570-572, 584-587 (TARSOM).

» 42. TYPE

In the most general sense, the classification of sound objects or their constituent criteria into different *types* comes from the need for an initial crude selection of a few limited examples (whereas the placing into *classes* is made after a more refined, more differentiated evaluation of the contexture of objects).

1) In the main, strict sense we have the 29 types of sound objects finally retained by typology (and additionally the 18 types of variant objects from the complementary typology of variant objects, which takes up some types of object from the first list).

The type of the object is, then, is its *general physiognomy, resulting from the combination of elementary morphological characteristics*. As we differentiate between the physical types of “long limbed” or “squat” individuals, the typology of sound objects differentiates types of homogeneous sounds, sustained sounds, “cells” etc.

Each of these types is identified by a name, and a symbol (generally a letter of the alphabet, perhaps further qualified by another letter).

2) In a secondary sense of the term, we have elementary types of certain *morphological criteria*: three types of mass and three types of sustainment are thus distinguished, which act as a basis for typological classification. For Grain and Allure there are also three types derived from an initial rough evaluation, which is eventually refined by the study of different classes of the same criteria.

3) P.S. insists on the idea that the typological criteria which are used to define the main types of objects or morphological criteria convey an implied *musical intention*, that they are chosen with a view to “selecting” sound objects “suitable” for a musical purpose.

4) The different types of sound objects or morphological criteria are summed up in the first column of the TARSOM; in particular the types of objects summed up earlier in the TARTYP are reclassified, after a fashion, in the various rows for morphological criteria (but this “reclassification” is necessarily a little haphazard).

TYPE: 369 (PROGREMU), 371, 379, 384, 444-447, 497, 499, 505, 515, 551, 552, 553, 556-558, 570-572, 584-587 (TARSOM).

b) Morphology

» 43. MORPHOLOGY

1) The second procedure in the programme of musical research, morphology, is a *descriptive procedure* (P.S. often says “qualification”) of *sound objects*, once they have been identified and classified by typology.

[101] This description essentially consists in distinguishing features called *criteria* in the fine detail, the “contexture” of sound objects, their number being limited to 7: these are the 7 *morphological criteria* - *mass, harmonic timbre, dynamic, grain, allure, melodic profile, mass profile* - which are examined one by one, defining different *classes* for each.

In other words, sound criteria are identified in the sound object and the object is described as a structure of these criteria (497) in accordance with the principle that Object/Structure are interlocked.

2) The pair: Form/Matter, the key to an elementary description of sound, inspires morphological investigation (see 60).

3) To study the criteria, we will focus on objects called *deponent*, i.e. objects where a certain number of criteria are absent or remain fixed, giving prominence to the criterion which is the object of study.

It must not be forgotten that, as in typology, these analyses and descriptions are relative, likely to be refined or challenged because of a change of context, viewpoint, experience.

4) Three different morphologies can in fact be distinguished, linked to different stages:

- elementary, preliminary morphology, which gives elementary criteria for description, sufficient to allow typology to classify sounds;

- the main morphology, which examines one after another the seven morphological criteria quoted above: this is the most developed, and makes up the second stage of the programme of musical research;

- a far less developed external morphology dealing with the particular example of sound objects formed of distinct (successive or simultaneous) elements (see 86 and 87).

MORPHOLOGY: 365, 369 (PROGREMU), 371, 379, 384, 389-403, 431, 461-465, 497, 499, 500, 584-587 (TARSOM).

» 44. CLASS

1) The differentiation by morphology of the different classes of objects depends on a “*description of sound objects in their contexture*” (369), once their constituent criteria have been identified. In other words, when morphology distinguishes different *classes* for each of the seven criteria which it studies, we must understand by this different *typical examples of these criteria*, which result from a more refined and more differential observation than was previously done by typology. Thus, morphology distinguishes 7 classes of mass, whereas typology distinguishes only 3 types.

2) As experimental theory progresses, every sound object or criterion is, therefore, individually situated in types (typology), in classes (morphology), in genres (characterology), in species (analysis). The different classes of sounds for each criterion are summed up in column 2 [102] of TARSOM. They are listed under each of the seven morphological criteria in the section on each criterion.

CLASS: 369 (PROGEMU), 371, 384, 487, 497, 505, 515, 517-518, 524-525, 531, 535-539, 555, 558-559, 574, 583, 584-587 (TARSOM).

» 45. DEPONENT (SOUNDS)

1) The term “deponent” (from the Latin *deponere*: to leave) is employed “*in a figurative sense, to denote the (phonetic or sound) objects which have one of their morphological components missing*”. (396)

2) The term deponent is therefore applied to “*phonetic objects (...) which consist of isolated stresses, without consonants: a, e, etc.*” or, conversely “*the consonants which are pronounced silently (...) giving only attacks without stress*” (396) (see 47).

3) The term “*deponent note*” is applied to sounds which, in the study of the internal morphology of objects (§27,3; p. 462-463), do not present in a perceptible and distinct manner the three temporal phases of what P.S. calls a “*balanced note*”: attack, continuant, decay. With deponent notes “*two of these phases, sometimes even all three, are fused into one*” (463). These are the most common examples, balanced notes being the exception.

4) The morphology of sound objects studies the criteria from examples of deponent sounds, i.e. sounds where a particular criterion stands out by the absence, the fixedness or the faintness of the others. This is because it is difficult to study these criteria from “*evolving sounds, which do not lend themselves at all well to analysis of matter and form*” (449). The

study of evolving sounds will be done separately, therefore, by means of two specific criteria (*melodic profile, profile of mass*).

Deponent sounds and the study of criteria.

By studying most criteria in deponent sounds, and by treating evolving sounds with two particular criteria, we can partially resolve the difficulty which continues to “*weigh upon all musical theory as it has influenced all musical evolution: the traditional system tends (...), visibly, to eliminate those criteria which elude any attempt at classification (...). How can we include them without making the same mistake as mathematicians of music, who without raising an eyebrow, haphazardly put together stimuli that are sometimes elementary, sometimes of formal values?*” (499)

Taking a “*qualified stance*” gives a way out of this dead-end: “*By using deponent examples, chosen from a general range of sounds, we can already considerably broaden the descriptive range which until now was limited to the identification of physical parameters [frequency, amplitude, duration] or of the three values recognized by music conservatories [pitch, intensity, duration].*” (499)

We can then elicit “*the main morphological criteria for a theory of music for borderline cases*” (500) taken from “deponent sound objects”:

α) to study *mass* (and with it *harmonic timbre*) we take sounds that are homogeneous, without dynamic or variation of matter (chap. XXX: music theory of homogeneous sounds, criterion of mass p.500-529);

β) to study the *dynamic criterion* we restrict ourselves to “*forms of mass which remain relatively fixed in tessitura*” (500) (chap. XXXI: music theory of fixed masses: dynamic criterion, p. 529-546). These objects can be called homogeneous “*if we abstract their dynamic*”, they are not therefore pure homogeneous sounds;

[103] γ) the criteria *grain* and *allure* which are characteristics of sustainment of sound, are best studied in homogeneous, or not very varying sounds (chap. XXXII: music theory of sustainment, p.547-560).

δ) the variation criteria (mass profile and melodic profile) which can currently be found in “natural” sound objects, are best studied in sounds which present only one of these variations (so-called “*deponent*” variations, 578).

We should add that studio resources allow us to obtain deponent sounds which display one single criterion (“homogenization” or “procedures to modulate form” which can separate the harmonic and melodic profiles of sound, which are normally linked together) more easily than in the raw state (where the criteria are generally mingled together) (541).

DEPONENT (SOUNDS): 396, 463, 499, 500-501, 578, 583.

c) Characterology

» 46. CHARACTEROLOGY

1) The definition of genres of sound, or characterology, is the third procedure of the five in the theory. After typology and morphology, where the criteria of sound are isolated in simple examples, characterology is a *return to the concrete*, since it considers the main examples of combinations formed, in sound and musical reality, by *bundles* of characteristic *criteria*, in accordance with natural acoustic laws which most often link them together.

2) Characterology and musical analysis complete one another, being respectively the *practical* pole (timbres, instrument-making, registers) and the *theoretical* pole (research into musical structures) of a process which aims to *synthesise* the musical. But these two procedures are presented in the *Traité* as working hypotheses, unlike typology and morphology, where a complete and assured account is given.

Difficulties of a characterology.

“In order for analysis of the sound field (...) to take place under the best conditions, we must reach a better understanding of which bundles in real sounds make up the criteria to which the criterion under study belongs; in other words, it would be necessary for the characterology of real sounds to be known. This is not the case... we can only refer to the practical knowledge we have about sound bodies (sector I) and factures (sector II) to discover the connections between criteria, approximately based on what is known of morphologies”. (505)

Everything associated with *connections* between criteria is, in effect, well known in its principle, but difficult to catalogue, to classify: we know that in instrumental and “concrete” sounds the characteristics of the sound evolve in an interrelated fashion, and that this combined development helps to make the form of the sounds more vivid, more assured: to produce *living* sounds, electronic sound synthesis must proceed precisely by *linking together evolving criteria*, since it has been noticed that sounds in which the parameters evolve independently from each other are not well perceived, appearing thinner, more artificial.

Only it is not easy to draw up a catalogue of these *genres*, to distinguish [104] well “characterized” examples, if we can put it this way. It is not surprising that *characterology* is the stage of the Music Theory that is dealt with most rapidly in the T.O.M.

CHARACTEROLOGY: 369 (PROGREMU), 497, 505, 584-587 (TARSOM).

» 47. GENRE

1) The *genre* of a sound (or characteristic) is defined by a certain combination of criteria, a “bundle of criteria”, which *characterizes* it, it defines a physiognomy which is simple, immediately perceptible yet complex to analyse. Indeed, with natural sounds (as opposed to electronic sounds), “*genre is the most common example*”. In other words, sound is not a sum of features, simple independent criteria; these features are combined and interdependent.

So, the study of the *genres* of sounds by means of characterology strives to distinguish what are typical combinations for each criterion “apart from pure examples”, and possibly examples of when the criteria correlate with other criteria.

2) Generally speaking, the *synthesis* of musical objects, if it were possible, would aim to produce *series of objects of the same genre* leading to the emergence of a variation of a relevant feature, or *value*. In this sense *genre* becomes synonymous with *characteristic*, in the sense of the concrete, sonorous, instrumental aspect of the sound rather than its abstract aspect, which functions as a musical value. *Genre*, therefore, replaces instrumental *timbre*.

a) *What is genre?*

“*The common expression: a “---like” sound, expresses the notion of the character of a sound very well. Because it does not only cite the example: piano, bell, electronic sound, it generalizes it, it postulates that a given sound, beyond any particular example can be presented as representative of a general structure. If I play bundles of notes which produce a thick mass on the piano, I will no longer hear the tonics, I will no longer analyse the chord, but I will do more than appreciate a width of more or less vague thickness. (...) I will distinguish a texture, a certain organization of mass, as for example in the sound of a bell.*”
(519)

b) *Genres of sound according to the criteria.*

In the Summary Table for the Music Theory of Musical Objects we can see *characterology* applied with varying degrees of success to each of the seven criteria, in order to define their genres. We refer to the articles on these criteria for more detail, limiting ourselves to the remark that the genres of sound are defined in many different ways according to the criteria. Thus, the characterology of the *dynamic criterion* is in fact based on the study of *attacks*, which are so important in the perception of instrumental timbre, and which are a characteristics example of the relationship between criteria connected to the facture of sound; in the characterology of the *criterion of grain* six genres of grain are suggested, obtained by combining in twos the three types of sustainment (resonance, friction, iteration) which define

the three types of grain; the characterology of criteria of *mass* or *harmonic timbre* is briefly outlines, etc.

[105] GENRE: 369 (PROGREMU), 487, 505, 506-508, 515, 519, 531-534, 552-553, 574, 580, 582, 583, 584-587 (TARSOM), 630.

d) Analysis and Synthesis

» 48. ANALYSIS/SYNTHESIS

Analysis and synthesis are the two final stages of the experimental Music Theory programme.

1) Analysis brings morphological criteria into the dimensions of the perceptual field, in order to estimate their capacities to emerge as musical values, and possibly to be used there in *calibrations*. To do this, it studies the *sites* and *calibres* of the criteria in relation to these three dimensions: this leads us to distinguish different *species* for each criterion, defining the different positions it occupies in the perceptual fields (see **SITE/CALIBRE**).

2) As for *synthesis*, it aims to create *musical* objects, made of “*bundles of criteria*”, which “*placed together, may display (...) an easily perceptible structure of values*” (385). To do this, it has to conceive of a new type of ‘instrument making’, or “*tablature*”, adapted to a new theory of musical structures.

3) In the T.O.M. the stage of analysis is only just sketched out; this is even more true for synthesis, which is very briefly set out as a “*working hypothesis*”. Moreover, whereas some hypotheses for analysis are summed up in the TARSOM (columns 4-9), where they occupy an important place, the results of synthesis do not appear, and for good reason: there is only a practical stage, merely postulated. The author does not conceal that he will perhaps need years to complete the whole enterprise, and wants to suggest a method rather than results.

4) Whereas typology, morphology and characterology aim to identify and describe *the sonorous*, analysis and synthesis seek to effect *the transition from sound to the musical*.

5) *Analysis* depends on the pair *Criterion/Dimension*, with the aim of describing structures of criteria in the musical perceptual field, and seeing if the positions in the field can give rise to *calibrations*; it occupies sector 4 of the 4 listening modes.

Synthesis depends on the two pairs: *Value/Characteristic* and *Variation/Texture*, according to whether what is being studied is a discontinuous or a continuous relationship; it occupies sector 1...

From Analysis to Synthesis: the impossible transition.

Whereas in traditional systems, syntheses and whole structural units are given at the same time, here we are attempting to restructure and recompose them artificially from their elements. But the author is under no illusions about the difficulty of moving on to a synthesis based on even very detailed results provided by analysis; “*synthesis cannot be safely deduced from analyses*” (381).

[106] If we can say that synthesis consists in attempting to create new structures from objects, we can then say that the object-structure chain, “*like our grandmothers’ knitting, unravels in one direction. It is not so easy to knit it up again by progressing from preexisting objects to automatic structures*” (381), and the author states clearly that it is “*probable that the quest for what we might call the philosopher’s stone of new music will not succeed with the analytical method. (...) In this sense, the present work proposes to go as far as possible, but (...) it would be unwise, and certainly make no sense, to want to reach authentically musical structures directly by this path*”. (487-88)

But “*the important thing for other researchers is to have the benefit of a method*” (498), and principles which are *necessary, but not enough*.

ANALYSIS/SYNTHESIS: 362, 369 (PROGREMU), 372, 376, 379, 381, 384-385, 487-488, 497, 498, 584-587 (TARSOM), 630.

» 49. SPECIES

1) The study of the *species* for each morphological criterion consists in comparing each of these criteria to the three dimensions of the natural perceptual field of the ear, to try to assess their different *sites* and *calibres* and, if possible, to put them into graduated calibrations (let us be clear that the site of a criterion, in relation to a particular field, is its situation in this field, and its calibre is its bulk in the said field). After the study of *types* in typology, and *classes* in morphology, the study of species is the first attempt to give an assessment of the “states” of different criteria other than qualitative, which is graduated and organized in such a way as to allow the establishment of calibrations, even rudimentary ones (calibrations of size of grain, calibrations of intensity from 1, ppp to 7, fff), clearly constructed on the model of calibrations of pitch.

2) Situated thus on their “co-ordinates” in the perceptual space, sound objects could not only be identified and described in all their variety, but also be *articulated* one with another in accordance with the relationships in the calibration. (Thus, the “species” of a mass, in relation to the field of pitch and in tonic sounds, is identified quite simply by its *pitch*.)

3) The species of criteria are summarized in columns 4 to 9 of the TARSOM, but most of the suggested graduations and calibrations are only hypothetical and provisional.

SPECIES: 369 (PROGEMU), 487, 505, 515, 519, 526-527, 544, 554-555, 559, 574, 581, 583, 584-587 (TARSOM), 588-591.

» 50. CRITERION/DIMENSION

1) The Criterion/ Dimension pair is the “major relationship” in the analysis of objects. It is concerned with the relationship between morphological criteria and the dimensions of the triple perceptual field (pitch, intensity, duration) where these [107] criteria occupy a particular *site* (“localisation” in the field) with a particular *calibre* (“bulk” in the field).

An example of the working of the Criterion/Dimension pair: a given “allure” of a sound object is evaluated as of “strong” calibre in relation to the pitch-field (its width in tessitura is very large) and of “tight” module in relation the field of durations (rapidity of oscillation).

2) The relationship Criterion/Dimension is all the more close because, from a certain point of view, a criterion **is** also a dimension. This is what gives prominence to every variant object: “*Let us listen to an object as classical as a fairly slow glissando on the violin. What is the dominant criterion at each instant of the sound? Pitch. What varies? Pitch again. In what space does it vary? In the field of pitch.*” (503)

Pitch is, therefore, both the “*criterion defining a sound*” and the “*dimension of its variation*”. The same is true of a profile of intensity evolving in the dynamic field and of a development in allure varying in the field of durations etc. The qualities of sound can, therefore, be evaluated both as “*an identification criterion*” of the sound, or as “the dimension of its variation” in one of the three perceptual fields (pitch, intensity, duration). The “criterion”, identified in an object, (grain, mass) and the “dimension”, evaluated in the perceptual fields, are the two facets of the same phenomenon.

“*The criterion and the perceptual field make up the relationship of indetermination which so complicates our ordinary vocabulary.*” (383)

3) Once their inventory and their sound description have been decided by typomorphology, the purpose of the *analysis* of objects and their criteria is to bring into play “... *the musical ear from which we expect, hypothetically, a field of qualitative, indeed progressive, appreciation.*” (384)

The question posed in analysis, with the help of the pair Criterion/ Dimension is: “*How do collections of objects, gathered together to be measured against such and such a*

criterion, become structured in the natural field of the ear, developed, of course, by specialized training?" (384)

CRITERION/DIMENSION: 369 (PROGREMU), 379, 383-384, 503, 504, 584-587 (TARSOM), 596.

» 51. SITE/CALIBRE

1) The *site* of a criterion is its *position*, its place, in each of the three perceptual fields of the ear. For example, the site of a tonic sound relative to the pitch-field is its degree of pitch; in relationship to the field of intensities, its inherent degree of intensity, etc. The location of the site is less or more easy depending on each criterion, and its particular relationship to each perceptual field.

2) The *calibre* of a criterion is its *bulk in the field* (for example, a white noise which occupies the whole tessitura has a maximum calibre in the pitch-field); it comes across as thickness, volume.

3) The evaluations of *sites* and *calibres* of criteria in relation to [108] perceptual fields have as their goal to detect the capacity sound objects have to convey *values*.

In other words, we rely on these graduated differences of site and calibre in objects to present to perception types of scales, calibrations, which are capable of functioning on the model of calibrations of pitch.

We therefore presume that it is because of the differences in sites and calibres of one characteristic in different objects of the same *genre* assembled in phrases that this characteristic can emerge as a musical value, in accordance with the law PCV2. The listener should nevertheless be able to perceive these differences adequately and perceive them in the framework of a calibration, however rudimentary. The intention of the stage of analysis is therefore to *test the ability of each of the 7 morphological criteria to be situated in the different perceptual fields and to be "calibrated" there*. A huge programme, only just sketched out.

Why these two complementary concepts? We can understand this if we recall the dimension/criterion dialectic: each criterion occupies the three perceptual fields as spaces where it occupies a certain place (its site) but at the same time itself filling a certain portion of this space (its calibre). Now this space is *limited* at its two extremes by the capacities of the human ear (the limit of the very high and the very low for the pitch-field). These limits therefore give a framework, and mark out a territory where the criterion in question can evolve, occupy more or less space etc.

We can, however, anticipate that the concepts of site and calibre, so clearly of use for perception of pitch in the pitch-field, will sit less easily for other criteria, in other dimensions. Hence the apparently obscure and complicated concepts of *weight*, *relief*, *impact*, *module*, which in the intensity- and duration-fields, “overtake” and replace the too-elementary and linear notions of sites and calibres and adapt them to the specific nature of each perceptual field. Why do they seem so difficult to handle, to calibrate? Because the perceptions they correspond to are more intuitive, plastic, diffuse, more difficult to single out and calibrate than the usual perceptions of pitch.

We would be wrong to attack only the concepts here, to judge them as ill-defined; they correspond to perceptions which may be both very subtle and well-differentiated, yet impossible to define in words, and even more to put into series or calibrations – except on paper, in the abstract, and thus without dealing with the sounds themselves.

So, for each of the three fields, site and calibre are described respectively in terms specific to each field, and with a different shade of meaning.

α) *In the double pitch-field:*

- the site of a criterion is called *tessitura*,
- the calibre of a criterion is called *width*.

β) *In the intensity-field:*

- the site of a criterion is called *weight*,
- the calibre of a criterion is called *relief*.

γ) *In the duration-field:*

- the site of a *duration of variations* is called *impact*;
- the calibre of a duration is called *module* (a term which has various meanings).

[109] SITE/CALIBRE: 497, 505, 515, 521, 526-527, 542-546, 554, 559, 574-575, 577, 584-587 (TARSOM), 588, 589.

» 52. WIDTH

1) *Width* is the name given either to the bulk of a criterion in the pitch-field, its “thickness” in relation to this field, or the calibre of the variation of this criterion in the pitch-field, in other words how much of the tessitura it occupies. For example, the vibrato of a singer who is said to have “too much” vibrato, has a large width.

2) This notion of *width* therefore concerns not only the criteria of mass and harmonic timbre but also the three criteria characterized by variations in the pitch-field: *allure*, *melodic profile*, *mass profile* and even *grain*.

The classifications of *width* are in column 5 of TARSOM.

a) *mass-widths*. This is quite simply the ‘interval’ for tonic sounds (harmonic field) and *thickness* for complex sounds (coloured field).

b) *grain- and harmonic timbre-widths*. This is a “thickness” or a “fullness” in relation to the lower or higher limits in tessitura.

c) *allure-widths*: for allure, which is a more or less regular oscillation in the sustainment of a sound, this is its width in tessitura, assessed by a rudimentary calibration with three degrees: *weak, medium, strong*.

d) *melodic profile- and profile of mass-widths*: for these two variation criteria, this is respectively the overall melodic width (extent of the tessitura covered) and the width of interval or thickness of the variation. (Let us remind ourselves that the concepts of “interval” and “thickness” correspond respectively to the two modes of pitch perception: as interval for *tonic* sounds, in the so-called “harmonic” field, as thickness for *complex* or *varying* sounds, in the so-called “coloured” field.) These widths are also assessed as *weak, medium* or *strong*.

e) for each of these last three criteria, the width can be compared to the duration of variation, which allows the *speed of variation* to be assessed in relation to one or other perceptual field. The *widths* of “pitch-calibres” are in column 5 of the TARSOM (boxes 15, 35, 45, 65, 75).

f) more generally, width denotes the fullness of any difference or variation in any perceptual field. For example: the *intensity-width* between two sounds

WIDTH: 433, 565, 570, 574, 575, 584-587 (TARSOM), 588-589.

» 53. WEIGHT

1) Weight is the relative intensity of a given sound (or component of a sound) in relation to one or several other sounds (or the other components of the same sound). The evaluation of a particular weight depends on the specific context, and cannot really be reduced to a limited number of simple examples: because of the particular property of the field of intensities that it only allows us to make very approximate and changing [110] evaluations of the *relative* intensities of several simultaneous or successive sounds. And this is for several reasons: *the effects of masking*; *the effects of reference to the sound agent* (a “fortissimo” on the violin although much lower in decibels than a pianissimo on the piccolo, will be perceived as louder); and also the *perceptual phenomenon when a variation emerges in the midst of an undifferentiated din*, even if the latter ought to possess a greater “weight” (for example, the weak meowing of a cat emerging from a general tumult). It is this last phenomenon which is described as *impact* (see 55). The notion of impact “*the effect of the*

nature and speed of a variation” (545) in a given context is, therefore, complementary and, as it were, concurrent to that of weight, since impact can succeed in masking a heavier sound with a sound of less weight.

2) While the definition of the notions of weight and impact is fairly clearly established, in practice this is less so, and gives rise to certain confusions, ambiguities and imprecisions. We must simply conclude that it is extremely difficult and risky to construct “gradings” of intensity and to use them as scales as is done with pitches, since perceptions of intensity are eminently fragile and relative, and influenced by particular contexts (cf. the work of Messiaen, *Modes de valeurs et d’intensités*).

3) The classifications of weight are in column 6 of TARSOM.

WEIGHT: 316, 543, 545, 554, 565, 583, 584-587 (TARSOM), 589.

» 54. RELIEF

1) Relief is, in theory, the “calibre of intensity of a criterion”. In other words, the relief of a criterion is its bulk in the field of intensities. The relief of an allure would, therefore, be the amplitude of its variations of intensity (the width between the maximum and minimum intensities of its oscillation).

2) Relief can really only be measured according to a rudimentary calibration with three stages: weak, medium, strong. Classifications of the relief of a certain number of criteria are in column 7 of the TARSOM.

Thus clearly defined, as it seems, the notion of relief, in the T.O.M. and particularly in the TARSOM, undergoes strange disappearances and substitutions: in effect it denotes either a pitch-width (544) or a weight; or else the concept it denotes is described by using the apparently improper term *impact* (comments on box 17 of the TARSOM, p.589). Finally, the term relief is absent from the three pages of comments explaining the TARSOM, in which it nevertheless occurs, and even from the comments on the boxes in the “reliefs” column (column 7).

RELIEF: 544, 559, 584-587 (TARSOM), 589.

» 55. IMPACT

1) Impact is a very “subjective” concept which describes the “*effect of the nature and speed of a variation*” in a given context, and particularly the manner [111] in which this variation *brings out* the criterion or the object affected by it from within a sound context, where normally it would be covered over or drowned out. In other words, impact denotes the “*capacity*” of a varying phenomenon “*to stand out*” in a sound context which contains it, by means of criteria which are as “psychological” as: the effect of surprise or “disturbance” (the coughing of a member of the audience in the silence before a concert performance), or the sudden and unexpected nature of a variation in a hubbub of sounds (the meowing of a cat emerging from a commotion where nevertheless its relative intensity is very weak). (545)

2) The concept of impact is complementary to the concept of weight (see 53), since it “*takes up what weight leaves out*”. (546)

3) Impact can be measured by comparing the amplitude of the variation (its “width”) to the time (“temporal module”) it takes to happen. In the TARSOM impact is “calculated” by means of tables with nine boxes intersecting *three degrees of width of variation* (*weak, medium, strong*) with three speeds (*slow, moderate, fast*). For example, for the dynamic criterion, the number 7 describes a marked but very progressive dynamic evolution; for melodic profile, the number 6 denotes a medium width with a lively speed of variation.

a) Whereas *weight* seems to express a discontinuous relationship of intensity between relatively fixed phenomena, impact is used for examples of continuous variation in short phenomena. Thus it can be seen that the particular impact of a sound could “*mask a heavier sound with a sound of lesser weight*”.

If the concept of weight seems to apply to the pitch- and intensity-fields most of all, the concept of impact, in variation phenomena, applies to every dimension, and in particular includes the concept of speed (density of a variation in duration).

b) In theory, impact occurs in the TARSOM in column 8, “sites for duration of emerging variations”. In fact on reading the comments on it, it appears that the notion of impact “goes walkabout”, being used to describe phenomena of another order: either under the name “harmonic impact”, the “*profile of a texture of mass*”, or “*the relative weight of the various elements of its texture*” – a sense in which any notion of variation is eliminated (but perhaps here the editor has confused it with *relief*). Or else impact is used to denote a perception of dynamic variation, etc.

IMPACT: 257, 545-546, 565, 584-587 (TARSOM), 588-590.

» 56. MODULE

1) Module is a “calibre of duration” i.e. a duration-value. More precisely, for criteria such as grain or allure, which are defined by oscillations or periodic and frequent unevenness, *module* is a measurement of the relationship between the amplitude of the oscillation and its “speed”. It can also denote the rapidity of the oscillation of this criterion (the number of pulsations in its duration).

The concept of module, therefore, expresses various dimensions, in which [112] the only common bond is that they are situated in *duration*: duration of existence or duration of variation, for criteria linked to a variation which is periodic (*allure*) or non-periodic (*melodic profile, mass profile*).

2) In certain cases module is expressed by a number which arises from a convention of classification, and not a measurement of size. Thus, module “8” is not larger than module “5”, it simply refers to a different box in a diagram with two types of entry. All this can be more easily understood by referring to the study of the *species* of each morphological criterion.

MODULE: 504, 559-560, 568, 574, 577, 584-587 (TARSOM), 588-591, 593.

» 57. TABLATURE

1) The “old word” (630) tablature is revived to describe “*the development of an ‘instrument making’ which is more than instrumental technology developed at random and open to all influences*” (630), but which attempts to make sounds of a particular *genre* produced specifically to be part of a musical discourse. Tablature, in this sense “*describes the value-relationships available in the sounds of a particular group of instruments*” (630) and, of course, uses research into the experimental music theory, particularly *characterology* and *synthesis*.

2) If we refer to the perceptual field which is the most full of promise and the best calibrated of the three, pitch, we may expect “*two extreme types of tablature (...): a ‘harmonic’ type where all the sounds have a tonic pitch [i.e. fixed and locatable], and a ‘complex’ type where there are only non-harmonic mixtures*” [complex sounds]. (630)

a) These tablatures should give rise to two types of music: the first to a “harmonic” music (which is traditional music) and the other to a music which P.S. calls “plastic”, which may, of course, include ambiguous or mixed types.

TABLATURE: 320, 366, 630, 632, 637.

A. *Approaching the sound object: bases for an initial description*

... A sort of first aid kit, a minimum of equipment to undertake a basic inventory of the sound universe using “reduced listening”. But also the basic criteria for a more highly developed classification and description of sound objects.

» 58. TYPO-MORPHOLOGY

1) Typo-morphology is the initial phase of the programme of musical research, which groups together as complementary the two procedures of typology and morphology: these indeed constitute a stage of exploring, listing and describing sound; whereas the two procedures of analysis and synthesis involve the analysis and implementation of the *musical* capacities of the sound object. Thus, typo-morphology is a *descriptive inventory which precedes musical activity*.

2) The three tasks of typo-morphology are therefore: *identification, classification, description*.

- identifying sound objects, i.e. isolating them, cutting them up into sound units.
- then, classifying them into rough characteristic types.
- finally, describing their characteristics in detail.

Typology takes care of the first two; morphology, the third.

Naturally, our approach is through *reduced listening*, so that in theory, to identify, classify and describe objects we make no reference to their cause, their origin, what they evoke ... etc.

The interdependence of the two procedures is shown in the way that they are conditional upon and have determined each other: “*It was important to separate (sounds) into distinct types; without a preliminary screening, we could only describe morphologies so crudely that it was of very little interest. But on the other hand, the screening [114] could only be done in accordance with morphological differences. So, for many a long year we have hesitated between a scarcely-formulated morphology and an ill-defined typology.*” (393)

So we had to create an elementary morphology to be a preliminary for a typology; itself followed by a more highly-developed morphology than the first.

TYPO-MORPHOLOGY: 365, 369 (PROGEMU), 384, 392-400, 430, 475, 499, 584-587 (TARSOM).

» 59. ARTICULATION/STRESS

1) The first pair of *identification criteria* in typology, allowing every sound chain to be cut up into units, isolated sound objects.

- Wherever there is “*a breaking up of the sound continuum into distinct successive energetic events*” (396) there is *articulation*, as with consonants - and this articulation is related to the *sustainment* of the sound.

- Wherever the sound phenomenon is prolonged, like a vowel, there is *stress* and this stress is linked to the *intonation* of the sound, “*i.e. whether the sound is fixed or variable in pitch*”, or whether this pitch is tonic or complex. (366)

This pair is, therefore, modelled on cutting up linguistic chains into syllables, made up of consonants and vowels.

Such criteria must deliberately ignore references which help other non-reduced listenings, where the aim is always something other than the sound itself: recognition of a source, perception of a meaning in a known language, etc.

2) Thus, expressed in terms of pure reduced listening, Articulation and Stress are: “*the common bases for the identification of sound objects, whatever they may be*” (337) and are the starting point for typo-morphology, and therefore of the entire “*programme of musical research*” (cf. PROGEMU, fig.24, p.369). This is why they appear in sector 2, as a major relationship, a founder-axiom of *typology*.

a) *Explanation of terms.*

When he speaks of intonation insofar as it has been overlooked by phonetic classification, Pierre Schaeffer means sound characteristics which arise as much from delivery (*a drawling voice*) as from timbre (“*reedy, tonic or hoarse*”) and from variability in tessitura (“*fixed or sliding*”). But when he suggests that his typological classification is concerned rather with intonation, the context makes clear that he means more precisely “variability in tessitura”, the “locatability in pitch”, which is the first criterion for typological classification (pair *Mass/Facture*).

The word “stress” suggests fixedness in tessitura, in contrast to intonation which suggests variation: but in both cases, we are dealing with a sound phenomenon which is *prolonged*.

b) *Articulation/Stress, Articulation/Intonation, Sustainment/Intonation.*

In general, the author speaks of either *stress* or *intonation* to describe the second term of the pair of identification criteria for sound objects – [115] the first being almost always

articulation, but sometimes also sustainment. *Articulation/Stress*, *Articulation/Intonation* and *Sustainment/Intonation*, therefore, form three pairs whose relationships of complementarity or equivalence are not very clear (even a pair *Facture/Stress* is implicitly suggested as an initial approximation for the pair *Articulation/Stress*).

In the *Solfège de l'Objet Sonore*, the author resolves the ambiguity which prevails throughout the *Traité* concerning the subtle distinction between *Articulation* and *Sustainment*, *Stress* and *Intonation*, by stating that the pair *Sustainment/Intonation* is simply the “*musically-orientated*” version of the pair *Articulation/Stress*.

“*When it was orientated towards language, “Articulation” principally dealt with consonants. We shall ignore consonants and give importance to what we call sustainment, i.e. whether the energy given out at the moment of articulation is communicated instantly or over a longer period of time. As for “stress”, language paid little attention to describing intonation, it lingered over the colour of vowels. But we shall ignore this aspect of stress and retain only fixedness in tessitura*” (S.O.S.).

So, *intonation* becomes an initial approximation to the criterion of *mass*.

c) *Definition and function of the pair Articulation/Stress (or Articulation/Intonation)*.

The “experimental system”, breaking with the classical concept of the note, and starting from the position of reduced listening, initially came up against the necessity of identifying and classifying sounds:

“*Faced with so many disparate objects, belonging to no group at all (...) we must have a classification, even approximate, a sort of “grid” which would completely replace instrumental tablature or the natural repertoire of noises. For how can we study an infinite number of sounds that have not been in any way identified? We therefore use “sound identification criteria”. They will give us the means to isolate sound objects from each other, since we refuse to do this through the usual workings of sound or musical structures.*” (366)

Out of what hat shall we take these identification criteria, devoid of any “usual” reference and in the absence of an established musical system? Consider first that in language, “*the definition of units which seemed so obvious to us, inscribed in the sound itself, is relative to their meaning, and to our knowledge of this meaning*”. (285)

The criteria for segmenting into units, in linguistics, are not purely phonetic or acoustic, but *phonological*, i.e. deduced from analysis taken from the whole system. Similarly, in traditional musics, it is our acculturation to the system which allows us to isolate as “notes” sound objects as dissimilar, from an acoustic point of view, as a piano note in a virtuosic passage and a violin note in a melody. How can we extricate ourselves from this problem in the experimental enterprise when the higher level of the system is absent, and when we refuse to use the “natural” mechanisms for identifying objects (through recognition of meaning or sources), and stick to reduced listening?

Paradoxically, through the inspiration of a linguistic unit which, the author notes, is considered negligible by linguists (362): the syllable, that “*phonic object*” of language. It is to this degree of segmentation in the linguistic chain that “*the instrumental note in the traditional system*” (365) corresponds, and P.S. aligns it with the “*elementary sound object into which, ultimately, the most complex sound chain can be broken down*”. (365)

And the criteria for segmentation which he adopts are *articulation* (corresponding to consonants in language), and *stress* or *intonation* (corresponding to vowels). These criteria can be applied to the whole sound universe, “*provided we remain at the level of generalization and give them a very broad meaning*” (365), and constitute the “*first approximation to a [116] typo-morphology which should allow us, not only to identify, but also to classify and thus to choose sound objects*”, (365)

Note here the progression from identifying to classifying, and above all from classifying to *choosing*. It is with this musical end in mind that the identification criteria Articulation/Stress are not without “*musical choices*”. (366)

ARTICULATION/STRESS: 285, 337, 365-366, 369 (PROGREMU), 379, 384, 394-397, 497.

» 60. FORM/MATTER

1) The founder-pair of morphology, making it possible to give an elementary initial description of the sound object.

In a sound, *matter* is what persists almost unchanged throughout its duration, it is what could be isolated if it were immobilized, so that we could hear what it is at a given moment of listening.

Form is the course which shapes this matter in duration, and perhaps makes it evolve.

2) In most cases the form and matter of a sound evolve together, but in order to study them, it is easier to consider so-called “deponent” examples, where one of the two is fixed, highlighting the identity of the other. For example, to study the matter of sounds, “homogeneous” sounds of rigorously fixed form are used.

3) Some morphological criteria are particularly linked to the study of matter: these are mass, harmonic timbre and grain.

Others belong rather to form, such as allure and the dynamic criterion.

a) *Form, Gestalt, Structure.*

The word *form* in the *Traité* is usually used in the sense of the *temporal form* of the object, as opposed to its matter. To refer to form as an organized entity, the *Gestalt* of

“psychologists of form”, the word “*structure*” is therefore preferred, in order to avoid any ambiguity. So, with the exception of the accepted expression *well-formed* and the expression “formed sounds”, the word *form* does not have its gestaltist meaning in the *Traité*.

Otherwise, the word *form* is often used as a synonym for the *dynamic evolution* of sound (its evolution in intensity).

b) It was the *cut bell* experiment that led to the isolation of the respective roles of matter and form in the perception of timbre – because the suppression of the initial form of the bell-sound revealed the resemblance of its matter to the sound of a wind instrument.

FORM/MATTER: 275, 369 (PROGREMU), 399-403, 407, 417-419, 431, 500, 516.

» 61. SUSTAINMENT

1) The SUSTAINMENT of a sound object is the energetic process which maintains it (or not) in duration. It must not be confused with the material causality [117] which gives rise to it. If the sustainment is short-lived, we have an IMPULSE (prolonged or not by a resonance); if it is prolonged in a continuous fashion it is referred to as a SUSTAINED sound; if it is prolonged by repeated impulses we have a third type of occupation of duration: ITERATIVE sustainment.

The *three types of facture* are defined according to these three types of sustainment, making up the three large vertical columns in typology.

2) Sustainment binds the form and matter of the object at every moment by contributing two characteristic criteria: GRAIN and ALLURE, which can just as well be perceived as criteria of MATTER and FORM. However, grain and allure are discussed in the chapter entitled “Music Theory of sustainment”, as the two sustainment criteria.

Sustainment and causality.

Although it is distinct from the causality of sound, sustainment, which only exists as a *perceptual* law, nevertheless obeys various “laws” or categories of material causality.

For example:

α) no cause for duration: sustainment is non-existent or short-lived (the crack of a whip, a wood-block) – examples of passive sustainment;

β) the environment prolongs and colours the sound after the attack: sustainment through resonance (e.g. piano, guitar), which is still a “passive” type.

γ) the sound can be further prolonged by a renewed input of energy obeying the same law (sustainment of a wind instrument, maintained by breathing, of a violin, with the bow, electronic oscillation, etc.) – examples of *active* sustainment. (469-470)

So, in traditional music, different categories of sustainment are determined by simple physical and mechanical laws, consciously activated by the performer. With natural sounds these laws are more complex and intermingled, but still present. Electronic music, however, can allow itself to flout these laws and give ARTIFICIAL sustainments to sounds, where these laws no longer apply. But then these sounds are “against nature”, and the *Traité* prefers the richness, the logic and the meaningfulness of *natural* sounds, which it always takes as models.

Of the sustainment criteria, ALLURE most strongly displays a close link with natural causalities, by “revealing” the workings of the “energetic agent”. (547)

It is enough to say that SUSTAINMENT is a characteristic concept of the concrete attitude, which is attentive to the logic of natural sounds and to the links between making and hearing.

SUSTAINMENT: 402, 412, 444, 4669, 470, 500-501, 539, 547-560.

» 62. FACTURE

1) *Facture* is the qualitative perception of the energetic *sustainment* of sound objects and is closely related to it.

We could therefore say that some sound objects have “no facture” if it goes on too long and too unpredictably in duration (over-prolonged sounds), or if, on the contrary, there is not enough time for it to be heard (*impulses*).

The notion of *facture* therefore presupposes a certain balance of sound, in an [118] optimum time for it to be memorized by the ear, and a certain degree of predictability.

2) For typology, therefore, there are examples of *formed* factures in “well-formed”, balanced sound objects, and examples of factures which are *non-existent* (because they are too redundant and commonplace - *redundant* sounds) and *unpredictable* factures (because they are too unpredictable and disordered - *excentric* sounds).

Within *formed* factures there are again three types linked to the three types of sustainment:

- instantaneous facture (in the impulse);
- continuous facture;
- iterative facture.

These different types of facture, combined with other criteria, guide typological classification. (see MASS/FACTURE, 68).

3) *Facture and sustainment.*

A distinction can be made between sustainment and facture by saying that sustainment is a neutral notion and that facture is a qualitative, musicianly criterion which “describes sustainment”.

A sound always has a certain type of sustainment (including those which consist in not having any), but it is possible to have no facture, if there is too much redundancy or originality in its sustainment.

4) In a secondary sense, the term facture denotes the intention embodied in the instrumental gesture, or again, in traditional or modern musics, the active creation of sound; and, by extension, the realization of sounds in the electroacoustic studio, with sound bodies, sound recording facilities etc.

FACTURE: 271, 342, 371, 393, 410, 413, 432, 437, 438, 440, 442, 444, 447, 550
(also see **MASS/FACTURE, 68**).

» **63. IMPULSE**

1) The name impulses is given to very brief sounds with non-existent or short-lived sustainment (402), as opposed to sounds which are prolonged in a continuous manner (held sounds) and sounds which are prolonged in a discontinuous manner, in other words by repeated impulses (iterative sounds).

Examples of impulses: the crack of a whip, a pizzicato on a cello, the impact of a tennis ball on a racquet etc.

2) The symbol used to notate an impulse is the apostrophe '. Therefore, N' means: tonic mass impulse (i.e. locatable pitch). (see **65**)

a) Impulses (sometimes also called micro-objects) occupy the central column of typology, and are placed between balanced objects despite their short-lived duration, which in theory does not obey the criteria for “suitable” objects, which are supposed to have a minimum duration. But they are nevertheless included as an exception to the rule, because they frequently occur in classical music, and our ear has become accustomed to their use.

[119] b) An impulse can be *varying*, i.e. affected by a rapid variation during its brief existence (e.g. some bird-songs, some very rapid glissandi which are labelled Y').

c) If we refine this concept we can use different notations to distinguish instantaneous percussions, notated by a dot, and very brief sustained sounds, notated by a '. Typology simplifies the situation, using the apostrophe to notate both totally instantaneous sounds and sounds of very brief duration, and calling them *impulses*. (445-446)

d) Note that in their brief duration, impulses can sometimes present many details which are contracted and therefore indiscernible to the ear: they can have a facture which is “*clearly defined (...) but almost imperceptible as such*”. (438)

IMPULSES: 402, 437, 438, 439, 442, 445-446, 459 (TARTYP).

» 64. ITERATIVE (SOUND), ITERATION

1) The name iterative is given to sounds whose sustainment is prolonged by iteration, i.e. by repetition of impulses at close intervals. An example of an iterative sound: the noise of a machine gun in action.

2) In the typology of balanced objects, iterative sustainment is notated by the symbol " after the letters which denote the mass of the object.

E.g.: N (continuous [iterative (sic)] tonic form: held violin-note)

N' (tonic impulse: violin pizz.)

N" (formed iterative tonic note: rapid violin staccato on the same note)

3) The term iteration could just as well describe the phenomenon of repetition as the sound which is affected: in this case it is synonymous with an iterative sound.

a) In typology, iterative sounds occupy the whole right section in the general recapitulative table for typology (TARTYP).

b) If an iteration is accelerated, it gives a sound perceived as *continuous* and having a certain *grain*.

Conversely, if the iteration is too spaced out, the iterative sound is no longer perceived as a unit, and each impulse once again becomes an isolated sound object.

The concept of an iterative sound therefore illustrates the problem of the continuous and the discontinuous, as it occurs on the cusp between the two. It is just about possible that, depending on context and listening intention, the same sound phenomenon could be perceived in three different ways:

- as a grainy, sustained sound;
- as an iterative sound;
- at a pinch, as a series of isolated impulses.

ITERATIVE: 402, 438-439, 442, 445, 447, 458 (TARTYP).

» 65. TONIC

Sounds are called tonic, or of tonic mass, when their pitch is fixed and locatable, such as traditional instrumental sounds (e.g. a C# on the piano). Typology notates them with the letter N (since they fulfill the traditional definition of the note). As they have [120] the greatest degree of “locatability in pitch” they appear on the top row.

The author also sometimes uses “harmonic” pitch in the same sense (e.g. 366).

a) Through the morphological study of *mass*, we can distinguish in more detail so-called *pure* sounds (sinusoidal electronic sounds with no “harmonic timbre”) from true *tonic* sounds, which have a “harmonic timbre” in the same way as traditional instrumental sounds. *Tonic groups* are the masses formed by superimposing tonics, which can be isolated in listening (traditional chords) and *channelled sounds* those whose mass is formed of an amalgam of tonics and “nodes”. (see 89)

It would be wrong to think that tonics only occur in music; many natural, mechanical or industrial sounds also have tonic mass.

b) It is in tonic sounds that it is easiest to isolate and study what is called the “harmonic timbre” of sounds, which does not exist in “pure” sounds, and which it is difficult to isolate from mass in *complex* sounds (nodes, channeled sounds etc. and *varying* sounds.

c) If we can distinguish a *double pitch-field*, harmonic and coloured, and two ways of perceiving phenomena of mass, it is precisely because only tonic sounds can be perceived as an absolute value (cardinal perception) and arranged in “cardinal” calibrations. Whereas sounds of varying or complex (non-locatable) pitch result from a perception which is more diffuse and “impressionist” in colour and density. Hence the distinction between a so-called “harmonic” field, solely for the perception of tonic sounds, and a “coloured” field for non-tonic sounds (either complex-fixed or varying).

TONIC (SOUNDS): 366, 440, 442, 446, 447, 459, 510, 511, 516, 517, 518, 520, 584-587, (TARSOM) (sometimes designated by the term “harmonic sounds”).

» 66. COMPLEX

1) Sounds whose mass is fixed but not locatable in pitch are called *complex* sounds, or sounds of complex mass. E.g. a cymbal sound, the “hiss” of a piece of electroacoustic apparatus etc. They are notated by the letter X.

2) Typology also distinguishes between *tonic* sounds of defined and fixed pitch (N) and *varying* sounds, of variable mass (variable-tonic, or variable-complex). The sequence: N,

X, Y denotes a *diminishing locatability in pitch*, and TARTYP is organized vertically in the same way, with *complex* sounds on the middle line, between tonic sounds and varying sounds.

3) Used alone, and in capitals, the letter X denotes the 3 types of balanced objects of complex mass (X = continuous complex note; X' = complex impulse; X" = iterative complex note). In lower case and as a suffix to another letter denoting another type of object, it means that the mass of that object is complex (e.g. Hx = homogeneous complex sound; Ax = accumulation of overall complex mass etc.).

[121] 4) Morphology distinguishes more subtly between masses of complex type:

- *nodal* mass (or *node*) - a compact agglomerate, a “slice” perceived as a whole (see **90**);
- *nodal group* - where the mass is perceived as a superimposition of “nodes” (see **90**);
- *white noise*, which in theory occupies the entire tessitura (see **92**);
- “*channelled*” sound where the mass is a superimposition of “tonics” and “nodes” (see **91**).

a) In relation to the double perceptual pitch-field, sounds of complex mass and their corresponding harmonic timbres tend to be perceived in *thickness* in the so-called “coloured” field, whereas tonic sounds and their harmonic timbres are perceived in *degrees* and *intervals* (traditional “harmonic” field).

Being “complex”, and therefore without precise pitch, does not prevent them from *also* being situated also in the pitch-field as more or less deep, medium or high, and more or less thin or thick. The ear turns out to be very sensitive to very slight differences in the “colour”, the “thickness” and the pitch “site” of complex sounds; but it is not equipped to memorize and locate these difference in a fixed “discrete” manner (as opposed to tonic sounds).

b) *Complex sounds and varying sounds*: the great boldness of P.S. in typology is to consider that varying tonic sounds (developing as glissandi in the tessitura) and varying complex sounds (*idem*) present themselves to perception in the same way, are no more “locatable” one than the other and that there is therefore no need to classify them in separate boxes. The symbol Y is therefore used to denote all varying sounds. It can, it is true, be refined into Y_n (tonic-varying) or Y_x (complex-varying).

COMPLEX: 446-447, 462, 518, 586.

B. Typology: a classification of sound objects

a) Classification criteria

» 67. TYPOLOGICAL CRITERION

1) The concept of *criterion* appears in the two distinct contexts of *typology* and *morphology*, with two different meanings, but stemming from a common definition: the criterion is a “*property of the perceived sound object*”, allowing it to be identified, classified, described, analysed etc.

2) Within the framework of *typology* we have pairs of *sound criteria for identification* allowing units or *objects* to be located in any “sound chain”, and to be classified into *types*. These criteria for the identification and classification of objects function in pairs, which bring together two opposing complementary aspects of sound.

[122] 3) The minimum criteria for *identification* of objects, i.e. for segmentation of the sound chain into units, are represented by the pair *Articulation/Stress* (see 59).

4) On a more complex level, for the *classification of objects into types*, three pairs of criteria are used: *Mass/Facture*, *Duration/Variation*, *Balance/Originality*. These criteria are already “morphological” (descriptive) but they are used only to establish approximate distinctions, allowing main types of objects to be defined. It is their interaction in 6 dimensions (reduced by “contraction” to 2 in order to fit on a two-dimensional diagram) which generates the principle of typological classification (TARTYP).

5) What these four pairs of typological criteria have in common is that they have been chosen with a “musical bias”, i.e. they seek to identify sound objects which are most “suitable” for music. They are, therefore, more or less normative and hierarchical criteria.

a) These criteria are not devoid of musical choices (346), arising from “*musical bias as infrequent, as justified as possible*” (366). This means that they are not altogether neutral in relation to the “totality of sound” that they are aiming to dig out of the woodwork, but that they are to a greater or lesser degree intended to classify it with a view to using it for music. The criteria of *mass*, *balance* and *originality*, particularly, refer respectively to notions of locatability in pitch (which is the traditional musical value par excellence) “*well-formedness*” and listening “*interest*”, all of which display a concern with music.

b) We have already looked at the pair *Articulation/Stress* (see 59). There remain to be studied the three other pairs, which correspond to the elementary morphological concepts without which a typology could not get off the ground. Before taking each one in isolation (see 68, 69, 70), we shall explain how they came to be developed.

We have a jumble of objects in an attic, say: how can we classify them? Using the criterion of material (wood, cloth etc.), size? (“*They suggest I order my clothes by size: this doesn’t allow me to arrange birds or bottles...*”) (429) or function? The latter suggestion seems the most feasible, for “*we want to use sounds first and foremost to make music*”. (431)

Therefore, all the criteria which are chosen are determined by the concern to discover objects “suitable for music” and having well-balanced, complementary qualities.

TYPOLOGICAL CRITERION : 346, 366, 429-442, 459 (TARTYP).

» 68. MASS/FACTURE

1) The pair Mass/Facture, the first pair of criteria used to classify sounds in typology, combines respectively a criterion relating to the “*capacity for a sound object to be heard as pitch*” (432) with another relating to “*the manner in which energy is communicated and displayed in duration*” (432). The main criterion, Mass, has to do with the matter of sound, and the second, Facture, its form. This is how they complement each other.

2) The choice of mass as the first typological criterion arises from the [123] concern to start off this classification with an essentially “musical” criterion (as with the pair Musical/Musicianly), since it relates to pitch, whereas Facture would, in contrast, introduce a more creative, “musicianly” spirit.

3) The four types of Mass retained for typological classification are:

- where the pitch of the sound is fixed and identifiable (*tonic masses*);
- where the pitch is fixed and non-identifiable (*complex masses*);
- where it varies moderately and in an organized manner (“*variable*” mass - both tonic-variable or complex-variable);
- where it varies in a disordered and excessive manner (“*nondescript*” mass).

4) The three types of Facture selected in parallel are:

- where the Facture is prolonged and continuous (“*continuous*”);
- where it is reduced to a simple impulse, i.e. an ephemeral phenomenon (“*instantaneous*”);
- where the Facture is prolonged by repeated impulses (“*iterative*”).

5) These variables, in the same sound, are not necessarily strictly independent, they are often linked. For example, if the facture of a sound is very mobile and complex, so also will be its mass.

MASS/FACTURE: 431-432, 436, 437, 439, 442, 443, 444-448, 459 (TARTYP).

» 69. DURATION/VARIATION

1) The pair Duration/Variation, the second of the three pairs of criteria of typological classification, introduces a *temporal* factor into the selection of objects.

Duration is the time of the object as it is “psychologically experienced” (not the “chronometric” time), and *variation*, defined as “*something which changes over time*”, is a relationship “*which resembles a speed*”. (433)

2) Thus, we can distinguish *short, medium, extended* durations and *non-existent, reasonable or unpredictable* variations.

3) The author of the *Traité* puts forward the hypothesis that human perception functions best within an optimal temporal space, which is a medium duration. Below and above this duration, perception will be disconcerted. Hence the choice of the three values of duration: (too) short - (ideally) medium - (too) long.

a) *Temporal criteria.*

The concept of duration was already present in facture, but as the “total duration of the sound object”. Here duration is considered “*in a relationship that resembles a speed, which is the quotient obtained by dividing a deviation (what changes) by the duration of the change*” (433), since it comes under the criterion of variation (defined as “*something that changes in relation to time*”). (433)

b) These two factors are linked to the first pair of criteria. “*We shall deal with [124] durations and variations of objects using the criteria of mass or facture.*” (433)

c) *Connection between variation and perception of duration.*

The study of temporal anamorphoses shows that “[perceived] *musical duration is a direct function of the density of information*” (248). The more the sound is packed with events, which can be variations, the more it tends to be perceived as long, and vice versa (see chap. XIV, time and duration, p.244-258). The perception of duration is therefore linked to the variations of the object and vice versa.

DURATION/VARIATION: 248, 432-433, 436-438, 442, 459 (TARTYP).

» 70. BALANCE/ORIGINALITY

1) The third pair of criteria in typological classification, dealing more particularly with the *structural* dimension of the object, considered qualitatively. These two criteria, in this sense, explicitly introduce a *value judgement* into typological classification, calling on notions

of “full of potential” (balance, “well-formedness”) and “interest” (originality), to select objects.

2) *Balance* is defined as a variable “compromise” in the facture of the sound object, between the “*too structured and the too simple*”(435), and *originality*, as the greater or lesser capacity of the object to “*challenge expectations*” (436) as it progresses.

These two notions are not opposed, but complementary: in typology “*attention is given to the object, chosen from possible structures and, for this chosen structural level, to the greater or lesser degree of originality*”. (436)

This can go from non-existent originality (*redundant* sounds) to excessive originality (*excentric*, too unpredictable sounds), passing through medium and “suitable” originality.

3) In accordance with these two criteria, typology distinguishes so-called *balanced* objects, which are placed in the central boxes of TARTYP; *redundant* sounds on each side of the central box; and finally *excentric* sounds on the circumference.

Grouping of criteria for typological classification.

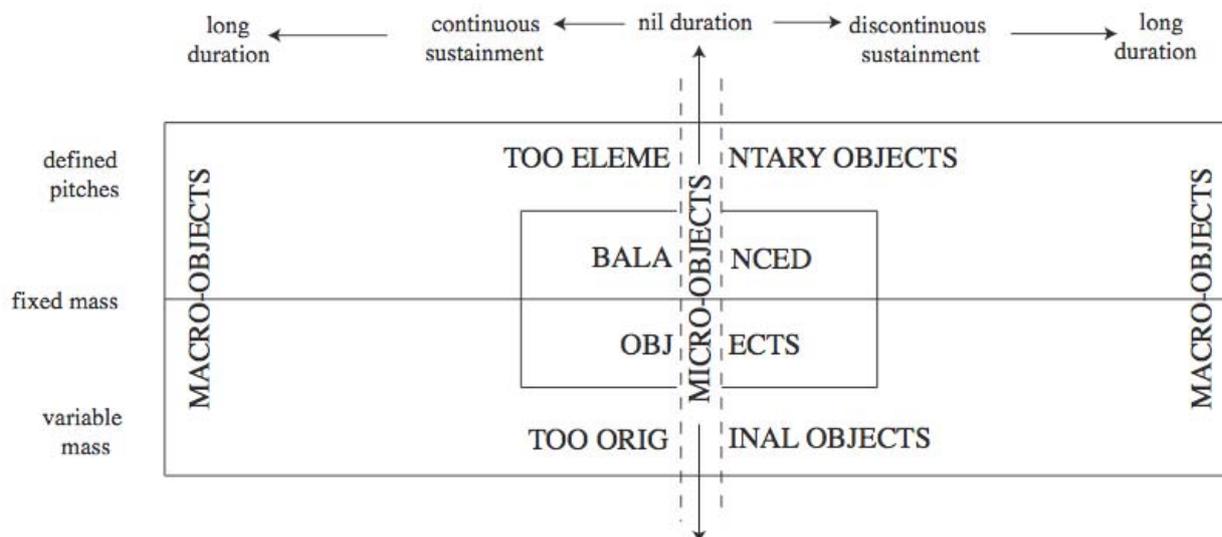
Since typology is intended to generate a diagram which can accommodate the main types of object, it is not possible to keep completely separate the 6 variables represented by the three pairs *Mass/Facture*, *Duration/Variation*, *Balance/Originality*, which would require a six-dimensional diagram. In fact, in objects they are not separate: the originality of an object, for example, is linked to its degree of variation in relation to its duration, and the complexity of its facture, etc.

So *facture* is combined with duration horizontally, and mass with variation vertically, “*arbitrarily simplifying their relationships*”. (437)

Facture and Duration are placed on the same horizontal axis in an arrangement starting at the centre (brief durations, non-existent factures: “impulses”) with sounds of medium and long duration, of continuous facture on the left, and on the right, sounds of medium and long duration, of discontinuous facture (iterative).

In the same way, Mass and Variation are combined on the same vertical axis, going

[125]



Recapitulation of typological criteria.

from top to bottom, starting with non-varying masses of defined pitch and going to the other extreme of “unpredictable” variations of mass: in the centre is the suitable mean of “fixed” masses, with non-defined pitch (complex mass) “*half-way between sounds of easily-locatable pitch (on the vertical axis above), and sounds with variable mass (below)*” (437)

The order of the associated criteria of mass and variation is as follows:

- fixed masses with pure pitch (“pure” sounds);
- fixed masses with defined pitch (“tonic” sounds);
- fixed masses with non-defined or “complex” pitch;
- masses with little variation;
- extremely variable masses (“unpredictable” variation).

“Arranged like this, the two axes form four quadrants on our drawing. So our classification has a centre.” (437)

The arrangement from a centre to a perimeter is then used to situate the pair of criteria Balance/Originality.

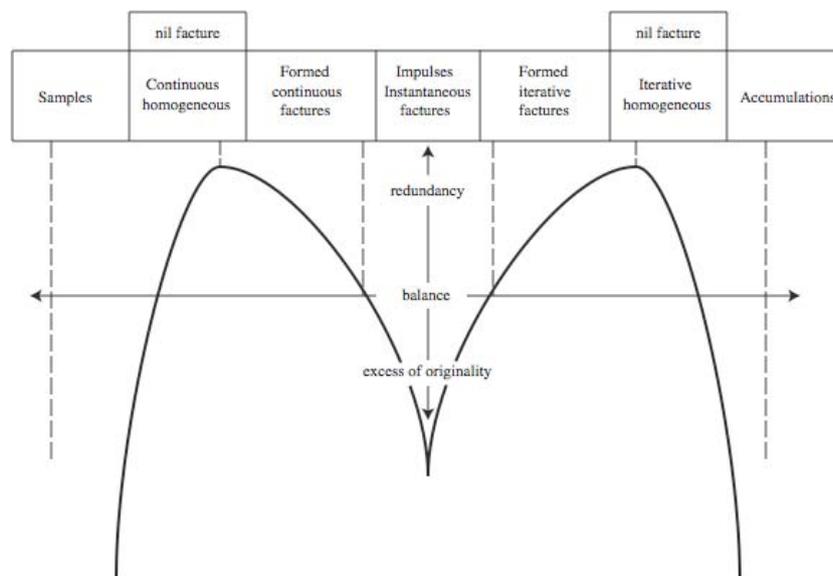
“Has this centre any significance in relation to our desired objective to organize objects on the model of balance-originality? We may hope so, if this classification manages to give central place to objects with good balance and neither excessive nor insufficient originality. In fact, and more precisely, we should expect to find a “vanishing point” (micro-objects), and around the centre an area of balance with, at the extremities, on the perimeter, an extensive zone of objects which are not well-balanced.

In the centre there is both a fixed mass, thus an acceptable balance and an adequate originality as far as the criterion of matter is concerned, and a shorter and shorter duration: we are moving towards micro-objects for which we need a vertical band in the middle of the page for temporally unbalanced sounds which appear as structurally elementary (...).

Vertically, originality will, of course, increase from top to bottom. The more the sound is stripped down, of determined pitch and at the limit of electronic purity, the less original it will be. The more the sound is of variable mass, the more originality it will have, but the more it will tend (towards the bottom) to be unbalanced, both in the complexity of its structure and in its unpredictability.” (437-438)

We can imagine how much time it must have taken to complete such an

[126]



ingenious combination, based on the areas of interdependence of each of the six variables in the three pairs of criteria.

“Thus along the horizontal axis we can situate seven fairly clear zones where facture and duration occur in a consistently characteristic way, and which have various degrees of originality or redundance, as is indicated on the diagram above by a curve of originality whose ordinates go from zero (redundancy) to infinity (total unpredictability).” (439)

The contraction of the 3 pairs to 2 dimensions gives a provisional diagram whose boxes must be filled in later: the TARTYP retains this diagram, but with some slight simplifications (for example it does not distinguish between pure sounds and tonic sounds).

BALANCE/ORIGINALITY: 435, 436, 438, 439, 440, 442, 443-448, 459 (TARTYP).

b) First series: Balanced Objects

» **71. BALANCED (SOUNDS)**

1) In the typology of sound objects, the 9 types of *balanced* sounds are those which present “a good compromise between the too structured and the too simple” (435), which have a suitable duration, are “well-formed” and have a strong “unity of facture”.

Balanced sounds are, therefore, *a priori*, those which can be *suitable* for music, but we must not confuse the typological notion of balance with the broader concept of suitability, which indicates an intention to use objects in music.

[127] 2) Balanced sounds are often called *notes*, with reference to traditional music. In the TARTYP (459) they have a privileged place: the nine central boxes which are assigned to them in accordance with the principle of typological classification.

	<i>Criteria of facture</i>			
<i>Criteria of mass</i>	Ordinary note	N	N'	N''
	Complex note	X	X'	X''
	Varied note	Y	Y'	Y''

The letters N, X and Y refer to types of mass, tonic, complex and “reasonably” variable respectively.

The letter N, X or Y without a particular sign refers to a balanced, continuous facture; the sign ' refers to a very brief facture of the impulse type; the sign '' refers to a balanced iterative facture.

3) Although *impulses* appear amongst **balanced objects**, although they do not fulfill the criterion laid down by the author of “*optimum memorisation time for the ear*” (443), they

are included, as it were, by adoption, as they are commonly used in traditional music, where our ear has learnt to listen to them.

4) In the study of *internal morphology*, sounds are called “balanced notes” when they display clearly and distinctly the three temporal phases: attack, continuant and termination. Sounds which present two of these phases, or even all three, fused into one are called “deponent notes” and these are commonly the case, balanced notes being the exception.

a) *Criteria for definition of balanced objects.*

Underlying the principle of typological classification is the idea of bringing out, separately and in a central position, “good objects” which are memorisable, full of potential, fit to be used in musical structures.

These central objects (literally and metaphorically) should not be “...*either too elementary or too structured. If they are too elementary, they will tend to be subsumed by structures more worthy of memorisation (...)* If they are too structured, they will be capable of breaking down into more elementary objects” (435). To this criterion of well-formedness is added a criterion of duration: “...*the adjective memorable, while it indicates a meaningful form, [128] also implies a suitable duration: neither too short nor too long, about the optimal duration for listening to objects*” (435)¹.

b) *Summary of balanced sounds.*

- 1) N: continuous tonic formed sound
or: ordinary sustained note (447)
or: formed sustained tonic (459)
- 2) N': tonic (or “tonic mass”) impulse
or: ordinary note, “impulse” type (447)
(e.g. xylophone note)
- 3) N'': iterative formed tonic sound
or: ordinary iterative note (447)
or: formed tonic iteration (459)
(e.g. violin staccato)
- 4) X: continuous formed complex sound
or: sustained complex note (447)
or: formed complex sustained mass (459)
(e.g. sound of a cymbal “*stroked with a metal brush*” (447))
- 5) X': complex (or “complex mass”) impulse
or complex note “impulse” type (447)

¹ The idea of an “*optimal listening duration*” rests on the experiments recorded in book III on the perception of sound in duration (254).

(e.g. cymbal “*clashed and immediately muted*” (447))

- 6) X": complex formed iterative sound
or: complex interactive note (447)
or: complex formed iteration (459)
(e.g. not too rapid percussion tremolo (447-448))
- 7) Y: continuous formed varying sound
or: continuous varying note (447)
or: formed slightly variable sustained (459)
(e.g. violin glissando)
- 8) Y': varying (or “slightly variable mass”) impulse (459)
or: varying “impulse” type note (447)
(e.g. brief glissando)
- 9) Y": varying formed iterative sound
or: iterative varying note (447)
or: formed iteration of slightly variable mass (459)
(e.g. “kettledrum” tremolo glissando (448))

The definition of Y sounds can be refined by notating varying tonic mass sounds as Y_n (or Y'_n, or Y''_n) or varying complex mass sounds as Y_x (Y'_x, or Y''_x).

In this summary of balanced objects we have brought together some of the varying (but equivalent) definitions given by P.S. for each type, and concrete examples which he gives, generally taken from the field of traditional music. However, while this list contains most objects from traditional music, it also includes types of objects encountered in experimental music – notably sounds of varying complex mass.

c) *Balanced objects, suitable objects, musical objects.*

These three concepts must not be confused although in certain contexts they can be considered as the same.

[129] Indeed “...*the most suitable sound objects for music are apparently sounds that fit in with the criteria in the nine central boxes...*” (443) thus balanced objects. But:

- *the balanced object* is defined in “concrete” terms within the framework of a typology which is the first step in a programme of musical research in 4 stages. It obeys precise typological criteria;

- *the suitable object* is a “founder” concept whose definition must remain open: often it is the bringing together of objects, the context of their structuring, which defines their criteria for mutual suitability and suitability for music, just as much as, if not more than, their intrinsic characteristics;

- the definition of the *musical object* is relative to an even broader (and vaguer) context: musical intention and implementation.

So, each of these concepts fulfills a fairly decisive function at different stages of musical research. They are interlinked, but independent, because they are located, the first in the precise framework of a general typology of sound objects: the two others, in the framework of a “musical project”, defined in broader terms.

BALANCED (SOUNDS): 435, 443, 447, 459 (TARTYP).

» 72. FORMED (SOUNDS)

1) In typology, *formed sounds* are medium duration sound objects with a feature that is “closed” or “formed” (i.e. describing a complete curve of “*sufficient originality*”) (438) and presenting a *temporal unity*. E.g. a piano note. This, as opposed to very brief sounds (micro-objects, or impulses) or very long ones, without temporal unity (macro-objects). The sustainment of formed sounds can be *continuous* or *iterative* (i.e. discontinuous, through repetition of impulses). In the TARTYP they are in the two columns to the left and right of the central impulses column.

Due to their similarity to the note in traditional music, they are sometimes called *notes*.

2) Two types of formed sounds can be distinguished:

a) basically, “well-formed” sounds as such (in the gestalt sense of well formed), corresponding to *balanced sounds in typology, with the exception of impulses*.

b) additionally, two *excentric* objects, because they are of excessively variable mass, but of medium duration and with temporal unity; the *Large Note* (W) and the *Cell* (K).

3) The list of formed sounds should not therefore be confused with the list of balanced sounds. There are indeed balanced-formed sounds as well as balanced non-formed sounds (Impulses) and formed non-balanced sounds (Large Note and Cell).

FORMED (SOUNDS): 438-439, 442, 443-446, 455, 459, 461.

[130] c) Second series: redundant sounds

» 73. REDUNDANT (SOUNDS)

1) In typology objects are called *redundant* when they offend by being too commonplace and regular, or insufficiently original or too predictable over a fairly

extensive duration. These sounds are “*almost without shape*” (in the sense of the pair Form/Matter) and are in theory, therefore, not suitable for music.

2) In accordance with the principle which guides the organization of types of objects in the TARTYP, redundant sounds occupy two columns on each side of balanced objects (one column for *continuous redundant* sounds, one for *iterative redundant* sounds).

3) The main types of redundant sounds are *homogeneous* sounds H, which do not evolve at all; there are also the particular examples of redundant “*wefts*” and “*ostinati*”, (notated Tn and Tx for redundant wefts and Zy for the redundant ostinato; finally the siren \bar{Y} (continuous) or \bar{Y}'' (iterative)).

a) *Criteria for the definition of redundant sounds*

Redundancy results from the relationship between a too summary or elementary facture and a duration which is too long: “*to arrive at redundant objects, we only need to start from balanced objects (...) and to extend their duration up to the point where every dynamic form disappears*”. (448)

There are two types of redundancy: one in which the matter is fixed (and the idea of redundancy is obvious) and one where it is variable, which could seem paradoxical, but where the variation itself becomes redundant because it is too predictable and extensive (the example of the “siren” \bar{Y}).

b) The arrows in fig. 32, p. 451 which lead from the central balanced objects (indicated by the dotted lines) towards our redundant objects, signify that the redundant sound could be the product of a balanced sound which has “deteriorated” by being excessively prolonged. Note that the siren \bar{Y} is omitted in the TARTYP summary.

- Note also that the Weft and the Ostinato are normally excentric objects.

REDUNDANT (SOUNDS): 435, 436, 437, 438-439, 441, 442, 448-451, 459 (TARTYP).

» 74. HOMOGENEOUS (SOUNDS)

1) Belonging to the family of redundant sounds, homogeneous sounds are those which remain entirely unchanged throughout duration, without any variation or development of matter, intensity etc. (401, 509). E.g. a “white noise”, an electronic “hiss”, a fixed held note on the organ.

It could be said that they have a non-existent *form* and fixed matter. Their origin is usually mechanical and artificial.

2) Homogeneous sounds are notated H or Z according to whether [131] they are continuous or iterative. On the one hand, there are tonic *continuous homogeneous* sounds (H) and complex continuous sounds (Hx) and on the other hand tonic iterative homogeneous sounds (Zn) and complex iterative sounds (Zx), according to whether their masses are tonic or complex.

3) Because of their absence of form, homogeneous sounds are particularly deponent and lend themselves more easily than others to the study of the criteria of matter: *mass* and *harmonic timbre*. This is why the chapter on these two criteria is called *Music Theory of Homogeneous Sounds*. (chap. XXX, p. 509-528)

In order to study the matter of certain sounds which have a dynamic development, we might be tempted to “homogenize” them, i.e. artificially flatten out their dynamic shape.

4) In relation to the three pairs of criteria which form the basis of typological classification: *Mass/Facture*, *Duration/Variation*, *Balance/Originality*, homogeneous sounds are easily defined as being of fixed mass, non-existent facture, non-existent variation, non-existent balance and non-existent originality. All that we need to do is evaluate their mass (tonic or complex) and their sustainment (continuous or iterative). They appear in the two vertical columns for redundant sounds in the TARTYP, to the left and right of central balanced objects.

a) *Origin and interest of homogeneous sounds*

The typology of homogeneous sounds, the author notes, is “*the best defined, the easiest to analyse*” (509) because in these sounds, mass is, as it were, immobilised and can be observed with the greatest precision. On the other hand, this typology is “... *often the least straightforward to obtain in practice*” (509).

Sounds that are of homogeneous origin (i.e. not created by a homogenizing manipulation) are, therefore, generally of artificial origin: either electronic (white noise, “*a synthetic sound imitating an indefinitely long bow movement*”) (438) or coming from instruments whose sustainment is maintained mechanically (hurdy-gurdy, organ).

The interest of homogeneous sounds for the study of matter is obvious, on the other hand they are “*unrewarding from the aesthetic point of view*” (401) and therefore more useful to research than to music.

b) We should point out that there may be a slight difference between “quasi homogeneous sounds” indicated by a dash above them, and which display slight dynamic fluctuations (\bar{N} , \bar{X} , \bar{N}'' , \bar{X}'') and sounds which are perfectly mechanical, smooth homogeneous (Hn, Hx, Zn, Zx). However, in its final state, the typology does not take account of the first and implicitly integrates them with the second. (cf. TARTYP, fig. 34, p. 459).

In addition, varying redundant sounds are not characterised as “homogeneous sounds” in the strict sense (despite what the *recapitulative table of redundant sounds* seems to show,

fig. 32, p. 451), even if their variation is of an implacable regularity (e.g. the siren), nor are *wefts*, “fusions of slowly evolving sounds”, which display internal variations.

c) A summary of the general types of homogeneous sounds H and Z can be found in box 21 of the TARSOM (types of dynamic criteria, 584), as representative of absolutely flat, non-evolving dynamics.

HOMOGENEOUS (SOUNDS): 401, 416-417, 449, 451, 459 (TARTYP), 509, 517.

[132] » 75. SIREN (\bar{Y})

1) A type of redundant sound characterised by a slow, continuous variation in tessitura, prolonged and regular, uneventful. It is notated \bar{Y} , since it can be considered as a “stretching” in time of the balanced note Y.

The name siren alludes to the most characteristic example of this process; the sound of a warning siren.

There is also a variation, the “iterative siren”, notated \bar{Y} ”.

2) The siren is mentioned in the study of redundant sounds, but does not figure in the final summary table of the TARTYP.

a) In the complementary typology of variant objects, (570-572) the continuous siren \bar{Y} is relocated beside the *weft* T, but more closely linked to traditional musics. The author is perhaps thinking of the slow glissandi of certain non-European (Japanese) or contemporary musics (the opening of *Metastasis* by Xenakis).

b) The siren also appears in box 41 of the TARSOM in the summary of types of melodic variation, as an example of the “progress” type of variation (slow and prolonged).

c) *Note*: In the different editions of the T.O.M. the line above the \bar{Y} is hard to see in box 41 of TARSOM, p. 586, and can be confused with a balanced object Y.

SIREN: 449-451, 570, 571, 572, 586 (TARSOM).

d) Third series: excentric sounds

» 76. EXCENTRIC (SOUNDS)

1) In typology, sounds which display a lack of balance in the sense of being too original and complex are classified as excentric.

In accordance with the provisional diagram of typology they are in the “excentric” boxes of the TARTYP, on the periphery.

2) The types of sounds classified as excentric are: the **Accumulation** (A), the **Cell** (K), the **Sample** (E), the **Fragment** (Φ), the **Large Note** (W), the **Ostinato** (P), (except the special ostinati Zy, which are redundant) and the **Weft** (T) (except the special redundant wefts Tn and Tx).

a) *Status of excentric sounds in typology.*

The “peripheral” position of excentric sounds in typology takes on a symbolic meaning: they are “at the limit” of the field of sounds which can be used for music: *“If indeed one of these sounds occurs in a work, there is a danger that it may distract the listener’s attention to itself, because as it is too structured, too unpredictable, and generally too bulky (...) in the structure where it occurs, it becomes the central point rather than simply one element amongst others.”* (452)

To study excentric sounds, only examples “where a certain unity can be perceived [133] in the sound, which causes it to appear as a sound object again.” (452) are considered, i.e. examples are omitted where an excess of information, of variation, etc. disrupts the unity of the object.

EXCENTRIC (SOUNDS): 435-437, 438-439, 442, 452-457, 459.

» 77. LARGE NOTE (W)

1) A type of excentric sound which presents a variation of medium duration, a variation “*both slow and multiple but interconnected*”, i.e. fused together by a coherent unity of facture and by the perception of a “*permanence of causality, which links the successive moments together*” (441). Example of a large note: the sound of a bell with its successive harmonics; the singing of a hotel plumbing system creating “*a unique object arising from a clearly determined aquatic episode*” with “*a beginning, a middle and an end*”. (441)

2) The Large Note is notated W. In the TARTYP it is in the column “formed sounds”, under the balanced varying note Y, of which it is an “*extrapolation*” (456) an excentric, “*giant variety*” (457).

a) *Details about the Large Note.*

“*The object spreads out in many-branched, multiform variations, an interweaving of motifs always interconnected in a logical manner: this is a large note W. It is not only hotel plumbing, (...), but the interminable gong, the bell with successive partials, also new objects*

from electroacoustics whose complex melodic-harmonic development is clearly technologically determined. If this is not the case, if the technical equipment does not hold the object together in such a way, the large note loses its unity and tends rapidly to become a sample (456)".

Why such sophisticated distinctions?

"This rather too original unit has not only the merit of providing a box for classifying a great number of new sounds, unclassifiable elsewhere; it also has the merit of reminding us that some musical motifs, notated on the score, are not really heard in isolation, but are blended into one large note: for example, the notes which Bach adds in an arpeggio above a low fundamental, in the following example" (456).

Here P.S. reproduces the famous dominant ninth arpeggio at the beginning of the *Toccata and Fugue* in D minor (fig. 33, p. 456).

b) *The large note in the Typology of Variations* (see **30**).

In the complementary typology of variations, the large note is redefined more narrowly, and at the same time divided into two varieties: large note W with a moderate speed of variation and micro-large note W' with a lively speed of variation (572).

The nature of its variation is defined as being of the "development" type, i.e. progressive and continuous (as opposed to the "modulation" type, which is **scalar**); on the other hand it now only designates objects which are the product of a "natural development", as opposed to those which result from a musical intention. Bach's organ arpeggio is, therefore, implicitly redefined as a *motif* (see **84**).

In the summary table of melodic variations, the large note W is placed side by side with the formed varying sound Y which is its "counterpart" in the field of traditional music, [134] likewise the micro-large note W' is next to the varying impulse Y'.

LARGE NOTE: 240, 441, 455-457, 459 (TARTYP), 462, 571, 572, 576, 584-586 (TARSOM).

» **78. WEFT (T)**

1) A type of excentric sound of prolonged duration, created by superimposing prolonged sounds, "sheaves", "*fusions of slowly evolving sounds*" (450) which are heard as groups, macro-objects, slowly developing, scarcely differentiated structures.

The weft is denoted by the symbol T.

2) In addition to the usual so-called "mixed" wefts T, in which the variations of details are quite complex and unpredictable, there are also specific examples of redundant wefts of

scarcely variable mass, notated Tn (“harmonic” weft based on tonic sounds) or Tx (“complex” weft of complex sounds).

3) Wefts are not encountered solely in natural phenomena and musique concrète, but also very commonly in traditional symphonic music.

a) *Originality of the weft.*

The weft belongs to the type of prolonged sound that could be analysed as an amalgamation of different intermingled constituent objects, but which present to the ear as macro-objects bound together by the sensation of a “causal unity”.

As a macro-object with mobile parts, but whose general profile is fairly continuous and fixed, the weft takes its place in the TARTYP in the column of homogeneous sounds “*where it extends the category in the direction of originality*”. (457)

b) *The weft in the typology of varying objects.*

The complementary typology of variations begins by considering the possibility of new distinctions between “fluctuating” wefts Tz, developing wefts Ty and “modulating” wefts (i.e. developing by stages) Tx, but ultimately it classifies the general type weft T with objects *varying slowly in a progressive and continuous manner* (variation of the “progress” type, see 30).

WEFT: 449, 450, 457, 459 (TARTYP), 510, 572, 586 (TARSOM).

» **79. CELL (K)**

1) A type of excentric object, which is created artificially by removing a fragment of magnetic tape containing a recording of “*disordered micro-sounds*”. Thus, an original object of fairly short duration, made of disparate and discontinuous impulses, is obtained (571). It is notated by the letter K, and is placed in the box next to iterative formed sounds, in the same row as sounds with “*unpredictable variations of mass*” (TARTYP).

[135] 2) Artificial repetition, by “looping” a cell, creates the cyclic macro-object which in typology is called “cell-ostinato” and notated P or Zk.

a) *Originality of the cell.*

Compared to the Large Note (W), which has coherent facture and fairly slow variation, the cell presents incoherent execution (facture) and rapid variation between “*disparate and scalar*” impulses (571) i.e. in stages. It is equally distinct from the Fragment (see 80), which is another type of artificial object, produced by splicing a balanced note N, X

or Y, and which is generally short and abrupt, whereas the cell is of a more prolonged, though moderate, duration.

The cell K, “cell-ostinato” P or Zk and Fragment Φ are three types of “artificial” objects (which can be created in the studio by “cutting” into objects and, possibly, repeating them by means of a loop) which in typology are given a place in the excentric boxes. Even if they implicitly reveal their artificial origins, they are heard as objects with an inherent unity, and must be taken into consideration.

One could even say, paradoxically, that it is their clearly audible characteristic of artificiality which welds them into a unit in relation to other objects whose causalities are more “natural”. They are nonetheless “at the limits of typology”. Moreover, the cell is close to the *accumulation*, the only difference being a more “measured” duration and a more “formed” facture.

b) *The cell in the typology of variations.*

In the complementary typology of variations, an appendix to the typology as such, the cell occurs as a type of melodic variation, as a group of “*disparate and (...) scalar impulses*” (571), whose variation is of the “*modulation*” type (in stages) and of rapid speed (“anamorphosed” variation), as an example of the “*most general music*”, compared to the micro-group G' which, while displaying the same characteristics, applies more to the “*materials of traditional music*” (572).

In box 41 of TARSOM, which recapitulates this typology (types of melodic profile), the cell K is no longer next to the micro-group G', which it seems to subsume as a particular example.

CELL: 438, 441, 454-455, 456, 457, 459, 471, 571, 572, 577, 584, 586 (TARSOM).

» **80. FRAGMENT (Φ)**

1) A type of artificial sound obtained by editing out a fairly brief “fragment” of a formed note X, N or Y.

2) The fragment should not be confused with the impulse. It does not follow a natural energetic logic and its artificiality is evident. But it is often found in experimental music.

3) The symbol of the fragment is the Greek letter Φ . As it is a brief object, it is placed in the column of impulses in the same row as sounds of “very variable” mass. With the Cell and the Ostinato, it forms the group of the 3 “artificial” sounds distinguished by typology.

[136] a) Examples of fragments: “*spliced piano or violin notes*”, “*cut bell*”, “*cut cymbal*”.

b) The author specifies that “*these are short sounds, but not necessarily so (...) Just as the cell does not entirely satisfactorily fit in with iterative formed notes (...), the fragment can be included as an impulse only because of a certain abruptness of presentation*”. (455)

FRAGMENT: 455, 459 (TARTYP).

» 81. OSTINATO (P)

1) A type of artificial excentric sound created by the mechanical looped repetition of a cell (therefore of a relatively complicated micro-object). The ostinato is therefore a kind of prolonged and cyclic iterative sound. Examples of an ostinato are: a “closed groove” in a musique concrète work, or else certain repetitive electronic phenomena. Normally the ostinato is notated by the letter P.

2) A *particular example* of ostinato which arises from redundant and not excentric sounds is represented by ostinati in which the element of cyclic repetition is more summary than a cell. This particular example of a cyclic iterative sound (which can be caused by something repeated naturally) is called a “*redundant ostinato*” and is notated Zy (Z in so far as it is an iterative redundant sound, y to characterise the cyclic variations which can be heard within it).

a) *Originality of the ostinato.*

In most cases the ostinato P is, therefore, the product of artificial repetition (looping of a recorded fragment, or repetition by an electronic procedure) of an equally artificial sound, as it is made either by cutting out from a complex sound phenomenon (the cell), or by electronic synthesis.

On the other hand, the 2 examples given by the author of the redundant ostinato Zy (the interminable chirping of a bird, and the creaking of the water-wheel) belong to the domain of natural sounds and are the products of a single causality which is repeated cyclically.

b) In the *complementary typology of variations* the ostinato is again quoted as a type of object with a slow speed of variation (progression) and a scalar type of variation (in stages) together with the macro-group G. This seems to contradict the definition given earlier.

c) In the TARSOM, on the other hand, in a summing up of different types characterised by a variation in dynamic level (box 12), a symbol Zk (cyclic repetition of a cell) occurs in the place where we would expect to find P, and seems to be completely synonymous with it.

OSTINATO: 450, 451, 455, 457, 459 (TARTYP), 572, 584-586 (TARSOM, denoted by the symbol P or Zk).

» 82. SAMPLE (E)

1) A borderline example of a prolonged excentric sound, continuous but disordered, which is nevertheless perceived as a unit because we recognise [137] “*behind the oddness (...) the permanence of a cause, the persistence of a single agent in pursuing its aims*”.(453)

An example of a sample: the prolonged and incoherent sound produced on a violin by the clumsy bowing of a beginner.

2) The symbol of the sample is the letter E, and in the summary table of typology (TARTYP, 459) it occurs in the column to the extreme left of continuous sounds with “unpredictable facture”, in the bottom row of sounds with “unpredictable variation of mass”.

3) Going further and with some reservations, as well as the usual type of the sample notated E there are three other examples where the mass is relatively fixed and tonic (En), or else relatively fixed and complex (Ex), or else even moderately varying (Ey).

4) In typology, the sample is exactly symmetrical with the accumulation A. In these two cases “extremes meet” (454) for certain objects which resemble one or the other, according to the listening intention.

The sample in the Typology of Variations and in the TARSOM.

The complementary typology of variations points out that a motif M can be made by splicing a varied sample (572). Finally, the sample occurs again in the TARSOM, in box 21 (types of dynamic criterion) (584). Curiously, it is there as an example of “reiterated dynamic” right next to the accumulation (“accumulated dynamic”). (584)

SAMPLE: 438-439, 453-454, 456, 459, 466, 470, 471, 572, 577, 584 (TARSOM).

» 83. ACCUMULATION (A)

1) A type of discontinuous (iterative) *excentric* sound of prolonged duration (macro-object) characterised by the disordered piling up of micro-sounds which are fused together by their similarity of facture into a single characteristic object. Examples of accumulations are: a stream of pebbles pouring out of a skip, an aviary of twittering birds, an orchestral “cloud” (accumulation of pizzicati or short glissandi) in a work by Xenakis (453), or any other “*profuse reiteration of brief, more or less similar elements*” (439). This is in contrast to the

sample E, an excentric object which is symmetrical with accumulation, since through a *continuous* facture it displays the “*permanence of a single cause*”, whereas accumulation is the product of “*multiple but similar causes*”. In some cases the distinction between the classification of a sound object as a sample or as an accumulation can be a matter of context and personal evaluation (453-454).

2) The symbol for an accumulation is the letter A, and in the summary table of typology (TARTYP, fig. 34, p. 459) it is in the far right column of prolonged discontinuous sounds of unpredictable facture in the row with sounds of “*unpredictable variation of mass*”, in a box symmetrical with samples.

[138] 3) Going further and with some reservations, three particular examples could be added to the usual type of accumulation notated A where the mass is:

- either fixed and tonic overall (An);
- or fixed and complex overall (Ax);
- or moderately varying (Ay).

a) Accumulation and the *cell* K have in common that they are composed of disordered micro-sounds, it is their difference in duration (and facture) which differentiates them, at least according to the TARTYP which links them with an arrow indicating that both come from “*multiple but similar causes*”. (459)

b) The accumulation also occurs in the TARSOM (584) in box 21, as an “accumulated” dynamic type, near the sample E.

ACCUMULATION: 438-439, 453, 454, 459, 584 (TARSOM).

e) Fourth series: variant sounds

We have seen that along with the main Typology which we have examined, the author outlines a complementary typology of Variations, dealing solely with variant sounds in the light of other criteria (see **VARIATION, 30**).

This complementary typology, nevertheless, takes up the types of objects already distinguished in the general Typology: Weft, Accumulation, Siren etc., and refines, sometimes even slightly changes, their definition to make them fit into its framework. This process is not without its ambiguities: the word Weft, for example, does not denote exactly the same thing in each Typology.

Most types of variant objects have already been examined along with the study of excentric objects in the general Typology (see *above*), but there are still two objects to be examined which have not yet been mentioned: the *Motif* and the *Group*.

» 84. MOTIF (M)

1) A type of variant object characterised by a relatively long duration, which evolves in stages, in a scalar (discontinuous) manner . The motif can, therefore, possess an embryonic musical organization, which makes it a border-line example, as it is already musically structured. But its materials are experimental sound objects, in contrast to the *Group*, which has more or less the same definition, but is made of traditional notes. Motifs, therefore, can be found in new music, whereas the Group belongs to traditional music. They are symbolised by the letter M.

2) In the typology of variations, the *motif* is distinguished from the large note W, (which in other respects it greatly resembles), by the fact that the large note progresses by continuous development and not, like the motif, by discontinuous modulation, and that it results generally from a “natural” evolution in [139] a sound phenomenon (whereas the motif reveals a *musical intention* applied to objects from the outside, or demonstrated by being deliberately cut out from a natural phenomenon).

3) The motif is characterised by a medium speed of variation, between the Ostinato (slower) and the Cell (faster).

MOTIF: 278, 471, 485, 572, 576, 586 (TARSOM).

» 85. GROUP (G)

1) The group is a type of object which is most commonly encountered in traditional music, in the form of a structure of notes, “*which can be easily broken down, but whose overall structure one might wish to study*” (571), and which has a variation of the scalar type (in stages). The Group is close to the Motif, which is also a very structured object, revealing an authorial intention and varying in a scalar manner, but which is built up of experimental “sound objects”, and not of traditional notes like the Group.

The two types *Group* and *Motif* complement each other as they are associated with classical music and experimental music respectively. The group is notated G.

2) The typology of “melodic variations” (expressed in the TARSOM as a criterion of “melodic profile”) describes three types of Groups according to their speed of variation. If the speed is slow (**progress**), we have a macro-group notated \bar{G} ; if it is moderate (**profile**) we have a group G properly speaking; if it is lively (**anamorphosis**), we have a micro-group notated G'.

3) In the typology of melodic variations, each type of Group defined within the framework of classical music has its counterpart in the domain of experimental “sound

objects”: the ostinato P corresponds to the macro-group \bar{G} ; the motif M to the group G; the cell K to the micro-group G'.

GROUP: 571, 572, 586 (TARSOM).

A. *External morphology*

Apart from so-called “internal” morphology, which has to do with the contexture of objects, there is also an “external” morphology which, at the moment, has as its entire stock the two pairs Composed/Composite and Accident/Incident. This is no reason to forget the, important, question which they raise about the *unity of the object*.

» 86. COMPOSED/COMPOSITE

1) A sound object is *composed* if it is made up of several distinct and simultaneous (juxtaposed) elements; *composite* if it is made up of several distinct and successive elements (464, 466). These descriptions can also be applied to the *sustainment* of a sound, *composed* if its simultaneous elements are juxtaposed, and *composite* if they follow each other (470). The melodic profile or the dynamic form of a varying sound could equally be called *composite* if they suddenly change régime or module in duration. (590)

To notate composed and composite objects typologically, several methods of notation have been suggested. (466-468)

2) There can be ambiguous cases between composed and composite. The decision about classification may, therefore, depend on different factors: the context, the use of the objects in the musical structure, the hearing intention, the listener’s conditioning etc.

a) “*External morphology*”: *composed, composite, intermediate objects*.

The study of sound objects “*built of distinct elements, whose forms are separate from each other*” (464) belongs to “external morphology”, a very subordinate field of study in the T.O.M. in comparison with internal morphology, or simply morphology. External morphology distinguishes two typical pairs comparable respectively to “*combinations (pure bodies) and mixtures (impure bodies) in chemistry*”. (464)

[141] The first pair is composite and composed objects, the second, objects which include an accident or an incident. To study composed or composite objects, we must avoid confusing the conditions in which the sound was made with the result which is actually heard in reduced listening: the fact of knowing, or not, how the sound object was made could, here, influence how it is perceived (for example, knowing the orchestration procedure from which a certain orchestral sonority originated).

b) *Method for typological notation of composed and composite objects.*

a) Initially, we can convey the interdependence of the overall object (composed or composite) and its constituent parts by using the example of upper case/lower case letters.

Example of a complex bell sound notated X (x, x, x, n, n, n):

if we are interested in one of its constituent objects, the first, for example, it is notated x (X), in the knowledge that the upper case letter always denotes the overall sound.

So X (x, x, x, n) means: X constituted of x, x, x, n and x (X) means: x, one of the constituents parts of X.

b) Notation can also clarify whether the relationships between the constituent objects are of simultaneity (composed objects) or succession (composite objects). The multiplication sign can represent simultaneity, and the plus sign, succession.

Composed objects: e.g., an essentially tonic composed sound, can be notated N (x.n), a second formulation “*which represents a listening in which equal attention is given to both aspects of the sound*” (467). In the case of a composed object notated, e.g. X.N, “*the order in which the constituent elements are juxtaposed does not necessarily indicate a fixed order; this notation simply attempts to take into account the simultaneity of a certain number of different elements, where one or another may be called upon to dominate, according to context*”. (468)

Composite objects: the sign + can describe both a natural sequence in a concrete object (a drum roll), notated as X (x+x+x, etc.) and an “artificial” link created by montage, as the perceived result is the same.

Chain-Fusions: if the linked objects in the composite object are “chain-fusions”, they are “*too bound together to use the addition sign, but not simultaneous enough for the multiplication sign; so a slash is used to notate chain-fusions: X'/X. This introduces a chronology and distinguishes the composite from the composed X'.X.*”. (467)

Finally, we can notate complicated objects by combining these various notation signs.

c) *note on terminology:* In the pages of the T.O.M. dealing with the “Helmholtz resonators” experiment, the French translation (anonymous) of the *Lehre von Tonempfindung* by Helmholtz which is quoted here seems to use the terms composed and composite interchangeably to describe what P.S.’s Music Theory calls *composed* (simultaneous), as opposed to composite, objects (174-176).

COMPOSED/COMPOSITE: 174, 464-468, 470, 590.

» 87. ACCIDENT/INCIDENT

1) In so-called “external” morphology (morphology of sounds built from distinct elements), the *accident* is a disturbance which can be added secondarily to a main sound, “tacking” onto it “*its particular anecdote*” [142] (464), but which “*is taken on board by the musical ear*”. For example: a little accidental click at the end of a long string or cymbal vibration. We say, therefore, that the main sound is *accidented*.

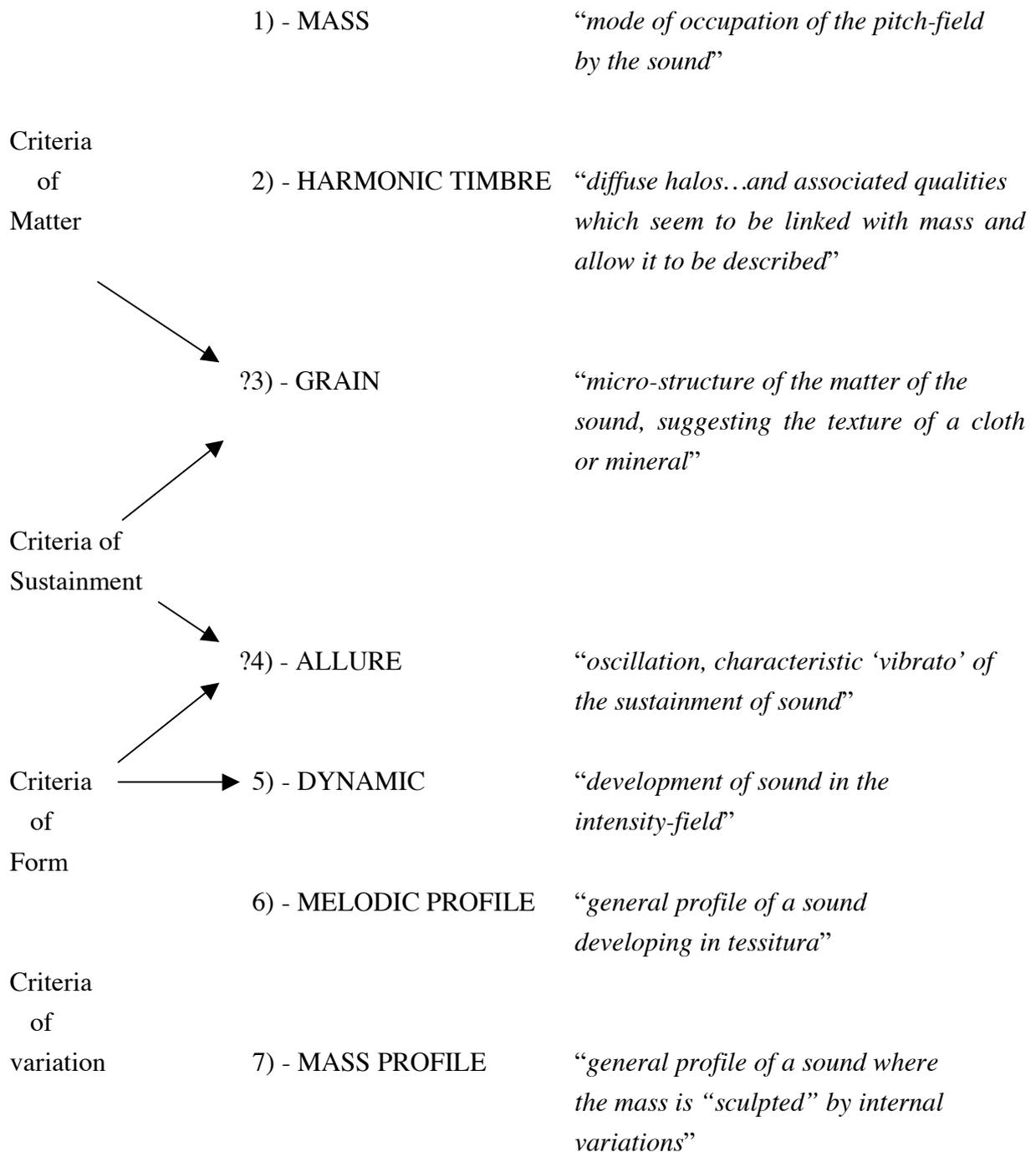
2) By contrast, the *incident* is a parasitic disturbance “*due to some technical fault, which adds itself on and is neither desired nor heard as a property of the sound*” (465). For example: sticking, a technical “click”, distortion, crackling of a record etc.

ACCIDENT/INCIDENT: 464-465, 559, 586 (TARSOM)

B. *What is a morphological criterion?*

» 88. MORPHOLOGICAL CRITERION

1) Morphological criteria are defined as observable characteristics in the sound object, “*distinctive features*” or “*properties of the perceived sound object*” (501). Theoretically infinite in number, they have been limited to 7:



They can be reorganized into criteria of matter (1 and 2), criteria of sustainment (3 and 4), criterion of form (5), criteria of variation (6 and 7).

2) Once isolated and studied separately by morphology, then evaluated in the musical perceptual field by *analysis* (where they may emerge in *site* and *calibre* in discontinuous or continuous structures), the aim is ultimately to attempt, by a new ‘instrument making’, or *tablature*, to recombine them in *genres* i.e. “bundles of criteria” (analogous to the “timbre” of traditional instruments) [143] in order to bring out musical values: this is the last stage of the

PROGREMU (sector 1), being a *synthesis* of musical objects derived from “pure entities” which the criteria are.

a) *Necessity for morphological criteria.*

The concept of morphological criterion, which is more general than value, is essential if we want to build a general Music Theory of the sound-world and must give up using the concept of timbre and traditional musical values, which are only relevant to the particular field of Western classical musics. Indeed, the concept of timbre is bound up with *instrumental identification* as a synthetic perception of a certain number of associated sound characteristics, rather than an aid to describing and perceiving these characteristics is themselves. Now, with studio music, there is no longer an instrument. Similarly, musical values are bound up with the traditional system of notes, and without this they lose their meaning.

“*Conclusion: if we abandon traditional musical identification, we must find something to replace it, in the all and sundry of sound, for we can no longer be sure of anything: neither timbres nor values.*” (370)

When there are several sound objects, instead of talking about their common value (pitch-value for example), we shall now talk about criteria, “*a more general term than value*”. (371)

The typological identification criteria described above had to be “*...elementary, common to all sound-factures in the world*” (371) in order to provide a classification grid which would not be too complex.

But after screening and general classification of objects by typology, morphology concentrates on their finer details, and studies the “*sound forms or sound qualities of the objects that have been thus examined, without having any premature concern for calibrations of values*” (371). From this study we arrive at *criteria*.

The pair *Form/Matter* is used to identify these criteria, which can be more easily observed in *deponent* sounds, i.e. sound objects where a particular criterion stands out because the others are absent, discrete or fixed.

But it is not so easy to study the very great number of “evolving” sounds “*...which do not lend themselves at all well to analysis by matter and form, and which, in any case, it would be self-delusion to try and describe using a combination of the criteria emerging from the study of deponent sounds*”. (499)

The perception of these varying sounds, where the varying criteria intermingle as they evolve, is not the same as an additive and strict synthesis of their constituent criteria as they can be observed in the “pure state”, or almost, in *deponent* sounds.

We should take into account, finally, that in sounds in their natural state, the “all and sundry of sound”, *deponent* examples that can be used for the study of a particular criterion

are less common than complex, combined examples: a subsequent stage, SYNTHESIS, will sketch out the study of criteria combined into genres, which is what is most commonly found in the acoustic world.

b) *Emergence and foregrounding of criteria.*

At the outset, a “group of progressively-trained observers” who can manage to “recognize new criteria for musical listening” (479-480), by practising reduced listening. Let us remind ourselves that criteria are “...properties of the perceived sound object, the correlate of reduced listening, and not measurable properties of physical sound”. (501)

Some of these criteria, therefore, emerge little by little from “collective listening to [144] a fairly large number of sound objects” (480) and stand out without any previous a priori knowledge: this is true of the criteria of “grain”, “allure”, or “thickness” (otherwise known as “mass”) which do not presuppose “any structure which might even remotely suggest evidence of higher levels” (480), levels of meaning or musical organization. So it is *criteria*, and not *values*, that are designated and located by a common, well-defined hearing intention. (481)

This hearing intention must be communicated and defined by the creation of an “adequate terminology”, which P.S. calls a *metalanguage*.

Once criteria have been located through listening to collections of existing sounds, we can begin “...to assemble sounds in a different way, so that a particular criterion stands out in a particular collection”. (486)

Time and work are needed to evaluate the true importance of each criterion. Memory, more than “the concatenation of sounds in the studio”, (487) often gives the first syntheses, makes the first groupings, and helps to bring out the main criteria.

Along with “experimental reels”, useful to the researcher for listening and *translation*, “teaching reels” are being devised, which, for the purposes of making, of *prose composition*, aim “to make sounds which will bring out these criteria more clearly” (487). These reels will be able to highlight **classes**, **genres** and **species**, without claiming prematurely “to build scales [of criteria] analogous to the traditional system” (487). Finally, we can create studies in composition which, without claiming to be music, aim “...from a given, appropriately limited, sound material, to create authentic structures, which will bring out, for others the criteria which the composer, in following his own personal schedule, endeavours to ‘give to be heard’” (488) For example: the *Étude aux allures*, composed by Pierre Schaeffer in 1958.

So, initially, from the pair Form/Matter, and also the concepts of sustainment and variation we can distinguish:

α) Two criteria of matter: *mass* and *harmonic timbre*.

β) One criterion of form: the *dynamic criterion* or *dynamic*.

γ) Two criteria of sustainment: “*i.e. the features that link form and matter*” (501), *grain* and *allure*, which can also be perceived respectively as a criterion of matter or form (500).

δ) Finally, with “non-deponent” evolving sounds, where the criteria evolve in an interlinked manner, we shall move on to a special study of criteria of variation which will be limited to two (501). In effect “...*in most cases, musical objects can present variations of the preceding criteria, and in particular, a variation of mass in tessitura, most often associated with a dynamic form*”. (500)

We shall limit ourselves to distinguishing two principal criteria of variation: *melodic profile* and *mass profile*, along with examples of variation of the other criteria (cf. chap. XXXIII of the T.O.M., p. 561-579)

MORPHOLOGICAL CRITERION: 346, 370, 371, 372, 379-382, 480-484, 486, 487, 488, 496-497, 499-508, 512, 584-587 (TARSOM).

[145]

C. *The three criteria of matter*

a) Mass

» 89. MASS

1) The criterion of *mass* is a generalisation of the concept of pitch, including sounds whose pitch is not precisely locatable by the ear (complex or varying sounds). This criterion is closely connected with *harmonic timbre* which complements it. Both “*should be used like connected vessels*”. (517)

2) In other words, the mass of a sound object is its *way of occupying the pitch-field*.

- whether it allows one or several distinct and locatable pitches (“tonic” masses) to be heard.

- whether it is made of one or several “packages” of pitch (nodes) grouped together, to which no precise nominal pitch can be attributed, but which are still capable of being analysed as more or less high, medium or low, more or less thin or thick etc.

- without forgetting the most common example in “natural” sounds, masses where complex and tonic elements are combined (*channelled* sounds); and also the example where the mass *varies* in tessitura and thickness as the sound progresses.

a) *Mass, a crossroads-concept.*

The arrival of the concept of mass in musical analysis can be explained by the development of Western music. As long as this music almost exclusively used tonic sounds of locatable pitch, and rejected almost all others as *noise*, this concept did not seem necessary.

But gradually “instrumental” composers have more and more used “sound packages” usually notated as complex extensions of tonics, and have realized that the perception of these packages cannot be reduced to the sum of the perceptions of their component pitches. Inversely, “concrete” or “electronic” composers were making complex masses directly, and these resisted any analysis by the ear into distinct pitches. To be described, these new materials required a new criterion, the criterion of *mass*, which also involves perceptions of colour and thickness and no longer simply perceptions of degrees and intervals.

So mass is a “crossroads-concept”, the meeting point, in two modes of apprehending the pitch-field, of traditional musics and new musics.

b) *Mass and harmonic timbre.*

If we call *mass* “*that quality whereby sound is registered (somewhat a priori) in the pitch-field*” and *harmonic timbre* “*the more or less diffuse halo, and, [146] in general, the additional qualities which seem to be associated with mass and enable it to be described*” (516), this distinction is best clarified on a case-by-case basis: those cases where mass is naturally distinct from harmonic timbre (“tonic” sounds of traditional music), and those where mass and harmonic timbre are to a greater or lesser extent intermingled (complex sounds). In the second example, the distinction may vary depending on the listener, the context, the listening intention, etc. (see **HARMONIC TIMBRE, 93**)

c) *Music Theory of mass.*

α) *Types of mass.*

The types of mass distinguished by typology are: *tonic* (fixed and locatable pitch), *complex* (fixed, non-locatable mass), *variable* (i.e. with reasonable modification, tonic or complex, during the sound-history) and *nondescript* (i.e. varying in too disordered and dominant manner, as with accumulations).

This classification into types involves the concept of fixedness or variability of mass: less and less locatable pitch, depending on whether it is fixed and defined (*tonic*) or fixed but not defined (*complex mass*) or, finally, *variable* (variable-tonic or variable-complex).

The criterion of “locatability” in pitch is chosen intentionally with reference to traditional music, where sounds with defined pitch (tonic) are the base material. It belongs to what could be called the *musical givens* of typological criteria.

It will be noticed that the author considers variable-tonic and variable-complex masses as almost equivalent to perception: while the difference between a tonic pitch moving in the

tessitura (violin glissando) and a complex mass, which does the same thing, is easily perceived – this difference does not seem enough to justify a separate classification in typology (which is mainly concerned with *locatability* in pitch). In effect, the two examples are not more locatable one than the other).

β) *Classes of mass.*

The author also says “classes of textures of mass”, in effect, this is the study of what textures of *fixed mass* are composed of (just as a *chord* is analyzed into its constituent notes).

There are seven *classes* of mass: *pure sound, tonic, tonic group, channelled sound, nodal group, nodal sound, white noise*. They are in this order for the sake of symmetry, which we have tried to represent visually in the diagram below:

In the centre there is the most ambivalent example, *channelled* sounds, which is also the most common in “natural” sounds, because of the complexity of their causes. At the two extremities, the borderline cases (pure sound and white noise) are naturally mainly found in “artificial” (electronic) sounds. Classes 2 and 3 (*tonic sounds* and *tonic groups*) are those most used in traditional music, classes 5 and 6 (*nodal groups* and *nodal sounds*) are mainly illustrated in new music (clusters).

Each mass texture has a particular texture of harmonic timbre associated with it.

We have already looked at tonic sounds and pure sounds. The following sections will return to *nodes, white noise* and *channelled sounds*.

γ) *Genres of mass.*

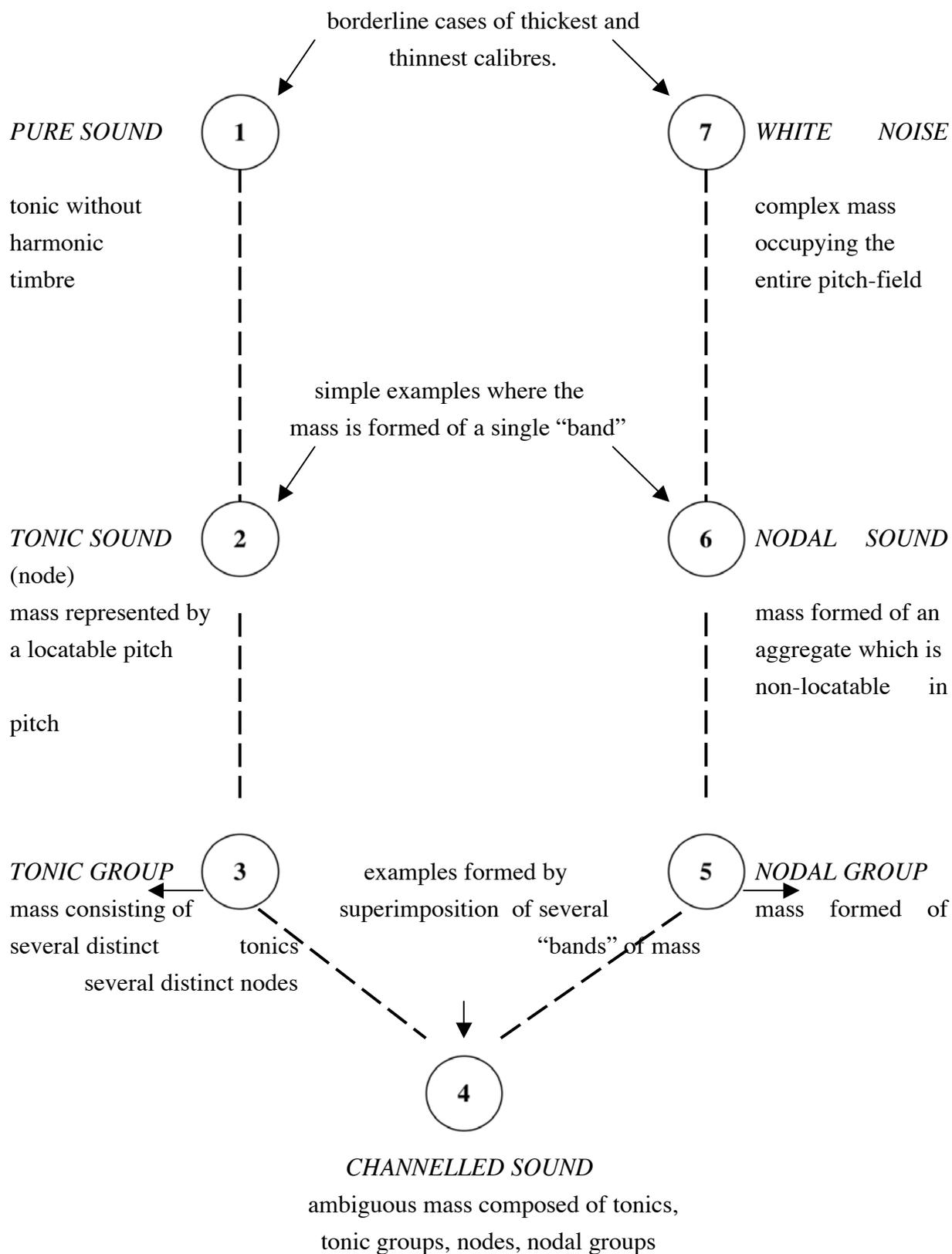
The author simply indicates that there are “*characteristic textures of mass*”, i.e. characteristic ways for the sound-mass to be “organized” into more or less broad or compact zones, with a certain distribution of thick zones [147] and thin or tonic zones. For example, “*the texture which characterizes these two sounds, which are nevertheless different (...) is made of a thick foundation with a bright band on top*” (519). This is one example of the characteristic structures arising from the distribution of mass in the tessitura.

We could say that the problem of the *arrangement* and *instrumentation* of chords in traditional orchestral music is a problem of *genre*, i.e. distribution of mass. We speak of arrangements as more or less full or empty, balanced or unbalanced etc.

δ) *Species of mass.*

- Where species of mass in the *harmonic* pitch-field (tonic sounds) is concerned, there is no problem: the *site* of a tonic sound is its pitch. As the Western ear perceives more or less 12 semi-tones per octave, over about 7 octaves, we have a minimum of 84 well-differentiated degrees. No other criterion gives such a precise evaluation of site.

[147]



Examples: 1, sinusoidal sound; 2, piano note; 3, piano chord; 4 sound of a gong, metal sheet, bell etc.; 5, several cymbals of different sizes together; 6, cymbal clash; 7, electronic white noise.

[148] - In the same way the calibre of a “width” between two tonic sounds is simply their *interval* (fifth, twelfth, etc.)

Where species of mass in the *coloured* field (complex and variable sounds) are concerned, we come across a perception which is much more diffuse and difficult to calibrate, more qualitative. The ear perceives differences in sites and calibres in complex masses with the same subtlety as the eye perceives different colours, but does not seem able to *calibrate* them.

- For sites of mass in the coloured field, the author suggests dividing the field into 9 registers, in which sounds of complex mass can be placed. Thus we could say of a percussion “noise” or a complex sound such as the wind or the sea, that it is: *superdeep, very deep, deep, mezzo-deep, diapason, mezzo-high* (or medium high), *high, very high, superhigh*.

- Where *calibres* of mass in the coloured field are concerned, he suggests only the perception of thickness (which could be calibrated in the same way: very thin, thin, medium, thick, very thick, etc.).

MASS: 191, 192, 401, 432, 440, 447, 500, 501, 509-528, 535, 542, 543, 544, 575, 584-587 (TARSOM), 588-589.

» 90. NODE (NODAL SOUND)

1) We use the term node, or nodal sound, when the mass of the sound consists of a single compact agglomerate, in which no precise pitch can be distinguished (for example: a vocal hiss).

2) We use the term nodal group when the mass is formed of a superimposition of nodes which are perceived as distinct from each other.

NODE: 517, 518, 519, 525, 584 (TARSOM).

» 91. CHANNELLED (SOUND)

1) “Ambiguous” sounds formed of a mixture of tonics and “nodes” are called *channelled* or *channelled* mass: this is the case with a large number of “natural” or musical sounds.

Examples of channelled sounds are an orchestral block formed of an instrumental chord and cymbal rolls; or again some sounds from metal sheets, gongs or bells.

2) The class of “channelled” sounds, which is intermediate, is situated naturally in the middle of the 7 classes of textures of mass, which are organized symmetrically around it.

a) Depending on context, channelled sounds can be perceived “*either as nodal sounds or groups of nodal sounds, with some so narrow that they sound like tonics, or as more or less clear tonic groups surrounded by a complex halo. Such sounds merit both evaluation with reference to traditional intervals [“harmonic” pitch-field] and assessment using colour-analogies [“coloured” pitch-field]*”. (518)

b) The harmonic timbre of channelled sounds (which, according to the definition of this criterion, is the “*remainder of the sound, whatever is not defined in its mass*” (525)), can be analyzed [149] in various ways: it can be heard as continuous (i.e. fused, compact) or else as itself presenting “chanellings” (525) “*depending on the extent to which it can analyzed, or the extent to which the masses are fused together*” (525). A harmonic timbre of *nodal sound, tonic group* or *nodal group* can also be analyzed as “channelled” (fig. 36, p. 525; TARSOM, box 32, p. 584: classes of harmonic timbre).

CHANNELLED: 401, 462, 518, 525, 584.

» 92. WHITE NOISE

1) “White noise”, “white sound” or “band” even quite simply “noise”, is a sound where, in theory, the mass contains all frequencies accumulated statistically. This sound can be produced with electronic apparatus (white noise generators, or even the “hissing” of machines in the studio).

2) “*Coloured noise*” is white noise cut into relatively thick “slices” by filtering.

a) *Interest of white noise in musical experimentation.*

Essentially a product of studio-equipment (white noise generators), although some natural sounds can come near to it, white noise is an interesting borderline case for research: “*It is indeed a homogeneous sound, and the exact opposite of the tonic sound (since occupies the whole tessitura): every moment of listening is, for statistical reasons, like the preceding moment. These circumstances are to some extent found in applause, poured gravel or water, indeed agglomerates of any sounds, provided they are varied enough and their distribution in the tessitura and in time obeys the laws of chance.*” (509)

The pioneers of electronic music were tempted by the use of “filtered” white sound, which seemed particularly well suited to their physicist speculations:

“Slices of white sound with perfectly homogeneous masses are calibrated into defined intervals: now, such precise cutting out produces nothing noticeable to perception; it is even usually impossible for a listener to calibrate such sounds while listening, or to situate them in the tessitura any better than approximately.” (520)

Such sounds in effect require perception in “thickness” and “colour”, where any identification of degrees is impossible, and they also allow only a rough evaluation in “registers”.

The name white sound and its derivative “coloured sound” comes from analogy with the visual phenomenon of the colour white, which is in theory produced by mixing all the colours together.

WHITE NOISE: 401, 421, 461, 509, 516, 517, 518, 520.

b) Harmonic Timbre

» 93. HARMONIC TIMBRE

1) A “satellite” morphological criterion of the criterion of mass, in connection with which it is defined, harmonic timbre is *“the more or less [150] diffuse halo, and generally, the additional qualities which seem to be associated with mass and enable it to be described”* (516).

Harmonic timbre is most easily located and distinguished from mass properly speaking in sounds of tonic mass. In complex sounds, it becomes much more difficult and even, in certain cases impossible, to dissociate it from mass and describe it independently.

2) In tonic instrumental sounds, harmonic timbre corresponds exactly to the perception of the *harmonic spectrum* of these sounds; therefore it has often been confused with their *timbre* (in the sense of instrumental timbre).

The study of classes, genres and species of harmonic timbre is therefore parallel to classes, genres and species of mass, but much more delicate and problematic due to the “subtle” nature of this criterion.

3) The *harmonic profile* is the profile of the development of the harmonic timbre of a sound object, when the harmonic timbre varies in duration (as with piano sounds, where the timbre becomes progressively impoverished as the resonance decays).

a) *Music Theory of harmonic timbre.*

This is guided by the principle that this criterion can only be described and located *through a mass which is located and also described.*

α) *Types of harmonic timbre.*

Two: either the mass of the sound is one and unified, and the harmonic timbre will also be the same.

Or the mass is perceived as subdivided into several layers (which can be tonics, in tonic groups) and then we have different specific harmonic timbres for each of these layers.

β) *Classes of harmonic timbre.*

In the same way, for each of the seven classes of mass there is an associated specific class of harmonic timbre.

- With pure sounds and white noises, i.e. borderline cases, the harmonic timbre is considered to be “*non-existent*” either because the mass does not exist at all (sounds without harmonics) or because the mass covers the whole pitch-field and does not leave room for it! (white noise);

- the harmonic timbre of tonic sounds is called “*tonic*”;

- the harmonic timbre of tonic groups is called “*channelled*”, or “*continuous tonic*”;

- finally, the harmonic timbres of channelled sounds, nodal groups and nodal sounds are called *complex* or *continuous*, according to type.

(“Continuous” harmonic timbre means that the harmonic timbre is fused with the mass, that it is inseparable from it.)

γ) *Genres of harmonic timbre.*

We shall only sketch out a theory of genres of harmonic timbre, suggesting some similar adjectives grouped in pairs of opposites: *empty-full*; *round-pointed*; *resonant-dull* (it will be noted that these adjectives belong to the vocabulary of comparisons currently used by musicians to describe “timbre” in general).

In addition, P.S. rejects the idea of using results from psycho-acoustic experiments on “timbres” to study genres of harmonic timbres: too [151] many variables are involved, he says, to use only these in vitro experiments on pure and isolated examples.

δ) *Species of harmonic timbre.*

Generally speaking, the author warns that what applies to tonic pitches, the capacity to emerge “spontaneously” as values in the pitch-field and to lend themselves to ordinal *and* cardinal calibrations, does not apply to harmonic timbre which is a much more diffuse perception. “*There is no standard for perceptions of harmonic timbre*” (526) and only advanced training could help to distinguish precise perceptions. Here the listening context and the nature of the sound mediating the harmonic timbre play a considerable role.

- *Pitch-field*:

- the site: dark-light (“*with appropriate training*”) (527);

- the calibre: narrow-broad (same comment as above).

(These two pairs of perceptions can be combined together: light site narrow calibre; dark site narrow calibre, etc.)

“*We remain very cautious as far as description of harmonic timbre in the pitch-field is concerned.*” (527)

- *Intensity-field*:

- site (or *weight*): poor or rich (in relation to mass);

- calibre (or *relief*): reference to criteria of density or volume.

Here, with reservations, the author returns to two characteristics observed in *pure sounds* when applied to all sorts of harmonic timbres; the hypothesis put forward here is that perceptions of density and volume could constitute the harmonic timbres of sounds which, in theory, would not be thought to have one (see *below*, **94**).

- *Duration-field*.

- impact: as the sound develops, the harmonic timbre can vary in breadth, colour and richness, in a progression that can be numbered 1 to 9;

- module: reference, for the record, to the identification threshold for timbres, in other words, to the minimum time module needed to hear a harmonic timbre.

b) *Harmonic profile*.

In some types of sound objects with varying harmonic timbres, the history of the harmonic timbre is usually linked to the development in dynamic, and particularly to what is happening in the sound's *attack* (percussion-resonance sound). In the attack there are very rapid variations in the harmonic timbre which create a specific perception called *attack-colour*. See the diagram of genres of attack which includes some hypotheses about attack-colour, and the harmonic profiles of sounds in relation to their attack (see **97**).

HARMONIC TIMBRE: 56, 57, 216-231 (under the frequently used name “harmonic content”), 233, 236, 240, 242, 511, 516-517, 518, 524-525, 526-527, 535-539, 541, 544, 575, 576, 582, 583, 584-587 (TARSOM), 588-590, 667. (*n.b.* harmonic timbre is often referred to simply by the name timbre, or else “harmonic content”, “harmonic richness”, “colour”, etc.; “harmonic profile” describes the variation in the harmonic timbre of a sound in the course of its duration.)

[152]» **94. DENSITY/VOLUME**

1) These two very specific criteria only apply here to the study of pure sounds (pure frequencies, without harmonics). Acousticians have singled them out through experiments in

psychoacoustics. We could therefore call them “additional qualities” of pure sounds, as they are added on to pitch and intensity.

2) These two criteria raise a certain number of questions for him:

- Doesn't their perception entirely depend on the “operative sound structure”, i.e. the particular context of hearing?

- What characterizes these two analogical and imprecise concepts, in relation to one another?

- How do we separate these two perceptions from intensity?

- Do Volume and Density represent the “harmonic timbre” of pure sounds (without harmonic spectrum, therefore in theory without harmonic timbre), or are they connected to what could be called their *mass*?

a) As a hypothesis, P.S. puts density and volume in the box in TARSOM assigned to the study of the relief of dynamic timbre (box 37), the study of the space occupied in the intensity-field by harmonic timbre.

b) *Erratum*.

T.O.M. page 513, lines 1 and 2, “diminishing with the frequency” means “diminishing if the frequency increases”.

DENSITY/VOLUME: 501, 511, 512-514, 516, 527, 544, 585 (TARSOM), 588-590.

c) Grain

» 95. GRAIN

1) Grain is a microstructure of the matter of sound, which is more or less fine or coarse and which evokes by analogy the tactile texture of a cloth or a mineral, or the visible grain in a photograph or a surface. Indeed, the perception of grain occurs in the three sensory domains of vision, touch and hearing, where it can be defined in the same way: every time it is the “*overall qualitative perception of a large number of small irregularities of detail affecting the ‘surface’ of the object*”.

2) Therefore, qualitatively, the perception of grain covers micro-phenomena of all kinds in the fine detail of the sustainment of sound: the concept of grain is therefore “*disparate in physical origin*” (548). A very rapid variation, or an accelerated iteration (rhythmic phenomenon), or again an extremely rapid allure, or any other kind of irregularity at a certain speed, can produce a sensation of grain.

The experiment with the “bassoon”, reported in book III (correlations), illustrates the special place of grain as a “qualitative criterion” resulting from micro-oscillations at the limit

of the separating power of the ear (“*in the same way as the texture [153] of a visible substance, examined closely, breaks down into small irregularities which can be perceived separately*”). It also illustrates the law of the progressive transition from the quantitative to the qualitative: a very rapid iteration which is accelerated gradually stops being perceived as a succession of impulses, and begins to be heard as a continuous sound with a pitch and a characteristic *grain*. If the repeated impulses are accelerated again, the grain is perceived as finer and finer, and then finally disappears and is perceived as a perfectly “smooth” material.

3) For this reason the criterion of grain can be called “*the signature of matter*”, as it enables it to be described, whereas *allure*, the other criterion which characterizes the fine detail of the sustainment of sound is called “*the signature of facture*”. (550)

Music Theory of grain

a) 3 types of grain.

As grain is considered to be a criterion characteristic of the sustainment of a sound, we shall assume that for the three main types of sustainment (*non-existent, maintained, iterative*) there are 3 different types of grain:

- *resonance grain* (or “sparkle”) for sounds with non-existent sustainment but prolonged by resonance (e.g. the rapid tingling of a resonating cymbal);

- *rubbing grain* for maintained sounds, often caused by the rasping of breath of the sustaining agent (bow, or breath in a flute sound);

- *iteration grain* for iterative sustainments (e.g. drum roll).

b) 9 classes of grain.

The classes of grain can be distinguished by using sensory analogies, in this case justified, rather than trying to analyse the physical nature of the perception of grain, which is often complex and heterogeneous.

So, for each *type* of grain we have three classes, each time going from the least to the tightest (in other words, from the coarsest to the finest grain):

- in *resonance grain* types we have *quivering, shimmering* and *limpid* grains;

- in *rubbing grains* we have *rough, matt* and *smooth* grains;

- in *iterative grains*, *coarse, medium* and *fine* grains.

c) 6 genres of grain.

In a good few examples, “pure” types of grain are combined and superimposed within one object. Their main combinations in twos gives us six genres of grain (fig. 39, p. 553), including the three examples for pure types: for the resonance type the *harmonic* genre; for the rubbing types the *compact* genre; for the iterative type the *discontinuous* genre.

We could take the analysis further and distinguish more than merely six genres: for example, by distinguishing grains of rubbing by friction, Aeolian grains of rubbing (wind), or

else by taking into account the greater or lesser irregularity of the grain, or its variations in the course of the sound.

d) *Species of grain.*

How are we to situate and calibrate this characteristic, “*hybrid between matter and form*”?

[154] α) *Pitch-field:*

- *site* and *calibre*: if, in a tonic musical sound, grain is heard as a separate noise which can be evaluated by being isolated from the mass of sound properly speaking, it can be *situated* in mass or in timbre as possessing a certain “*colour*” (*site*) and in *calibre* as possessing a certain “*thickness*”.

β) *Intensity-field.*

- *site*: similarly, if grain is heard separately from mass, we can speak of its relative *weight* in relation to the mass (relative intensity *site*);

- *calibre*: the *calibre* of intensity, or relief, corresponds here to the *amplitude* of the dynamic oscillation (very rapid) which characterizes the grain; this relief can be evaluated in a calibration with three stages, *weak, moderate, strong*.

(We should add that the species indicated here for the pitch- and intensity-fields, are provisional.)

γ) *Duration-field:*

- *module* (duration as absolute value): there are three modules, or speeds, from the fastest to the slowest: *tight; moderate; slack*;

- *impact*: by combining these three modules horizontally with the three reliefs of intensity, corresponding to the amplitude of the variation of intensity, placed vertically, we obtain a diagram with nine boxes whose nine numbers allow us to trace the profile of the variation of a grain over the whole history of the sound.

E.g.: 1-6-8 reads: transition from a packed grain with weak relief to a slower grain but with more accentuated relief, then to a grain of medium speed, but with a fairly marked dynamic oscillation.

Particularly complex sounds can present “mixed” grains, which can be separated out and analyzed separately. (554)

However, for evaluating “modules”, the author gives us the choice of an evaluation by numbers or by “analogy”, which has already been used to distinguish classes of grain (“rough”, “shimmering” etc.).

GRAIN: 205, 401, 468, 480, 481, 501, 502, 503, 548, 550-555, 563, 565, 576-577, 583, 586-587 (TARSOM), 588-591.

D. *The two criteria of form*

a) The dynamic criterion

» 96. DYNAMIC (CRITERION)

1) The dynamic criterion (also sometimes called quite simply “dynamic” or “form” or “profile”) describes the *profile of intensity* characteristic of sound, whether the intensity is fixed (homogeneous sounds) or varying. For convenience, the study of the dynamic criterion is based on “deponent” sounds of *fixed mass*. By definition, it is a criterion which exists only in time; it is therefore one of the most important criteria relative to the *form* of the sound.

2) The developments in intensity of sound objects in the course of their duration usually obey general laws (the law of progressive decrease in intensity in percussion-resonance sounds, for example).

[155] 3) Experiments carried out on the correlations between physical signal and sound object have shown the importance of the perception of the *attack* as the crucial moment of the sound, but also as a point of fixation where, later, the listener’s memory will place impressions of timbre and intensity which in fact are a *synthesis of the whole history of the sound*.

In the very common example of percussion-resonance sounds (a piano note, for example) it is the *attack*, with its immediate consequence (the beginning of the resonance) which is the decisive moment for the development of the dynamic. This is why the study of the dynamic criterion is largely based on the *attack* phase, considered as a kind of “sub-criterion”, of specialization of the dynamic criterion.

Theory of the dynamic criterion

a) *Types of dynamic criterion.*

Here the author gives a recapitulation of typology, taking up some types of typological objects in order to evaluate their *dynamic* type (TARSOM, box 21):

- the homogeneous H and iteratives Z are of the “*non-existent dynamic*” type;
- the tonic or complex wefts T, are of the “*weak dynamic*” type;
- the N, X, N', X' (sic) sounds are of the “*formed dynamic*” type;
- the tonic and complex impulses are of the “*impulse dynamic*” type;
- the cyclic iterative homogeneous Zk (cell ostinato) is of the “*cyclic type*”;
- the sample E is of the “*reiterated*” type;
- the accumulation A is of the “*accumulated*” type.

b) *Classes of dynamic.*

First we consider whether the attack of the sound plays a decisive role, or not, in its energetic history:

- either the sound is not sustained, and in this case the attack is both the significant and decisive moment in the energetic history (percussion-resonance);

- or the sound is sustained, and in this case its dynamic can be relatively or wholly independent of what it is at the moment of attack.

Let us consider these two examples, one by one:

- *Profile determined by the attack* (also called “anamorphosed”).

Here, we can also distinguish two situations depending on the relationship established between the initial shock as such and the resonance. In fact, either shock and resonance are practically fused together, homogeneous, indiscernible (e.g. the piano); or the shock that sets off the energy gives a *specific*, rapidly absorbed noise and the resonance follows, quite distinctly (e.g. the “double” sound made by some percussion instruments, where two independent and superimposed dynamic profiles can be heard).

- *Profile not determined by the attack.*

If the dynamic shape is pronounced, deliberate and characteristic, we have a profile properly speaking; if the dynamic is, as it were, regular and motionless, at the borderline of “homogeneous sound”, we have *amorphic* sound (and not anamorphosed sound, as a misprint in the TARSOM says). The author distinguishes several simple profiles: *crescendo*, *decrescendo*, *delta* (crescendo followed by a decrescendo), *hollow* (the opposite) and *mordant* (with a peak of intensity, then returning to a fixed intensity).

[156] So the list of profiles in the TARSOM is obtained.

c) *Dynamic genres.*

Here the author prefers to narrow the field, confining himself more specifically to genres of attack (see: **ATTACK, 97**).

d) *Dynamic species.*

α) *Pitch-field*: nothing in particular, as the relationship between the dynamic of the sound and its mass is infinitely complex and presents too many potential links; the corresponding boxes in the TARSOM therefore remain empty;

β) *Intensity-field*: the dynamic criterion is primarily involved.

- *Site* (weight): this is quite simply the intensities expressed by the traditional symbols (from ppp to fff), but also, under weight, the “*weight of a profiled mass in relation to its module*”, i.e. as a function of its duration. In effect, “*depending on whether the sounds are short, moderate or long (column 9), the weight is different, affected by how much or how little intensity is integrated into duration*” (589). This is why, here, an arrow links the calibration of suggested nuances, in column 6, to a short evaluation in duration.

γ) *Duration-field*:

- *impact*: a grid compares three values which correspond to three “profile modules” (i.e., it seems, three degrees of intensity: *weak*, *intermediate*, *strong*) with three speeds of variation for this profile (*slow*, *moderate*, *fast*). In effect, “*the perception of dynamic variation (...) plays a distinctive part in the differential emergence of objects*” (589). In other words, some sounds, with a rapid and pronounced dynamic variation, can attract attention, to the detriment of more intense sounds that are mingled with them, but which obey a more regular “regime”.

DYNAMIC (CRITERION): 54, 500, 529-546, 583, 584-587 (TARSOM), 589-590.

» 97. ATTACK

The attack of a sound, the “*distinguishing point*”, the “*crucial and determining moment*” of its development, is the subject of two separate studies in the T.O.M.:

1) *Role of attack in the perception of the timbre and form of the sound.*

On the one hand, experiments in splicing the attack and, on the other, modulating its shape (see book III) have brought out two neglected phenomena in the role played by attack in certain types of sound objects.

- on the one hand, the physiognomy of attack, its “steepness”, the profile of its dynamic development, can play an important role in the identification of *instrumental timbre*, occasionally even more important than the harmonic timbre of the sound. For example, we have only to cut off the attack of some sounds noticeably to distort their timbre (e.g. high notes on the piano);

- on the other hand, in certain cases, a phenomenon of “time warping” occurs which makes us locate the source of the listener’s perception of an attack at the *beginning of the sound* (and this appears elementary), whereas this perception in fact results from a synthesis, made *after the event* by the ear, of the dynamic and harmonic development of the sound throughout its duration.

[157] These experiments also show us how to distinguish characteristics of *steepness* and *colour* of attack, which play an important role in the assessment of the “timbre” of the sound object. They lead to the formulation of certain laws of perception of attacks, according to the type of sustainment of the sound.

The perception of steepness of attack is related to dynamic development, *colour* to its *harmonic development*.

2) Music Theory of attack.

The study of the dynamic criterion leads us to present attack as a to “sub-criterion” insofar as the dynamic profile of a sound is, in many cases, predetermined by its attack.

Thus, rather than a characterology of dynamic genres, we shall construct a characterology of genres of attack, which takes into account that the dynamic and harmonic profile of the entire sound may be predetermined by its attack.

This characterology distinguishes 7 genres of attack: *sudden, steep, soft, flat, gentle, sforzando, non-existent* (see fig. below).

a) Laws of perception of attacks.

1st law: “In general, with sustained sounds, the ear, to describe its perception of the steepness of attack, is sensitive to how the sound energy appears in time” (226). If the sound energy appears in a period between about 3 milliseconds and 50 milliseconds (i.e. up to a twentieth of a second), and if the harmonic content of the sound is constant for the whole of its duration, a splice made at a suitable angle (in the tape containing the recorded sound) “*fully reproduces the original attack, with its degree of steepness and colour*”. (228)

2nd law: “With sounds which have a percussive or tight attack followed by resonance, the ear, in order to describe its perception of the steepness of the attack, is sensitive to how the energy disappears more than to how it appears” (229). “*If the harmonic content is constant throughout (deep notes on the piano), a straight splice in a part of the sound where the dynamic has the same rate of decline as at the beginning fully reproduces the perception of the original attack, with its steepness and its colour.*” (229)

Laws of the impact of dynamic on the perception of timbres: provisionally, we can say that:

α) “*Every sound of the percussion-resonance type has its characteristic timbre from the moment of the attack;*

β) *every sustained sound with dynamic or harmonic variations is characterized only secondarily by its attack. The timbre is the result of a perception which develops over the entire duration of the sound (...);*

γ) *the timbre perceived is a synthesis of the variations in harmonic content and dynamic development; in particular when the rest of the sound comes directly from the attack, it is given from the moment of the attack.*” (230-231)

b) Genres of attack.

This classification is, of course, the author reminds us “approximate”. As we have said, the *dynamic profile* is the development of sound in dynamic and its *harmonic profile* is its development in harmonic timbre (fig. 37)

[158] c) The notion of attack reappears to characterize the beginning of the object which runs its course in three phases: attack, continuant, termination. We must be clear that examples of sound objects which present these three very distinct phases are somewhat rare, and that mostly we are dealing with objects which have only one or two, or which have all three, but more or less imperceptibly mingled together (“deponent” notes, see 82).

(Fig. 37, 533)

DYNAMIC TIMBRE		1	2	3	4	5	6	7
GENRES OF ATTACKS	Bathygraphic trace							
	Nature of attack	ABRUPT or explos.	STRONG	SOFT	FLAT	GENTLE	SFORZANDO or stress	NIL or very progressive
	Conventional symbol	 (shock or plectrum) without appreciable resonance	 (felt hammer) with strong linked resonance	 (pizz. or soft mallet) with resonator	 (pseudo attack) or mordant	 sound without apparent attack	 or rapid crescendo	 perception of the profile
PREDETERMINATION OF THE PROFILE according to the genre of attack	Dynamic profile	dynamic point (shock)	regular graduated	reinforcement of the resonator	nil, except for the pseudo-attack	nil profile	characterist. profile generally short sounds	single, threshold case emergence of the profile
	Harmonic profile	double sound (2 timbres)	impoverishment	response of the resonator	nil in instruments such as the organ, varied in elec. music or strings	often progressive profiles	characteristic stamp	most often connected or artificially independent profiles

ATTACK: 217-231, 401, 462-463, 530-539, 584-585 (TARSOM).

b) Allure

» 98. ALLURE

1) *Allure* describes the oscillation, the characteristic fluctuation in the sustainment of certain sound objects, instrumental or vocal vibrato being examples. In other words allure can be described as “*every type of generalized vibrato*”.

The criterion of allure can be analyzed as the overall perception of slight [159], more or less cyclic oscillations in all the characteristics of the sound (557) and mainly in its pitch (or mass) and dynamic; but it is a whole criterion in its own right.

2) Generally speaking, the allure of a sound “*reveals what the agent of its energy is, and whether this agent is living or not*”. (550)

The typology and morphology of allures, therefore, come from direct reference to the agent, which leads us to “*classify allures as much according to the assumptions to which their perception leads us (the allure of the agent) as the examination of their effect (the allure of the form)*”. (557)

According to whether the oscillations which an allure consists of are:

- of mechanical regularity,
- of supple periodicity, revealing a living agent (man),
- of unpredictable irregularity (natural phenomenon),

the agent is respectively *mechanical, living* or *natural*, and there will be *three types of allure: mechanical, living* and *natural*.

We can also evaluate an allure by the *rapidity of its oscillation* (“*tight*”, “*moderate*”, “*slack*”) and by its *amplitude* (“*weak*”, “*medium*”, “*strong*”) as well as how it may develop in the course of the sound (acceleration, deceleration, etc.).

a) *Allure and grain: the two criteria of sustainment.*

The development of a sound is characterized initially (first-degree perception) by a general *profile* (e.g. percussion-resonance of a piano note); then more subtly (second-degree perception), by possible oscillations which are the fine details of this profile and which form the criterion of *allure*; thirdly, and more subtly (third-degree perception), by the presence or otherwise of a microstructure of the matter termed *grain*. (549-550)

Allure and grain are therefore *two corollary criteria* of the *sustainment of sound*, each in its own way: “*The quality of grain attached to the sound material suggested the surface of a material object and the sense of touch. Similarly, the criterion of allure, linked to the form, suggests the dynamism of the agent and the sense of motion.*” (556)

Allure could also be considered as a criterion of *form* (together with dynamic) and grain as a criterion of *matter* (together with mass and harmonic timbre). But as these two criteria correspond to more subtle (second and third order) details of the sustainment of sound, we prefer to classify them as sustainment criteria, inasmuch as sustainment “*links form and matter all the time*” (500) and to study them in a separate chapter (ch. XXXII, 547-560) as coming under a “*Music Theory of sustainment, i.e. features linking form and matter*”. (501)

b) *Components of the criterion of allure.*

Allure is a composite criterion, if we want to make a very subtle analysis of the variations of which it is composed: it “*is not only a dynamic criterion; the more or less regular oscillations by which it manifests itself also causes variations in pitch (vibrato in string instruments, singers...), and harmonic timbre...*” (549)

Allure is, however, at its own level (second order perception), perceived as a property of the sound object, well-defined, very apparent and distinct from the others, in the same way as *grain* which, in third order perception (even more subtle), [160] could itself be analyzed as made up “of dynamic microstructures” (550) or as “a mutation of perceptions of allure when it becomes denser” (550), but is an entirely separate criterion.

Allure is not, therefore, a “transitional criterion” (550) but an entirely separate criterion.

c) *Allure and causality: the “facture signature”.*

Allure is a criterion which spontaneously refers back to the causality of the sound.

“Man very commonly questions every object, musical or not: ‘natural or artificial? man- or machine-made? wood or plastic?’ Where the musical object is concerned, allure provides the answer. With allure, perception clings to everything that might reveal the presence of the specific, the living (...) we can immediately distinguish a very regular vibrato, made by a violinist, from another produced by a machine: from the point of view of form, the difference between them is not great. However minimal it is, it is immediately seized upon and interpreted by a perception which seeks to know whether the event depends on natural laws and is completely predictable, whether it obeys a human will or if it merely arises from chance.” (556)

It could be objected that to consider the criterion of allure in this manner is to go against the rules of reduced listening and to try instead to locate clues. But in this case the level of natural listening (identification of types of source) depends on the level of reduced listening (listening to effects) and vice versa, with each nevertheless retaining its specificity.

d) *Music Theory of allure.*

α) *Types and classes of allure (557-560).*

Studies of types (typology) and classes (morphology) of allure are more or less indistinguishable. The 9 classes of allure are simply more subtle and refined distinctions than the 3 main types.

The three essential types of allure refer back to three types of characteristic agents: *mechanical*, *living* (human agent), *natural* (natural phenomenon). The ear displays extreme sensitivity to the signs which allow these 3 types of agents to be detected.

Amongst these three pure types of allure, “mixed”, intermediary examples may present: *mechanical/living*, *mechanical/natural*, *living/natural*; which altogether gives six types of allure.

To distinguish the different classes of allure, 3 forms of sustainment as it is perceived: (order, fluctuation, disorder), are placed opposite the 3 pure types of allure.

“The allure that gives equilibrium to a disorder of small events, the characteristic fluctuation of the living agent, is a central class or type amongst styles of sustainment. On both sides we place predictable mechanical order on the right, and, on the left, the unpredictability of chance, disorder.” (557)

Each type of allure normally corresponds to one form of sustainment: “normally a mechanical sustainment is regular, a living sustainment fluctuates, a natural sustainment is disordered”. (557-558)

For morphological classification the following is suggested “a nine-box morphological diagram (...), where “normal” allures are placed on the diagonal... The boxes on either side of the diagonal are for other allures, such as those which, in a disordered phenomenon, allow the action of man or machines to be discerned. Thus, with real thunder and stage thunder (imitated by the “sound effects person”), we endeavour to suppress any difference, we attempt to describe the allure which comes from sheet metal being shaken in the wings, by stripping it of everything that could betray the intervention of man or machinery, in order to create the illusion of natural disorder”. (558)

[161] We could in fact consider that the effect of allure does not inevitably arise from a certain type of agent. By placing the 3 types of agent identified and the 3 types of effect in a grid, we get the 9 typo-morphological boxes for allures (fig. 40, p. 558, see above). This typo-morphology, repeated in boxes 71 ad 72 of the TARSOM (types and classes of allure, 586), is described by the author as “highly abstract”.

β) *Genres of allure.*

The question of genres of allure is not really tackled in the T.O.M., although the author names it as an area of study (550). In the box intended for it (box 73, genres of allure) in the TARSOM, 586, the following genres are quoted: “(Allure) *regular cyclic vibrato; progressive; irregular; steep muted, termination; incident.*” These genres of allure go from the most to the least regular. They are hardly mentioned elsewhere (but see allure, p. 470, 550, 559).

γ) *Species of allure.*

Allure is a *differential* phenomenon denoted by a “width”, an oscillation in duration, in the pitch- and intensity-fields. So it is evaluated by *calibres* (which express the bulk of the criterion of allure in the field under consideration), rather than by *sites* (which express the average situation, the position of the criterion in the field). “The differential of dynamic”, allure can thus be calibrated “as the differential of the average pitch of the sound (the amplitude of the vibrato in tessitura)” (559). But “it also emerges in duration, either through its module (the number of pulsations in duration) or by the variations in its make-up”. (559)

- *Pitch-field:*

- *Site:* No site in pitch for allure “since it is only a differential”. (559)

- *Calibre:* The pitch-width is measured in three degrees: *weak, medium, strong.*

- *Intensity-field*:

- *Site*: The intensity-site or weight of allure can be assessed as the relative intensity (or weight) of the allure of a sound in relation to its general dynamic, and allure can contribute to the weight of the object. This is doubtless the meaning of the terse heading “*Relative weight: allure/dynamic*” (box 76 of the TARSOM).

- *Calibre: Relief of the allure*: The “*dynamic relief of allure*” is assessed in three degrees: *weak, medium* or *strong*. Calibres of pitch (box 75) and intensity (box 77) “*assess the ‘hollow’ created by the pitch- or intensity halo in relation to the pitch of weight of the sound*” (560). Boxes 75 and 76 are linked by an arrow, because these two calibres are often interdependent: “*It is usually the case that a dynamically strong vibrato is also melodically strong, but these two qualities have only pulsations in common [= a common temporal module].*” (589)

- *Duration-field*: duration of the variations of emergence of the criterion of allure.

- *Impact and module*, boxes 78 and 79: the first edition of the T.O.M. has lacunae in boxes 78 and 79 which are rectified in the second.

These rectifications consist in additions which give us to understand that these two boxes should be read as one: in the nine-box diagram “*three indicators of calibre cross over three indicators of module*” (560). The three indicators of module (the number of pulsations in duration) are placed as VERTICAL entries on the diagram and are as follows: “*dense, moderate, slack*”:

- “tight module” describes an allure with rapid oscillations;
- “moderate module” an allure with medium speed oscillations;
- “slack module” an allure with slow oscillations.

Again, here there is a slight difference between the first edition of the T.O.M. and its re-editions. The first has a note, page 590: “*Correct the qualifiers [162] in boxes 69 and 79 on the diagram. Read in the following order: ‘Wide, moderate, tight’.*” (590) This note does not appear in the second edition, but the correction is not exactly what the first edition suggests. Instead of the modules “wide, medium, tight” we have “tight, moderate, slack” which not only uses different terms, but is presented in REVERSE ORDER. Thus, in the first edition, module 1 should be read as “wide”, and, in the second, as “tight”. Of course, we consider the corrections in the second edition (which are kept in the third) as definitive.

Where the HORIZONTAL entries on the same diagram are concerned, it should be understood that they can, independently or simultaneously, refer to the three calibres of pitch or intensity tabled in columns 5 or 9 (boxes 75 and 77). The author sums this up in the following terms: “*The grid of modules which crosses over columns 5 and 9 can therefore be independent from the grid which crosses columns 7 and 9.*” (589)

However it is read, this diagram can be used in two ways:

- For an allure which does not vary in the course of the sound: “the criterion is regular, possesses a fixed value”, (590) the module diagram can be used to evaluate it.

- For an allure which varies in the course of the sound: in this case several of the figures on the diagram can be used to trace the history of these variations in duration.

ALLURE: 401, 468, 470, 480, 481, 502, 503, 547-548, 549-550, 556-560, 565, 576, 586-587 (TARSOM), 588-598, 590-591.

E. *The two criteria of variation*

» 99. MELODIC PROFILE

1) A criterion applied to *varying* sounds, and describing a *variation which affects the whole mass of the sound, making it describe a sort of “trajectory” in the tessitura*. As opposed to mass profile, which refers to an *internal* variation of mass, melodic profile is a displacement of the entire sound in the pitch-field: it is the sound itself which moves, instead of being sculpted by an internal development.

2) Such melodic profiles can be heard, in their “continuous” form, either in the elaborate melodic figures of some non-European musics, or in contemporary Western music, notably electroacoustic music, when manipulation of speed-variation make continuous sound processes move in the tessitura (*Hymnen* by Stockhausen). In their “scalar” form (in stages), we find them in all our traditional music (melodies).

3) In most cases of “natural” melodic profiles, the melodic variation is accompanied by a parallel variation in dynamic (*dynamic profile*) and harmonic timbre (*harmonic profile*) from which it is difficult to dissociate it: this makes this criterion, like all the varying phenomena, particularly difficult to analyze into *species*.

[164] 4) Melodic profile is studied under the name of “melodic variation” in the *music theory of variations* (chap. XXXIII of the *Traité*).

5) The author brings to our attention that the *Gregorian neumes* were already an attempt to formulate a typology and notation for characteristic melodic profiles; this is why he uses some of them to describe different classes of melodic profile (*podatus, torculus, clivis, porrectus*).

Music Theory of melodic profile (or “melodic variation”).

a) *Types of melodic profile.*

The typology of melodic profiles forms a little typology in its own right, subsidiary to the large typology studied in the previous section. It takes up some of the symbols and types

from the general typology, either in the same form, or in a new one: when the symbols have a horizontal bar above them, this denotes the slow, prolonged version of the type of object under consideration (a \bar{Y} is a varying macro-object, a macro-Y), and when they have a comma after them this denotes the “iterative” and “discontinuous” version.

For example, G represents the “normal” form of the Group (see 85), with medium duration and continuous sustainment; \bar{G} its prolonged form or macro-group, and G' its iterative, or discontinuous form.

On the other hand, the author is careful to differentiate between melodic variations in traditional music, and in a “more general” music. The first consists of sound “figures” made of *musical notes* which can be identified as such: the second are sound objects which are “fused together, distinct or otherwise, blending into one another” (571), and which cannot be so easily described.

In order to illustrate the types of melodic variations, the author places *three horizontal criteria*, relating to the *facture* of the variation, in a grid with *three vertical criteria* relating to its *density* and *speed*, which, if we consider two distinct examples for each combination (traditional music, generalized music), gives us 18 objects.

The three criteria of facture distinguish variation by “*fluctuation*” (slight instability), by “*development*” (progressive and continuous), or by “*modulation*” (in stages, leaps “*sketching out a scalar structure*”). (568)

The three speed-density criteria are called: *progresses*, when the speed is slow and the density of variation weak; *profiles*, when both are moderate; *anamorphoses*, when the variation is rapid and marked. This gives us the following diagram:

<i>Forms of variation:</i>	<i>Progress</i>		<i>Profile</i>		<i>Anamorphosis</i>	
Speed of variation:	slow		moderate		rapid	
<i>Facture of variation:</i>	1	2	3	4	5	6
a) Fluctuation	\bar{N}	\bar{X}	N	X	N'	X'
b) Development	\bar{Y}	T	Y	W	Y'	W'
c) Modulation	\bar{G}	P	G	M	G'	K

(The materials of traditional music are situated where the lines a) and c) and columns 1, 3, 5, cross over. The other configurations are for the most general music.)

[164] b) *Classes of melodic profile.*

We shall limit ourselves here to “Y” sounds, i.e. varying continuous sounds (e.g. glissando or vocal melody) in order to distinguish 4 bass figures taken from the medieval system of neumes: podatus, clivis, torculus, porrectus.

c) *Genres of melodic profile.*

Here we shall also limit ourselves to mentioning some characteristic types of long drawn out melodic sounds, which can be found in non-occidental musics, hence these few succinct references in the TARSOM: “melodic pizz., dragging, etc.”.

d) *Species of melodic variation* (TARSOM, boxes 44 to 49)

Here the author suggests that variation should be “*signposted*” by a system of elementary notation enabling the “history” of the variation in the perceptual field to be more or less recounted, and this system consists in comparing the “module” of variation (the absolute value of its width) with its speed of variation. Each is assessed using a calibration with three degrees (*weak, medium or strong* melodic width; *slow, moderate or quick* variation in speed), “*the interplay of these numbers will then enable us to schematize melodic profile, which can occupy all or only part of the duration of the sound*”. (575)

This signposting, fairly simple in principle, figures in the TARSOM in a form which makes it appear relatively complicated:

- on the one hand, because the columns for the pitch-field are linked by arrows to the columns for the duration-field, and it must then be noted that these arrows *cross* the columns for intensity without their being directly concerned);

- on the other hand, the column for the duration-module has the enigmatic words: “partial or total”, doubtless meaning that the melodic variation (or the melodic profile) may only affect one part of the sound object (its beginning, its continuant, or its termination) or the whole of its history.

The summary of the species of MASS PROFILE obeys the same principles.

MELODIC PROFILE: 565, 569, 570-572, 573-574, 575, 576, 578, 583, 586-587 (TARSOM), 588-590.

» 100. MASS PROFILE

1) A morphological criterion describing an *internal* variation of the sound mass which is, as it were, “sculpted” in the course of its development, by modifications which cause it to become thicker, thinner etc. E.g. a tonic sound developing into a thick sound of complex mass. By contrast, melodic profile is the overall trajectory of the sound mass moving in the tessitura.

It is naturally difficult to come across such a criterion in its pure state, as it occurs most often in “natural” sounds closely associated with developments in dynamic (dynamic profile) and harmonic timbre (*harmonic profile*) from which it is difficult to dissociate it; however, we do come across very pronounced and even very pure mass profiles in some electroacoustic musics (where they are produced by filtering), and even in some orchestral musics, where they are obtained by progressive changes in instrumentation.

Like all variation phenomena, mass profile therefore occurs most often in close association with a certain number of other variations.

[165] The ideal would be to study it in “deponent” sounds which have neither variations of intensity nor melodic variations (i.e. without melodic profile).

2) In a secondary sense, the expression *mass profile* refers to something quite different: all the intensities (perceived) simultaneously, and not successively, of the various components of the spectrum of a sound (542). We then have a sort of instantaneous, vertical profile.

a) *Mass profile and harmonic profile.*

“How is mass profile distinct from certain variations in harmonic timbre? Neither more nor less than mass itself form harmonic timbre.” (575)

Telling one from the other is a question of ear-training, but also of the listening intention.

P.S. nevertheless reminds us that, particularly in listening to traditional orchestral musics, we are practised in hearing certain variations in harmonic timbre (linked to changes in instrumentation), but not in perceiving the variations in mass caused by these instrumental changes (thickenings, narrowings, etc.) However, “*the borderline is vague*”.

b) *Music Theory of mass profile.*

α) *Types of mass profile.*

We shall limit ourselves to making a short list of typical developments from one type of mass to another, in accordance with the 3 models of variation facture, fluctuation, (progressive) development, and (scalar) modulation. This gives the following 6 examples, since each variation can occur in either direction:

- *fluctuation*: N/X or X/N;

- *development*: Y/W or W/Y;

- *modulation*: G/W or W/G.

β) *Classes of mass profile.*

Returning to the principle of neumatic notation (see *melodic profile*) we can distinguish four types of development in thickness:

- *dilatation*;

- *delta* (i.e. dilation followed by thinning);

- *thinning*;
- *hollow* (i.e. thinning followed by dilation).

γ) *Genres of mass profile*.

Here, a brief allusion to the ambiguity of some perceptions of mass profile, which can just as well be heard as variation in harmonic timbre.

δ) *Species of mass profile*.

The same signposting system is used as for melodic profile, with the reservation that “widths” of mass profile “*are generally much vaguer than widths of melodic profile*”. (588)

MASS PROFILE, meaning 1 (morphological criterion): 541, 569-570, 575-576, 578, 583, 586-587 (TARSOM), 588-590; meaning 2 (dynamic mass profile): 542-543, 544.

Epilogue: and then?

More than ten years after the publication of the *Traité des Objets Musicaux*, the author, in his third edition, added a postscript entitled *In search of music itself*, in which he spelt out the basic misunderstanding which greeted this work: people presumed to reproach him for not being what he had never claimed to be!

“The main fault of this work is indeed that it remains the only one. More than six hundred pages on objects weigh down one side of the scales. To balance them out the author also ought to have produced a Traité des Organisations Musicales of equivalent weight.

Would those who censure me be so good as to excuse me: I had neither the time nor the genius to embark on such a work, in a field where, furthermore, everything has yet to be done.

The Traité des Objets Musicaux can, therefore, be interpreted in two ways: positively, as a bridgehead, from the point of view of materials and the faculties of hearing. Negatively, as having missed the point, since it seems to ignore the other bank, of combinations which give meaning to collections of objects. Between these two banks, a deep river: referential structures, that term vague or precise according to usage and users, describing the intermediate configurations by means of which the river can be crossed.” (663)

So what is to be done? Lots of things. Especially if the assertion has been made that music is not of one type: *“We maintain that there are musics, and that there are not solely differences of genres (such as lyrical or symphonic), but doubtless differences of nature. For the arts which involve the ear, there could be as great a variety as in the arts which use space.” (679-680)*

It seems that the originality of this hypothesis was misperceived, misunderstood: what a revolution, what a change of perspective if we accept it! None of the problems which people present at the moment is beyond the consequences of such an idea. On that basis, if we allow that there are *several* musics, we can look afresh at contemporary works, and wonder what they *really* communicate, no longer taking for granted that we can perceive the composer’s intentions as a matter of course.

Thus, the research in the *Traité*, begun with objects, can be continued with works: “Where these are concerned, we shall put the researcher back into the initial situation recommended by the *Traité* for isolated sounds. We shall suppose he has the same, perhaps excessive ambition: to consider the general notion of (musical) works just as he considered (sound) objects. As a consequence he will [167] have to renounce almost all traditional approaches, or at least avoid inappropriately applying his particular cultural references to the whole field. The project would certainly be insane if it did not rest on the possibility of experimental outcomes similar to those which guided previous research.” (681-682)

To composers themselves, and not only researchers, we suggest exercises to develop the art of *better listening*. Better listening to what they compose or what others compose.

Furthermore, music will no longer be based on preconceived notions: “If we only make the music that we can conceive of, we perpetuate banality. If we challenge the absurd, we encounter refusals, and it is very fortunate for us. Because, our own needs are revealed by our successes and sometimes chance comes to our aid. What is ‘inherent to man’, can be disclosed to us by music: let us only learn to be guided by our divinations, rather than our deliberations.” (700)

Is not music indeed *another way of knowing*? “In contrast to science which ensures the mastery of nature, it can in a complementary sense, shed light on us ourselves. But the way of knowing which it offers is not the same as anthropology, does not respond to a purely – and coldly – intellectual curiosity. What interests us in fact, is less to explain our own mechanisms than to activate them, in a word to live and no longer be alone in the world.” (700)

All the author can do is refer man back to the question of music: if, to repeat the final words of the *Traité*, music is: “*man disclosed to man, in the language of things*” (662), it is up to man to work out the consequences, and to stop the reassuring pretence that the essence of music is “objective”. It is himself that he engages in the “battle” which the musical act is, his flesh and his being. By referring the musicianly man back to his ear and his perceptual structures, that author of the *Traité* challenges the whole question of conventional music. Whether or not we follow him in his opinions, his denunciation of current music, we must recognize that the questions he asks are not negligible. It is not necessary to be a “disciple” to acknowledge this. We simply hope to have given to these major questions – even if we don’t share in all of them – an increased chance of getting through to those who should be concerned: musicians, all people concerned with music, who usually get nothing from contemporary music but a formal discourse steeped in progressivist optimism.

May this discourse, all pervading, mechanical, leave a little space for a true speech-act, may certain words recapture a little of their meaning – at last.

THE SOUND OBJECT IN FIVE DIAGRAMS

Note: of the many diagrams in the *Traité des Objets Musicaux*, we have chosen five which contain almost all his fundamental concepts and which, above all, show the interrelationships created by these concepts:

- the *Four Listening Modes* diagram, because with its four sectors, numbered clockwise, it is fundamental to many of the diagrams throughout the work (including the *Programme of Musical Research*);

- the *Final Summary of Listening Intentions* (called BIFINTEC), because it explains the fundamental concepts of Reduced Listening and the Sound Object;

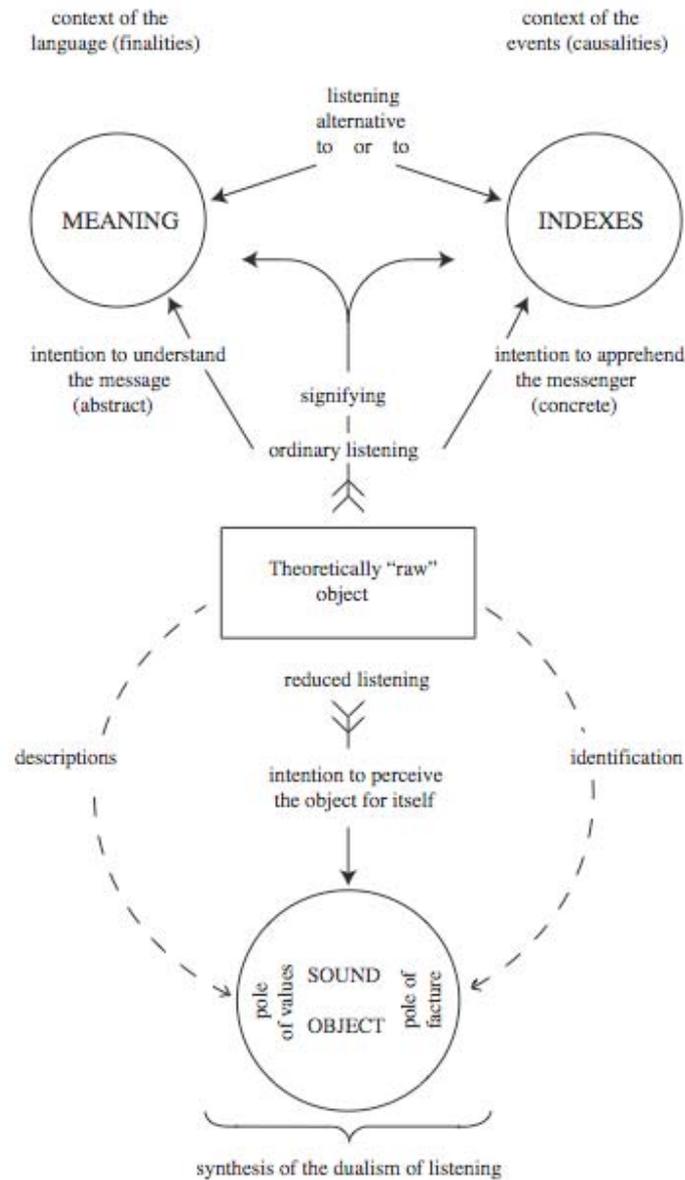
- the *Programme of Musical Research*, because it summarises the whole intended programme of research. The quite complex principles of the PROGEMU are explained in the article 'Music Theory' (38);

- the two *summary diagrams* for *Typology* (TARTYP) and for *Music Theory* as a whole (TARSOM), because, as their name indicates, they recapitulate what the Theory has achieved;

In this Guide, these diagrams are frequently referred to by their acronyms which are our own invention, intended only to make it easier to use them.

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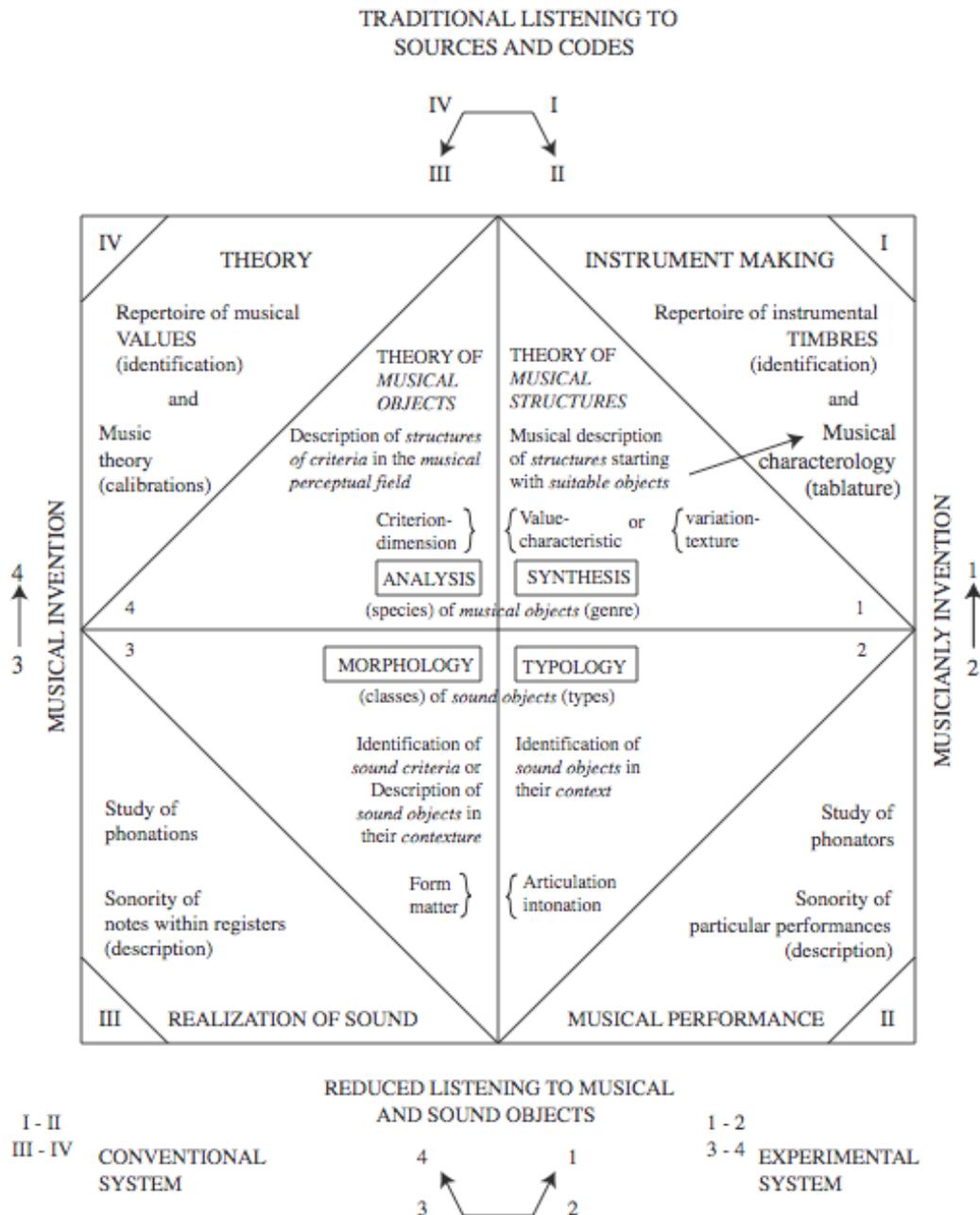
2. Final summary table of listening intentions (BIFINTEC, fig. 2, p. 154)



For this diagram, see **REDUCED LISTENING (11)**, **SOUND OBJECT (12)**, as well as **INTENTION (9)**, and **IDENTIFICATION/DESCRIPTION (23)**, **VALUE/CHARACTERISTIC (28)**, **FACTURE (62)**, **ABSTRACT/CONCRETE (15)**.

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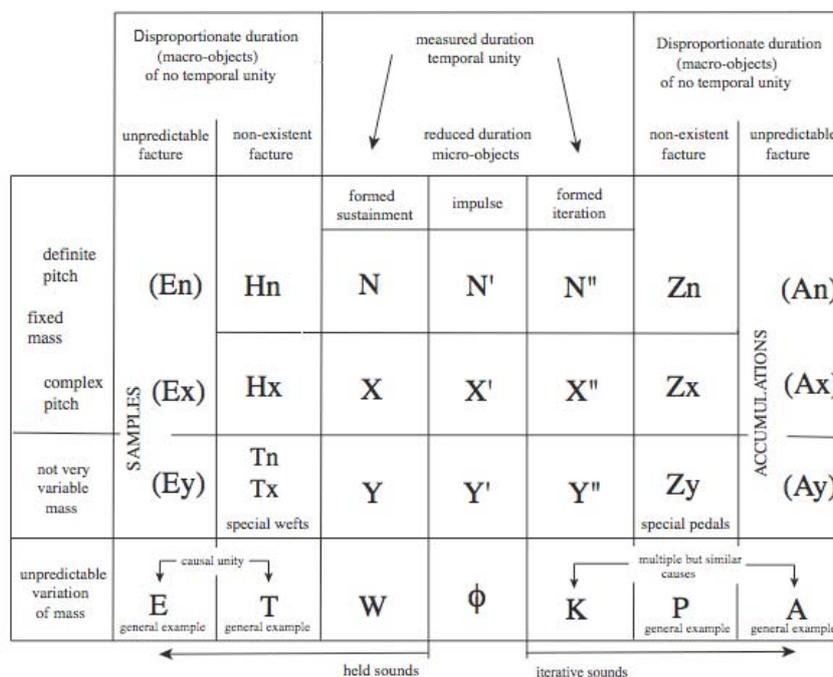
3. Programme of Musical Research (PROGREMU, fig. 24, p. 369)



To understand this diagram, see **MUSIC THEORY (38)** and **FOUR LISTENING MODES (6)**. See also **TPOLOGY (41)**, **MORPHOLOGY (43)**, **CHARACTEROLOGY (46)**, **ANALYSIS/SYNTHESIS (48)**. ... and also at **TYPE (42)**, **CLASS (44)**, **GENRE (47)**, **SPECIES (49)**, as well as **ARTICULATION/STRESS (59)**, **FORM/MATTER (60)**, **CRITERION/DIMENSION (50)**, **VALUE/CHARACTERISTIC (28)**, **VARIATION/TEXTURE (28)**, and at **MUSICALITY/SONORITY (27)**, **IDENTIFICATION/DESCRIPTION (23)**, **MUSICAL/MUSICIANLY (16)**, **OBJECT/STRUCTURE (22)**, **CONTEXT/CONTEXTURE (24)**

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4. Summary diagram of Typology (TARTYP, fig. 34, p. 459)



For the central boxes (N, N', N'', X, X', X'', Y, Y', Y'') see **BALANCED SOUNDS (71)**.

For intermediary boxes (Hn, Hx, Tx-Tn, Zn, Zx, Zy) see **REDUNDANT SOUNDS (73)** and **HOMOGENEOUS SOUNDS (74)**.

For boxes at the periphery, see **EXCENTRIC SOUNDS (76)**, and also, for special cases:

E (SAMPLE): 82;

T (WEFT): 78;

W (LARGE NOTE): 80;

Φ (FRAGMENT): 80;

K (CELL): 79;

P (OSTINATO): 81;

A (ACCUMULATION): 83;

For the classification principle, see **MASS/FACTURE (68)**, **DURATION/VARIATION (69)** and **BALANCE/ORIGINALITY (70)**.

Also see **ITERATIVE (64)** and **IMPULSE (63)**.

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5. *Summary diagram of the Theory of Musical Objects* (TARSOM, fig. 41, p. 584-587)

This diagram shows the 7 morphological criteria (see: **MORPHOLOGICAL CRITERIA, 88**) in horizontal rows from 1 to 7, and in vertical columns (numbered 1 to 9) various distinctions arising from the various stages of the programme for musical research.

Reference should therefore be made, on the one hand:

- for criteria, to the sections **MASS (89)**, **DYNAMIC (96)**, **HARMONIC TIMBRE (93)**, **MELODIC PROFILE (99)**, **MASS PROFILE (100)**, **GRAIN (95)**, **ALLURE (98)**;

- and on the other hand, for the description and evaluation to which they give rise, to the sections **TYPE (42)**, **CLASS (44)**, **GENRE (47)**, and **SPECIES (49)**, and also **SITE/CALIBRE (51)**, and to **WIDTH (52)**, **WEIGHT (53)**, **RELIEF (54)**, **IMPACT (55)**, **MODULE (56)**.

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		1	2	3
	Description (2-3) Evaluation (4-9) of CRITERIA of musical perception	TYPES typo-morphological recapitulation	CLASSES musical morphology	GENRES musical characterology
1	MASS	TONIC type N COMPLEX X VARIABLE Y OTHERS W, K, T	1. PURE SOUND 2. TONIC 3. TOMIC GROUP 4. CHANNELLED 5. NODAL GROUP 6. NODE 7. WHITE NOISE	characteristic TEXTURES of mass
2	DYNAMIC	homogeneous H nil: iteratif Z weak: web N, X, T formed: note N, X, N', X' impulse N', X' cyclic Zk reiterated E accumulated A	SHOCKS  Anamorph: RESONANCE  profiles cresc.  decrease.  delta  hollow  mordant  Lifeless: flat 	ATTACKS (dynam. timbre) 1. abrupt  2. solid  3. soft  4. flat  pseudo 5. gentle  mordant 6. stressed  7. nil 
3	HARMONIC TIMBRE	either: GLOBAL TIMBRE or: secondary masses M1 M2 M3 ... timbre of masses th1 th2 th3 ...	(conneced to masses) NIL 1-7 TONIC 2 COMPLEX 6 CONTINUOUS 3-4 CHANNELLED 4-5	CHARACTERISTIC OF THE SOUND BODY hollow-full round-pointed bright-matt] etc.

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4	5	6	7	8	9
SPECIES (site and calibre of the dimensions of the musical field)					
<i>PITCH</i>		<i>INTENSITY</i>		<i>DURATION</i> of the variations of emergence	
SITE TESSITURA	CALIBRE WIDTH	SITE WEIGHT	CALIBRE RELIEF	IMPACT	MODULE
7 oct. x 12 = 84 deg. HARMONIC COLOUR REGISTERS ex. low -1 very low 0 low 1 med. low 2 diapason 3 med. h. 4 high 5 very high 6 ex. high 7	HARMONIC INTERVAL COLOUR THICKNESS	WEIGHT OF A HOMO-GENEUS MASS 1 ppp 2 pp 3 p 4 mf 5 f 6 ff 7 fff	PROFILE of the texture of mass	(threshold of recognition of the masses for short sounds)	
		WEIGHT OF A PROFILED MASS according to its module 1 ppp 2 pp 3 p 4 mf 5 f 6 ff 7 fff	MODULE OF THE PROFILE weak medium strong	VARIATION OF THE PROFILE slow modernic lively 1 2 3 4 5 6 7 8 9	SHORT SOUNDS MEASURED SOUNDS LONG SOUNDS
COLOUR	FULLNESS narrow ample		RICHNESS dens.? vol.?		variation: of fullness, of colour, of richness no. 1 to 9
dark	1	2	1	2	(threshold of recognition of the timbres for short sounds)
light	3	4	3	4	

		1	2	3																
	<p>Description (2-3) Evaluation (4-9) of</p> <p>CRITERIA of musical perception</p>	<p>TYPES</p> <p>typo-morphological recapitulation</p>	<p>CLASSES</p> <p>musical morphology</p>	<p>GENRES</p> <p>musical characterology</p>																
4	<p>VARIATIONS</p> <p>MELODIC PROFILE</p>	<table border="1"> <tr> <td></td> <td>Progress</td> <td>Profile</td> <td>Anam.</td> </tr> <tr> <td>Fluc.</td> <td>N, X</td> <td>N, X</td> <td>N', X'</td> </tr> <tr> <td>Dev.</td> <td>Y, T</td> <td>Y, W</td> <td>Y'</td> </tr> <tr> <td>Mod.</td> <td>G, P</td> <td>G, M</td> <td>K</td> </tr> </table>		Progress	Profile	Anam.	Fluc.	N, X	N, X	N', X'	Dev.	Y, T	Y, W	Y'	Mod.	G, P	G, M	K	<p>(Only Y notes)</p> <p>podatus </p> <p>torculus </p> <p>clivis </p> <p>porrectus </p>	<p>characteristic of the profile: pizz, melodic, dragging, etc.</p>
		Progress	Profile	Anam.																
Fluc.	N, X	N, X	N', X'																	
Dev.	Y, T	Y, W	Y'																	
Mod.	G, P	G, M	K																	
5	<p>MASS PROFILE</p>	<p>Typological development</p> <p>Fluc. N/X or X/N Dev. Y/W or W/Y Mod. G/W or W/G</p>	<p>(Only thickness)</p> <p>swelled </p> <p>delta </p> <p>thinned </p> <p>hollow </p>	<p>Characteristic development of mass, of harm. timbre</p>																
6	<p>SUSTAINMENT</p> <p>GRAIN</p>	<p>Pure or mixed of</p> <p>resonance friction iteration</p>	<table border="1"> <tr> <td>Quiv.</td> <td>Shim.</td> <td>Limpid</td> </tr> <tr> <td>rough</td> <td>mat</td> <td>smooth</td> </tr> <tr> <td>coarse</td> <td>net</td> <td>fine</td> </tr> </table>	Quiv.	Shim.	Limpid	rough	mat	smooth	coarse	net	fine	<p>harmonic compact-harmonic compact compact-discontinuous discontinuous discontinuous-harmonic</p>							
Quiv.			Shim.	Limpid																
rough	mat	smooth																		
coarse	net	fine																		
7	<p>ALLURE</p>	<p>Pure or mixed</p> <p>mechanical living natural</p>	<table border="1"> <tr> <td>order</td> <td>fluct.</td> <td>disord.</td> </tr> <tr> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>7</td> <td>8</td> <td>9</td> </tr> </table>	order	fluct.	disord.	1	2	3	4	5	6	7	8	9	<p>regular cyclic vibrato progressive irregular abrupt decay, muffled incident</p>				
order	fluct.	disord.																		
1	2	3																		
4	5	6																		
7	8	9																		

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4	5	6	7	8	9	
SPECIES (site and calibre of the dimensions of the musical field)						
<i>PITCH</i>		<i>INTENSITY</i>		<i>DURATION</i> of the variations of emergence		
SITE TESSITURA	CALIBRE WIDTH	SITE WEIGHT	CALIBRE RELIEF	IMPACT	MODULE	
or site of the profile (see mass)	melodic width. } weak medium strong	linking of the melodic profile		slow mod. lively		
		→		1	2	3
		→		4	5	6
		to the dynamic profile		7	8	9
				Partial see col. 3 } onset cont. term.		
or total						
incidence on the tessitura or colour (mass and harmonic timbre)	width of interval or thickness } weak medium strong	linking of the profile of mass		slow mod. lively		
		→		1	2	3
		→		4	5	6
		to the dynamic profile		7	8	9
				Partial see col. 3 } onset cont. term.		
or total						
GRAIN APPRECIATED THROUGH MASS OR TIMBRE		Relative weight	Dynamic texture	variation of grain fullness/speed		
colour of the grain	thickness of the grain	GRAIN-MASS LINKED		no. 1 to 9		
		of the grain } weak medium strong				
		tight med. slack				
				1	2	3
				4	5	6
				7	8	9
GRAIN APPRECIATED THROUGH MASS OR TIMBRE		Relative weight	Dynamic texture	variation of allure fullness/speed		
pitch width of allure	pitch width of allure } weak medium strong	GRAIN-MASS LINKED		no. 1 to 9		
		of the grain } weak medium strong				
		tight med. slack				
				1	2	3
				4	5	6
				7	8	9
GRAIN APPRECIATED THROUGH MASS OR TIMBRE		Relative weight	Dynamic texture	variation of allure fullness/speed		
pitch width of allure	pitch width of allure } weak medium strong	GRAIN-MASS LINKED		no. 1 to 9		
		of the grain } weak medium strong				
		tight med. slack				
				1	2	3
				4	5	6
				7	8	9
GRAIN APPRECIATED THROUGH MASS OR TIMBRE		Relative weight	Dynamic texture	variation of allure fullness/speed		
pitch width of allure	pitch width of allure } weak medium strong	GRAIN-MASS LINKED		no. 1 to 9		
		of the grain } weak medium strong				
		tight med. slack				
				1	2	3
				4	5	6
				7	8	9
GRAIN APPRECIATED THROUGH MASS OR TIMBRE		Relative weight	Dynamic texture	variation of allure fullness/speed		
pitch width of allure	pitch width of allure } weak medium strong	GRAIN-MASS LINKED		no. 1 to 9		
		of the grain } weak medium strong				
		tight med. slack				
				1	2	3
				4	5	6
				7	8	9
GRAIN APPRECIATED THROUGH MASS OR TIMBRE		Relative weight	Dynamic texture	variation of allure fullness/speed		
pitch width of allure	pitch width of allure } weak medium strong	GRAIN-MASS LINKED		no. 1 to 9		
		of the grain } weak medium strong				
		tight med. slack				
				1	2	3
				4	5	6
				7	8	9
GRAIN APPRECIATED THROUGH MASS OR TIMBRE		Relative weight	Dynamic texture	variation of allure fullness/speed		
pitch width of allure	pitch width of allure } weak medium strong	GRAIN-MASS LINKED		no. 1 to 9		
		of the grain } weak medium strong				
		tight med. slack				
				1	2	3
				4	5	6
				7	8	9

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- n.b. the articles of the "Lexique du T.O.M." published in the *Bulletins-Programmes* in a limited publication of the G.R.M. (18 issues between 1973 and 1975) should be considered as sketches for the present guide.

Note that the *Traité des Objets Musicaux* is published by Seuil (last edition in 1977) and that it is supplemented by the *Solfège de l'Objet Sonore*, with sound examples plus commentaries, re-published on cassette by I.N.A./G.R.M.

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