

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*.

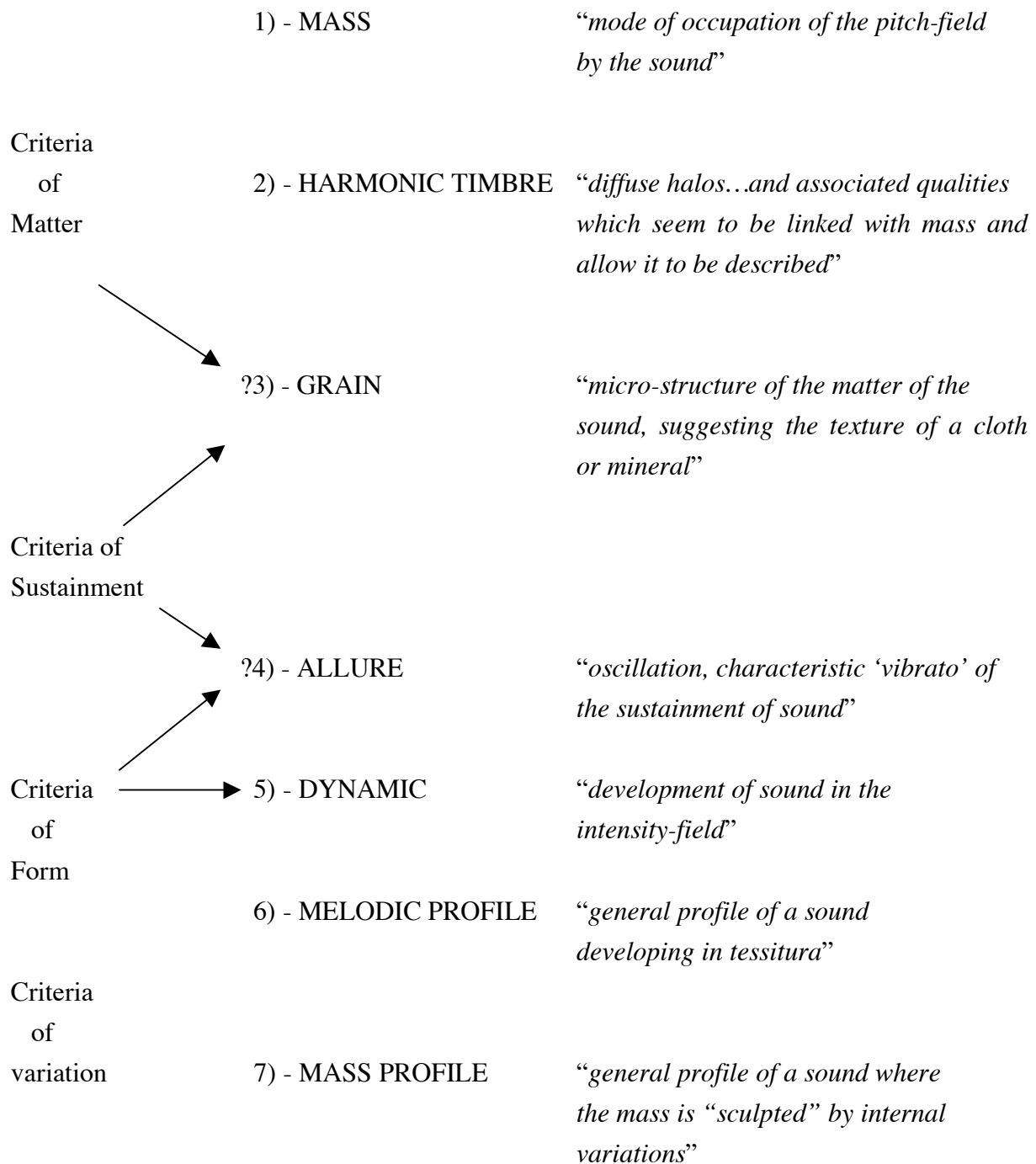
2) By contrast, the *incident* is a parasitic disturbance “*due to some technical fault, which adds itself on and is neither desired nor heard as a property of the sound*” (465). For example: sticking, a technical “click”, distortion, crackling of a record etc.

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*, *channeled 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.*

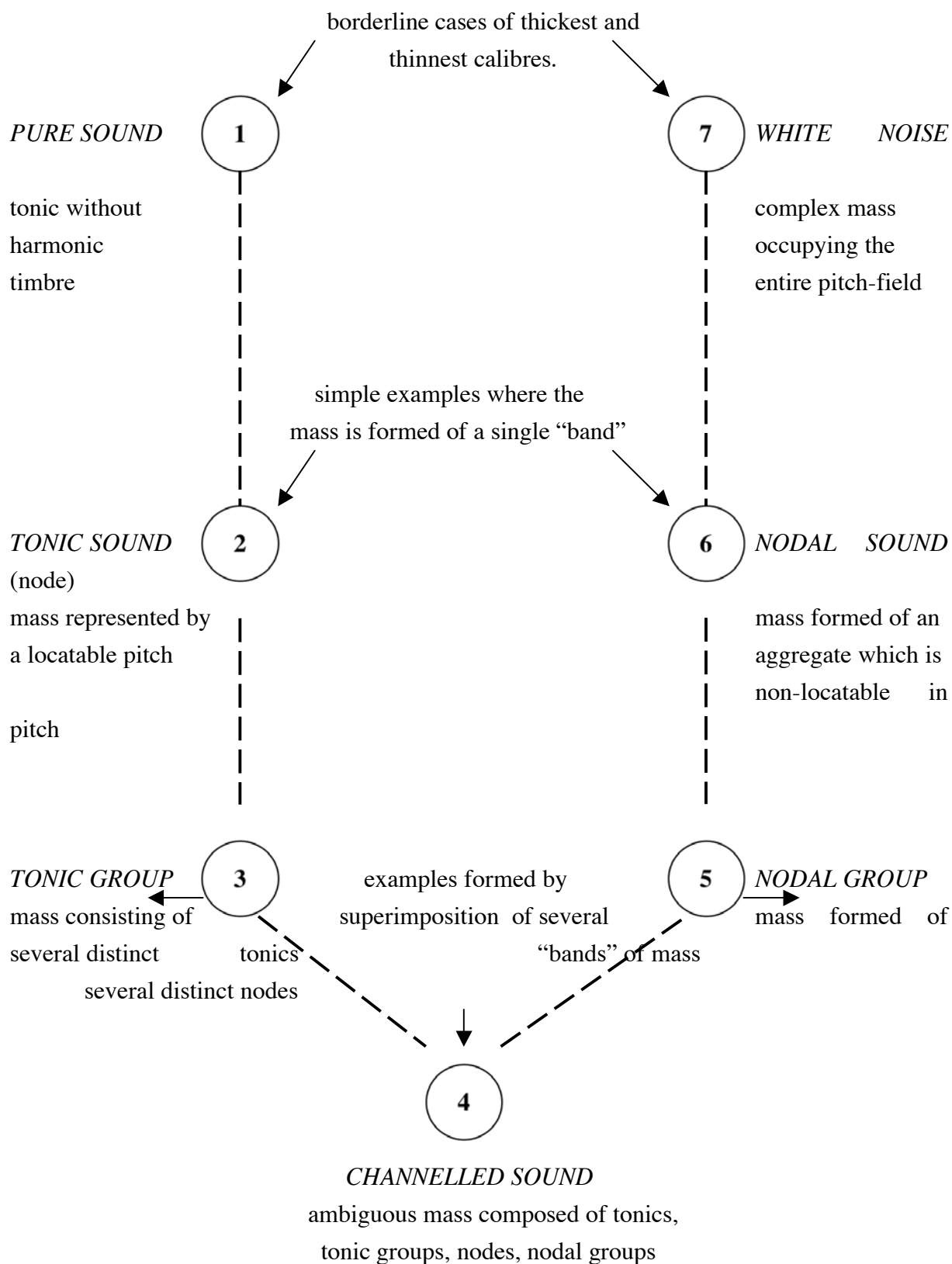
The author simply indicates that there are “*characteristic textures of mass*”, i.e. characteristic ways for the sound-mass to be “organized” into more or less broad or compact zones, with a certain distribution of thick zones [147] and thin or tonic zones. For example, “*the texture which characterizes 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:

Forms of variation: Speed of variation:	Progress		Profile		Anamorphosis	
	slow		moderate		rapid	
Facture of variation:	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.